Ever Closer Union or Babylonian Discord?
The Official-language Problem in the European Union

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Abstract

Extensive multilingualism is one of the most important and fundamental principles of the European Union. However, a large number of official languages (currently 23) hinders communication and imposes substantial financial and legal costs. We address the merits of multilingualism and formulate an analytical framework to determine the optimal number of official languages in the EU. Using the results of a 2005 Eurobarometer survey of languages in the EU 27, we first derive the sets of languages that minimize aggregate linguistic disenfranchisement of the Union's citizens for any given number of languages. We then proceed by discussing the political-economy framework and feasibility of a potential linguistic reform in the EU under alternative voting rules. We argue that a six-language regime would be a reasonable intermediate choice: a lower number of official languages results in excessive linguistic disenfranchisement whereas adding further languages increases the costs but brings only limited benefits. We also show that even though a linguistic reform reducing the number of official languages to six is unlikely to gain sufficient support at the present, this may change in the future since young people are more proficient at speaking foreign languages.

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> "- I don't speak English. Kurdish I speak, and Turkish, and gypsy language. But I don't speak barbarian languages.
>   - Barbarian languages?
>   - English! German! Ya! French! All the barbarian."
> Yasar Kemal, quoted by P. Theroux, *The Great Railway Bazaar*.

1 Introduction

Public policies concerning linguistic diversity in various countries and international organizations increasingly appear at the forefront of public debate. Linguistic issues and, in particular, the treatment of minority languages are almost unparalleled in terms of their patriotic and emotional appeal. As was pointed out by Bretton (1976, p. 447), "language may be the most explosive issue universally and over time. This is mainly because language alone, unlike all other concerns associated with nationalism and ethnocentrism … is so closely tied to the individual self. Fear of being deprived of communicating skills seems to raise political passion to a fever pitch."

The prevalence of multi-lingual societies and their challenges are well-documented over the course of the human history. A well known example is the Rosetta Stone[1], a religious stone-set decree issued in Ptolemaic Egypt in 196 BC and inscribed with three scripts (Hieroglyphic, Demotic Egyptian and Greek), each of which addressed a different group: government officials, local population and priests. Multilingual societies are, however, by no means a thing of the past. The latest version of the Ethnologue database[2] lists 6,912 distinct languages spoken all over the world. Since there are only 271 nations, dependencies and other entities, a large number of countries, if not most, should be therefore multi-ethnic and multilingual. Even though many of these nearly seven thousand languages are spoken in small and often remote and isolated communities, ethnic heterogeneity is not exclusively a third-world phenomenon. In Western Europe, for example, despite a long tradition of the nation-state, most countries are multilingual, and there is a plethora of indigenous regional languages such as Welsh in the UK, Catalan and Basque in Spain, Provençal and Breton in France or Frisian in the Netherlands.

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[1] The Rosetta Stone is at display at the British Museum in London. See http://www.thebritishmuseum.ac.uk/compass/ixbin/goto?id=OBJ67.
[2] http://www.ethnologue.com/.

The policy of official multilingualism in the EU represents a crucial link between the EU institutions and its citizens. The Treaty of Rome and Regulation 1/1958 stipulates that all EU languages are to be treated on an equal basis with respect to publication of official EU documents and that EU citizens have the right to communicate with EU institutions in an EU language of their choice (see also Schaerer, 2002). However, with the growing number of member countries and official languages, multilingualism increasingly enters the political debate in the EU. A notable example of this is the opening speech to the European Parliament by Queen Beatrix of the Netherlands who said: "I am addressing you today in Dutch. At the same time, I am convinced that cooperation in Europe will increasingly demand concessions of us in this field. Unless we want to turn the European Union into a Tower of Babel, we shall have to make every effort to understand each other as clearly as possible."[3] Although, as pointed out by Laponce (1992, pp 599-600) "like religion, language does not lend itself easily to compromise," a functional multilingual society requires willingness on behalf of the participating linguistic groups to make compromises and to accept some sort of *linguistic standardization*. Indeed, the need for linguistic standardization is recognized by a majority of the citizens of the European Union: in a recent EU-wide survey carried out in all its 27 member countries, 54 percent of the population "tend to agree" that the European institutions should adopt one single language to communicate with European citizens and 69 percent "tend to agree" that everyone in the EU should be able to speak a common language.[4]

The main objective of this paper is to discuss the challenge of linguistic standardization faced by the EU as well as the possible remedies and their political and economic impact. Linguistic standardization entails an important trade-off between the benefits and cost. On the one hand, standardization can deliver important benefits in terms of improved communication, increased trade, enhanced economic performance and administrative efficiency. On the other hand, language standardization restricts the linguistic rights of some groups, which, in line with Ginsburgh and Weber (2005), we refer to as linguistic disenfranchisement. The effects of not including some languages in

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[3] Address by Her Majesty the Queen of the Netherlands to the European Parliament in Strasbourg, 26 October 2004. See http://www.koninklijkhuis.nl/content.jsp?objectid=4096 for the original (Dutch) version and http://www.koninklijkhuis.nl/content.jsp?objectid=4099 for the English translation of the speech.
[4] See Special Eurobarometer 255 (2006), question 11.

the set of the official ones[5] go beyond restricting access to information. Citizens prevented from communicating in the language of their choice may be unwilling or unable to fully participate in the political process. Furthermore, given that EU law takes precedence over national legislation, the citizens' ability to receive information and to communicate in their own language has profound and direct implications for the economic and social fabric of the society and individual well-being. In an extreme case, linguistic disenfranchisement may even threaten the long-term of survival of some languages.

To address the potential impact of linguistic standardization in the EU, we assess the relative importance of European languages by examining disenfranchisement as reflected in linguistic proficiency (or lack of thereof) of EU citizens. Our analysis is based on a unique and comprehensive survey data set on languages and their use. This Eurobarometer survey[6] was commissioned by the Directorate General for Education and Culture of the European Commission and it is the first such survey to cover and ask identical question in all current member and candidate countries of the EU. The data were collected in November-December 2005. The respondents were queried about their mother tongue and other languages that they speak "well enough to have a conversation", allowing them to list up to three languages. The respondents were asked also to assess the quality of their linguistic skills. Since the surveys are nationally representative, we can use them to estimate the number of people speaking the various languages across the EU.

We focus on disenfranchisement that would result if the set of EU official languages were limited to a particular single language or a combination of languages. Specifically, we formulate a procedure for selecting subsets of official languages from among all *eligible* languages so as to minimize the disenfranchisement rate. We implement this procedure for different numbers of official languages so that the "optimal" sets satisfy the *sequencing principle:* the optimal pair contains the single optimal language, the optimal triple contains the optimal pair, and so on. We further augment our analysis by using the notion of distance between languages. Both sequencing and linguistic proximity are important: some languages are more widely

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[5] See Appendix 1 for the difference between the terms "official", "working" and "procedural" language, and the rules followed by the various bodies of the EU.
[6] Special Eurobarometer 255 (2006).

spoken outside of their countries than others and some pairs or groups of languages are relatively similar while others are very different. We then test which of these subsets would be supported by the Council of the EU under the application of the qualified majority voting (QMV) as stipulated by the Nice Treaty. We show that the number of official languages would have to be relatively large: depending on the extent of linguistic disenfranchisement deemed as tolerable, between three and eleven official languages would be required in order to meet all three QMV criteria. A possible recommendation would be to compensate those countries whose languages are not chosen, as suggested by Fidrmuc and Ginsburgh (2006). This would allow them either to implement their own preferred translation and interpretation regimes (possibly on a different scale than the current EU regime) or to forego linguistic services altogether and instead divert the compensation transfers to alternative uses.

The paper is organized as follows. In Section 2 we present a broad view of language use and linguistic policies in the European Union while in Section 3 we analyze multilingualism and disenfranchisement in the EU and formulate criteria for finding possible subsets of official languages. Section 4 uses the provisions of the Nice Treaty, of the European Constitution and of the Penrose Law to analyze which type of linguistic reform could pass under the application Qualified Majority Voting (though, at present, linguistic regime requires unanimity). Section 5 is devoted to concluding remarks.

2   Multilingualism and Linguistic Standardization

The challenges encountered by multilingual societies include issues such as linguistic standardization, promotion or suppression of languages, political and economic impact of such policies and their fairness.[7] Linguistic standardization may be necessary to prevent communication from becoming excessively costly, complicated or outright impossible. A public policy entailing concessions and compromises, however, necessarily imposes restrictions on the linguistic rights of some segments of the society. While linguistic standardization may deliver important benefits in terms of increased trade, enhanced economic cooperation and improved communication, it inevitably raises the problem of

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[7] See Van Parijs (2005).

linguistic disenfranchisement (Ginsburgh and Weber, 2005), since it restricts the linguistic rights of some groups within a society.

The EU proudly asserts that its "policy of official multilingualism as a deliberate tool of government is unique in the world. The EU sees the use of its citizens' languages as one of the factors which make it more transparent, more legitimate and more efficient."[8] The potential implications of restricting multilingualism at the EU level would go well beyond the relatively narrow circle of national and EU officials, MEPs, lobbyists and people associated with the various think-tanks, consultancies and law firms dedicated to European integration. EU directives set (minimal) standards for legislation that EU member countries are obliged to implement subsequently into their national legal frameworks within a set time limit. Even more importantly, EU regulations and decisions become effective directly and immediately as soon as they are adopted by the EU (and translated into all official languages). Hence – unlike directives – regulations and decisions do not have to be implemented into the national legal framework and can even overrule national laws. Similarly, rulings issued by the European Court of Justice (ECJ) have immediate legal effect (once they are published in all official languages) and can overrule national laws or earlier decisions of national courts. Therefore, if the EU were to introduce a reduced set of official languages, EU regulations, decisions and ECJ rulings would be legally binding in all member countries even if they are not translated into all member countries' national languages.

Furthermore, changes in linguistic policies at the EU level would have also important intangible implications. Having one's language recognized as an official language of the EU may evoke feelings of national pride and patriotism, boost the country's international recognition, encourage the learning of that language by foreigners and help develop literary and cultural traditions in it. In officially bilingual countries, the fact that a language is being used in communication with EU institutions may encourage its wider use also by national authorities.[9] On the other hand, taking away the official status from a language may discourage the speakers of that language from participating in the political process at the EU level.

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[8] See the EU web portal "Languages and Europe" at http://europa.eu.int/languages/en/home.
[9] Maltese is said to have benefited from this effect. A similar effect may materialize for Irish now that it has been given official status as well.

There is, however, an important difference between the implications on social, economic and political participation and those that relate to national pride and patriotism. A person whose language is not accepted as an official EU language can still get (nearly) all social, economic and political benefits if she speaks one of the official languages or (to a lesser degree) if the list of official languages includes a language that is sufficiently close to her own language. But her sense of national pride would nonetheless be adversely affected. In our analysis, we focus on the former type of effects, for which proficiency in other languages is crucial. Considering the latter type would make our analysis trivial and uninteresting: all that matters is whether one's language is in or out; all other considerations are irrelevant.

Table 1 gives an overview of the official languages spoken in the European Union in its current form (i.e. a union with 27 member countries). The lower part of the table lists some additional languages spoken in Europe: those that have been proposed as contenders for the official-language status (Basque, Catalan and Galician), the languages of the candidate countries (Croatian and Turkish) and those of the main immigrant communities (Russian, Arabic and the languages of the Indian sub-continent). Columns (1)-(2) report the number of native speakers of each language, both in the native country or countries (for instance, German in Austria and Germany, English in the UK and Ireland) and in the EU as a whole (denoted as 'All'). Columns (3)-(4) provide a similar count that includes both native and nonnative speakers of each language, again distinguishing between the native countries of the language and all EU countries. Columns (5)-(6) restrict these numbers to those who are either native speakers or who assess their linguistic skills as being good or very good. Finally, columns (7)-(8) present worldwide numbers as estimated by Crystal (2001).

Insert Table 1

Some general remarks are in order. First, the table clearly shows that cross-boarder mobility is limited in the EU: English, French, German, Hungarian, Polish, Portuguese and Spanish are the only languages with more than half a million native speakers outside

their native countries.[10] Second, as expected, English, French, German and Spanish are the most widely spread languages: the numbers of those who speak them well or very well (column 6) are, respectively, 2.9, 1.6, 1.4 and 1.4 times larger than the numbers of native speakers (columns 2). Some other languages also seem to be well-known. Russian, a non-official and indeed a non EU language is the mother tongue of some 4.2 million EU27 citizens but 22 million EU citizens speak it well or very well (including the 4.2 million native speakers). On this measure, it is the eighth largest language in the EU, after English, (183 million), German (122 million), French (97 million), Italian (65 million), Spanish (54 million), Polish (41 million) and Dutch (24 million) and just ahead of Romanian (22 million).[11] While six or seven languages dominate in the EU, English is clearly a step ahead of the others and, furthermore, "globalization proceeds in English" (De Swaan, 2001, p. 186). This is highlighted by the fact that English is the most widely spoken language in EU and globally: according to Crystal (2001), 1.5 billion people speak English worldwide.

Allowing multiple official languages is costly.[12] The EU15 was spending some EUR 686 million annually[13] on translating and interpreting services. In the wake of enlargement, this cost has risen to 1,045 million.[14] At the outset of the European integration process, meetings involving six countries with four languages were relatively simple and manageable. With each enlargement, the combinations of languages requiring

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[10] In case of Hungarian, this includes large indigenous populations of ethnic Hungarians in Slovakia and Romania.

[11] The accession of Turkey would add 73 million speakers of Turkish, catapulting that language to the fourth position.

[12] The Treaty of Rome and Regulation 1/1958 recognized Dutch, French, German and Italian as official languages. Danish, English, Finnish, Greek, Portuguese, Spanish and Swedish were added at later stages. The latest enlargement in 2004 resulted in the addition of Czech, Estonian, Hungarian, Latvian, Lithuanian, Maltese, Polish, Slovak, Slovene. Irish was given the same status in 2005 but it was agreed that the decision would be implemented only as of January 2007. Bulgarian and Romanian have become official languages of the EU as of that date as well, in the wake of their countries accession to the EU. All these languages enjoy the same privileges as the original four. Without a reform, the list of official EU languages is likely to grow even further as more countries enter the EU: at present, Croatia and Turkey are the only candidates for membership but in the future they may be joined by the other countries of West Balkan. Turkish may become an official EU language not only due to Turkey's accession but also as a result of the re-unification of Cyprus. Furthermore, as has happened for Irish, languages that currently enjoy national or regional official status in their own countries without being used at the EU level can eventually become official EU languages. A number of other languages such as Luxembourgish, Catalan, Basque, Welsh or Russian, may therefore follow suit.

[13] Unofficial estimates are even larger. *Le Monde*, November 30, 1999, put the cost at 1.8 billion euros!

[14] Included in this figure are 807 million for translation of written documents and 238 million for interpretation of oral statements. See European Commission (2005 a,b).

translations grew. At present, with EU membership having grown to 27 and the number of languages to 23, providing translation and interpretation services is not an easy task. In practice, increasing costs have been kept in check by scaling down the scope of services provided. The new DG Translation selects the documents that need translation into all languages and those that do not.[15] EU bodies increasingly use relay translations (that is, translating a text or speech first into one of the procedural languages and then translating the resulting text again into the target language) or two-way translations (into and out of a principal language). The downside is that relay and two-way translations can result in misunderstanding, misrepresentation or outright errors, so that revisions by a mother-tongue speaker of the target language are often necessary (Lönnroth, 2006). The issue of validity of legal documents is also important; national delegations may agree on a text prepared in a single language such as English, even though it is the translated text that is eventually incorporated into national law and becomes legally binding.[16]

Though any change in the EU linguistic policy requires unanimity (Article 217 of the Treaty of Rome), not all languages are equally often used by the various EU bodies. This practice is based on Article 6 of the same Treaty stating that "the institutions of the Community may stipulate in their rules of procedure which of the languages are to be used in specific cases." This allowed each institution to adopt its own internal rules, which typically favor English, French and German as the so-called *procedural* languages.[17] These are used for day-to-day communication within the EU bureaucracy and for preparing drafts of official documents. The vast majority of all EU documents are prepared in English (62 percent in 2004), French (26 percent) and German (3 percent), with the remaining languages accounting for some 9 percent of all inputs. In February 2005, the Commission went even further by suggesting to limit the automatic

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[15] "The highest priority is given to legal acts and similar documents which have major legal or financial implications...[There is a distinction] between core documents, which should in principle be translated in-house, and non-core documents which can be outsourced...[There are] strict guidelines on the maximum length of different types of documents...Finally...two thirds of the documents are written in English...[and] authors now work in a language which is not their own." (Lönnroth, 2006).

[16] The Treaty of Rome established the principle of 'equal authenticity' of treaties and legal documents adopted by the EU, whereby each translated version is considered correct and legally binding (see Athanassiu, 2006). An interesting example relates to the name of the single European currency. The French translation of the Maastricht treaty left it as the *European Currency Unit (ECU)* while the German text indicated it should be called *Europäische Währungseinheit (EWE)*. As a result, the name ECU had to be abandoned and the new round of negotiations lead to the birth of the Euro.

interpretation of its press conferences to English, French and German, which raised immediate protests by Italian and Spanish officials and journalists.

Until the enlargement in May 2004, full multilingualism and simultaneous interpretation were the rule in the European Council, the Economic and Social Committee, and at the plenary sessions of the European Parliament. In preparatory meetings of the Council, a system of interpretation upon request has been implemented recently. While simultaneous interpretation is used in the Parliament, its members were asked to use simple sentences and to avoid jokes. Full multilingualism is also used in contacts between the EU and its citizens and all official documents are translated into all member states' languages. However, ministerial meetings on topical issues and diplomatic meetings are interpreted into the three procedural languages only (Truchot, 2003, p. 102). Of the approximately 4,000 meetings held every year (before the last two enlargements), 75 percent did not require simultaneous translation (Truchot, 2003, p. 102).[18]

Other international organizations tend to be more restrictive with respect to the languages that they endorse. While the official languages at the United Nations since 1973 have been Chinese, English, French, Russian, Spanish, and Arabic, its bureaucracy uses mainly English and French.[19] Speeches given in one of the official languages are translated into the remaining official languages only. Delegates who wish to address the UN Assembly in any other language can do so only if they arrange translation into one of the official languages.[20] English is the language used by the OECD, NATO, IMF, Word Bank and other international organizations. However, those organizations are not necessarily relevant for the EU, since none of them has any ambition of political integration.

Multilingualism also can have important drawbacks. In May 2004, for example, the implementation of new directives on financial regulation and transparency of securities

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[17] The European Court of Justice and the European Central Bank, which use French and English, respectively, as their working languages are the main exceptions to this practice.

[18] See Appendix 1 for a more detailed description of the rules governing the use of languages in the various EU institutions.

[19] In 2001, official representatives were asked in which language (English, French or Spanish) they wanted to receive their emails. Out of the 185 members who replied, 126 chose English (including 14 from French speaking countries), 39 French and 20 Spanish (Calvet, 2002, p. 154).

[20] See http://www.un.org/Depts/DGACM/faq_languages.htm.

information had to be delayed because they were not translated in time.[21] As the EU has expanded in the meantime, the directives had to be translated into nine additional languages, necessitating a delay of six months. In 2003, the EU along with other rich countries agreed to allow developing countries to import cheap generic medication to treat diseases such as HIV, malaria and tuberculosis. The implementation of this decision was delayed by more than a year because of the need to translate it into all 20 official languages.[22] Another compelling case concerns patent applications filed with the European Patent Office (EPO), both in terms of cost and speed.[23] By filing out an application in English, French or German, it is possible to obtain protection in all 31 EPO member countries. However, once the patent is granted by the EPO, it must be validated, translated into each language of the country where the firm wants to be protected, put in force and renewed in each national system. Translation costs alone for the 13 frequently cited countries[24] are estimated at 13,600 euros, while the total filing for 20 years costs 129,000 euros (the same filing costs 16,500 euros in the US and 17,300 euros in Japan). But as Van Pottelsberghe and François (2006) point out "the total cost is not the only issue." They show that both the incoming workload of examiners and their output is three to four times higher in the US than at the EPO. The length of the procedure is 27 months in the US and 49 months in Europe. As a consequence, the number of claims (a patent application is composed of on average 7 claims in Japan, 18 in Europe and 23 in the US) amounts to 1 million in Europe, 3 millions in Japan and 8 millions in the US, though the European market is the largest.

3   Effects of Reducing the Number of Languages

In Section 2, we reviewed the costs and practical challenges posed by the extensive multilingualism embraced by the EU. In this section we turn to potential solutions that could help alleviate or avoid these challenges by reducing the number of official languages. The current status-quo in the EU is that over 90 percent of the written

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[21] See "A Welcome Break," *Wall Street Journal Europe*, May 17, 2004, p. A8).
[22] See "EU Language Barrier Costing Lives," *The Guardian*, 28 July 2004.
[23] The reader is referred to the very comprehensive paper by Van Pottelsberghe and François (2006) from whom we borrow this information.
[24] Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, Switzerland and the UK.

documents are drafted in English, French or German and most of those are subsequently translated into some or all of the remaining languages, including languages that have a small number of speakers, or languages of populations that often would be able to understand a language other than their own. This suggests that the choice of official languages should take into account the number of citizens who speak each language, its use in other countries where it is not a native language as well as its linguistic proximity to other languages.

3.1 Linguistic Disenfranchisement

Linguistic disenfranchisement (Ginsburgh and Weber, 2005), quantifies the number of citizens who would lose their ability to communicate if their language would not belong to the group of official languages. Let Λ be the current set languages spoken in the EU. For any subset T of Λ, disenfranchisement in country j, $d^j(T)$, can be defined as:

$$d^j(T) = n^j - v^j(T) \tag{3.1}$$

where n^j is the population of country j and $v^j(T)$ is the number of country j's citizens who speak *at least one* of the languages in T. When comparing disenfranchisement across countries, it is more convenient to express it in terms of *disenfranchisement rates*:

$$D^j(T) = \frac{n^j - v^j(T)}{n^j} \tag{3.2}$$

If the set T consists of a single language l, the expression above reduces to the evaluation of disenfranchisement rate for an individual language:

$$D^j(l) = \frac{n^j - v^j(l)}{n^j} \tag{3.3}$$

However, when examining disenfranchisement rates, one can also take account of the linguistic proximity between languages and the externalities that this proximity may generate. Clearly, if two languages are close, as for example German and Dutch, a Dutch person (who does not speak any foreign languages) will be better off if German becomes an official language rather than French. Such a Dutch person would find it relatively easy to understand and speak German or would be able to learn it easily. Similarities between languages therefore may be important and should not be ignored when analyzing linguistic policies. Disenfranchisement can be reduced not only by choosing a language that is spoken by many but also by choosing one that, due to linguistic proximity, would

be understood by many. We can derive formulae analogous to (3.2)-(3.3) that take into account linguistic distances. To keep the notation simple, we assume here that every individual in country j speaks the native language of that country and ignore intermediate languages that the individual speaks in addition to his native language that might be closer to one of the languages in T than the individual's native language. Then, if $l^j(T)$ represents the language in T that is closest to the native language in j, and $\gamma(j, l^j(T))$ is the linguistic distance between the two languages, (3.2) can be rewritten as

$$\tilde{d}^{\,j}(T) = \left(n^j - v^j(T)\right)\gamma\left(j, l^j(T)\right) \tag{3.4}$$

and the disenfranchisement rate adjusted for distance becomes

$$\tilde{D}^{\,j}(T) = \frac{\tilde{d}^{\,j}(T)}{n^j} \tag{3.5}$$

The EU-wide disenfranchisement rate, $D(T)$, can be derived analogously.

Most European languages have common Indo-European roots, though they may have branched off at different points in time. Indo-European languages have been the object of close scrutiny for a very long time, leading to the construction of language trees determining the timing of separations between languages and divergence times.[25] Distances between pairs of Indo-European languages have been computed by Dyen, Kruskal and Black (1992), and those for the EU Indo-European languages are summarized in the tree represented in Figure 1. The main language groups are clearly delineated: Romance languages (Italian, French, Spanish, Portuguese and Romanian), Germanic languages (German, Dutch, Swedish, Danish and English), Slavic languages (Slovak, Czech, Slovenian, Polish and Bulgarian) and, somewhat isolated, Greek, and Baltic Languages (Lithuanian and Latvian).[26] Within the first three groups, there are also

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[25] It is thought that the Indo-European peoples originate from Central Russia, with the earliest evidence of their presence dating back to the 5th millennium BC. The break-up into the present-day linguistic families is estimated to have been completed by 3000 BC. See Diamond (1992) and the references cited therein.

[26] The tree does not include Estonian, Finnish, Hungarian, which belong to the Ugro-Finnic group and Maltese with its Semitic roots.

sub-groups formed by languages that are particularly close to each other as shown by language dissimilarity measured on the vertical axis. Given the special place of English, both in terms of its remoteness from the other members of the Germanic group and its worldwide spread, we can place English in a separate linguistic group. Accordingly, we categorize EU languages into eight distinct groups, the first six of which are Indo-European: (1) Romance languages, (2) Germanic languages, (3) English, (4) Slavic languages, (5) Baltic languages, (6) Greek, and the two groups of non Indo-European languages: (7) Ugro-Finnic languages (Hungarian, Finnish and Estonian) and (8) Maltese.

Insert Figure 1

Table 2 exhibits the disenfranchisement rates for the main and most widely spread languages in the individual EU27 countries.[27] The results allow us to make several observations. Firstly, even though English is the most widely known language, it would leave 62.6 percent of EU27 citizens disenfranchised if it were the only official language. Moreover, there are only seven countries were less than 50 percent of the population would be disenfranchised. But the EU-wide disenfranchisement rate rises to 75.1 and 80.1 percent if English were replaced by German or French, respectively, and it would be even worse if Italian or Spanish were chosen (86.7 and 88.9 percent, respectively). Secondly, all disenfranchisement rates are larger for the remaining candidate countries, Croatia and Turkey, indicating that disenfranchisement would be even higher in the future EU29. Thirdly, with the exception of English, German, French, Italian and Russian, no language is spoken by more than five percent of the population in more than two European countries. Finally, though Russian is not an official language, it disenfranchises fewer people in the EU27 than many official languages: Bulgarian, Czech, Danish, Estonian, Finnish, Greek, Hungarian, Irish, Latvian, Lithuanian, Maltese, Portuguese, Slovak, Slovenian and Swedish (detailed disenfranchisement figures for these languages are available upon request).

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[27] The notion of disenfranchisement rate that we use is relatively strict: it comprises not only those who do not speak the language in question but also those who say that they only have a basic knowledge of it.

Insert Table 2

It is often thought that the younger generations are more fluent in languages. Table 3 reports disenfranchisement rates for four age groups (15-29, 30-44, 45-59, over 60) for the nine main languages (English, German, French, Italian, Spanish, Polish, Dutch, Turkish and Russian). Clearly, English is the only language for which disenfranchisement rates are significantly lower among the younger generations. Detailed country by country results[28] show that this is the case in all 29 countries, though in almost half of these (Czech Republic, France, Hungary, Italy, Latvia, Poland, Portugal, Slovak Republic, Spain, Bulgaria, Romania, and Turkey), disenfranchisement rates are still larger than 50 percent even among the youngest generation. Overall, if English were the only EU language, disenfranchisement would nevertheless drop from 62.6 percent to 44.6 percent in the EU27 and to a little more than 50 percent in the EU29 if the whole population were as knowledgeable in English as is the youngest generation. Therefore, one could expect that some 40 years from now, English would be known by more than half of the population of the EU27 and nearly half of the EU29. The same cannot be said about French, German and the other languages reported in Table 3, as the shares of respondents proficient in them is roughly the same irrespective of age. Note that though Russian is well-known in Europe, its use does not increase among the younger generations.[29]

Insert Tables 3

3.2   Disenfranchisement-minimizing Sets of Official Languages in EU27

Determining the set of official languages for a multilingual society entails, implicitly or explicitly, a cost-and-benefits analysis. In particular, the society must weigh the benefits of multilingualism (reducing or avoiding linguistic disenfranchisement) against its costs. The latter go beyond the monetary costs of maintaining several parallel languages: communication is more cumbersome when speakers of different languages interact with

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[28] Detailed results for individual countries are available upon request.
[29] This is mainly due to the fact that the knowledge of Russian is decreasing in the former Eastern bloc countries.

each other, the need to translate official documents results in delays and the costs due to misunderstandings or erroneous translations are all important as well. However, if the costs depend only on the number of chosen languages, the search for an optimal linguistic regime boils down to achieving the lowest possible disenfranchisement with a given number of languages. The analysis that follows is concerned with choosing subsets of languages that minimize overall disenfranchisement in such a framework.

Formally, let $m \leq n$ be a positive integer, where n is the number of languages under consideration for official status. Denote by T_m the subset of Λ that minimizes the disenfranchisement rate over all sets with m languages, i.e.

$$D(T_m) = \min_{T \subset \Lambda: |T| = m} D(T) \tag{3.6}$$

We can then construct the sequence of optimal sets $\{T_1, T_2, \ldots, T_n\}$. Obviously, T_m may not be unique. However, this problem does not arise in our analysis: at least for small values of m, this sequence satisfies the sequencing principle. Namely, $T_{m-1} \subset T_m$ for every m and there exists an ordering of languages $\{l_1, l_2, \ldots, l_m\}$ in Λ such that

$$T_m = \{l_1, l_2, \ldots, l_m\} \tag{3.6}$$

for every m.

Though this calculation is conceptually simple, in practice it would require a large number of computations for large values of m. However, since European languages differ considerably in the numbers of people who speak them, the scope of the analysis can be narrowed down substantially. For instance, it is clear that English should be introduced first, followed by French or German, then the other large languages (Italian, Spanish and Polish) and so on. In this way, identifying the most suitable combination is often easy and at any stage in the analysis the number of possibilities to be considered is relatively small.

Panel A of Table 4 reports the resulting sequence. The sequence includes only the official languages of the EU27; the only exception to this is Russian included for comparison purposes as it is widely spoken in several new member countries. The sequence is presented in a way whereby each column indicates which language should be

added to the subset formed by the languages reported in the preceding columns so as to minimize dienfranchisement. The optimal subset of one language, T_1, therefore contains English, T_2 contains English and German, T_3 is formed by English, German and French, and so on.[30] The marginal contribution of each additional language to reducing disenfranchisement falls under one percent of the EU population once m exceeds 13 and the differences between marginal contributions attributable to the various candidate languages are often minute. Therefore, in the remainder of our analysis, we will only consider the first 13 languages: English, German, French, Italian, Spanish, Polish, Romanian, Hungarian, Portuguese, Czech and Greek (tied at the tenth position), Bulgarian, Dutch.[31]

Insert Table 4

English is clearly the first language in any sequence as it is spoken well or very well by one third of the EU27 population. German and French are in close race for the second position; German, with a 49.3 percent disenfranchisement rate, fares better than French with 50.6 percent. This triple leads to a disenfranchisement rate of 37.8 percent. Italian, Spanish or Polish would each make almost the same contribution to reducing disenfranchisement further, with Italian slightly ahead of the other two languages. Spanish, in turn, performs only marginally better than Polish at the fifth position. With the six largest languages included, 16 percent of the EU population would still remain disenfranchised. Adding Romanian brings the residual disenfranchisement rate further down to 13 percent.

Of course, important differences across countries remain, with several countries facing disenfranchisement rates in excess of 50 percent: Bulgaria, Czech Republic, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Portugal, and Slovakia. The most dramatic case is Hungary where only 16 percent of the population can speak one of the first seven languages. Not surprisingly, Hungarian becomes the eighth language in the

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[30] Note that there are several instances when two or three languages result in approximately the same reduction in disenfranchisement at a particular step in the sequence. For example, the tenth language could be Czech, Greek or Russian. Taking Czech as the tenth language, Greek then appears again as the eleventh language. Swedish, Slovak and Danish appear twice within the sequence for the same reasons.

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sequence. In addition to eliminating disenfranchisement in Hungary, this has a positive impact also on Slovakia whose disenfranchisement rate declines from 70 to 57 percent. Portuguese is the ninth language, followed by Czech and Greek tied in the tenth position (along with Russian). Finally, the sequence is concluded by Bulgarian and Dutch. Of course, adding further languages brings more gains but these are small and as a rule limited to a single country. With 13 official languages (as opposed to the current 23), the EU-wide disenfranchisement rate would be 4 percent.

Adding the next 6 languages (Finnish, Swedish, Lithuanian, Slovak, Latvian and Danish) would lower disenfranchisement to 1 percent. Any of the remaining four languages (Slovene, Estonian, Maltese and Irish) would lower the disenfranchisement rate by no more than 0.2 percent. Note that the objective of this exercise is to minimize disenfranchisement in the current EU and therefore the candidate countries and their languages are not considered. As a consequence, Croatia and especially Turkey are left with very high disenfranchisement rates.

These disenfranchisement rates are a snapshot of the situation at the time of the survey (i.e. the end of 2005). However, the knowledge of languages changes over time. In particular, the pattern of learning foreign languages may change both with respect to languages that are popular and the frequency with which people learn other languages. Indeed, Table 3 shows that the youngest generations of Europeans are more likely to speak foreign languages, and especially English. Therefore, we calculated a sequence of optimal sets based on the disenfranchisement rate of the youngest generation (15 to 29 years old) only. This sequence is presented in Panel B of Table 4.

The first difference is that German which was second to enter in the previous sequence is replaced by French. This is due to the fact that among the younger generation in Germany and in Austria, 60 percent know English so that German becomes less necessary. Beyond the first two languages, the sequence is essentially the same as before, and includes English, French, German, Italian, Spanish, Polish, Romanian, Hungarian, Portuguese and Czech (using the same criterion as before, that a language's contribution to reducing disenfranchisement should be at least 1 percent). The disenfranchisement rate

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[31] The rest of the sequence would be formed by Finnish, Swedish, Lithuanian, Slovak, Latvian and Danish. Afterwards, the contribution of the remaining languages to reducing disenfranchisement is negligible.

that would prevail among the youngest generation with these ten languages is essentially the same as with 13 languages among the EU population as a whole: 3.9 percent.

So far, we have discussed disenfranchisement assuming languages are chosen only based on the number EU citizens who speak them. Some languages, however, are very close to each other: Danish and Swedish, Spanish and Portuguese, Dutch and German, and Czech and Slovak are the most notable examples (see Figure 1). Since these languages are so similar to each other, the speakers of either one would benefit from the introduction of the other language even if their own language remains left out, both with respect to understanding spoken work and when receiving written documents. Therefore, an alternative approach would involve choosing relatively dissimilar languages in order to increase the chance that any EU citizen can at least partially understand one of the official languages.[32]

Panel C of Table 4 reports the results of an exercise that takes into consideration distances between languages.[33] In constructing the sequence, individual disenfranchisement at each stage is adjusted proportionately to distance to the closest language among those already included in the sequence. In the single-language (English-only) scenario, accounting for linguistic proximity reduces the EU-wide disenfranchisement considerably, from 62.6 to 43.1 percent. Adding French reduces disenfranchisement also in all Romance-language countries, bringing the EU-wide rate to 24 percent. A deviation from the two sequences reported above is that Polish now comes in the third position ahead of German. Italian is the fifth language followed by Hungarian and Spanish. Greek ties with Romanian for the eighth position. The requirement of at least 1 percent contribution to reducing disenfranchisement cuts off the sequence at nine languages with the resulting disenfranchisement rate 2.9 percent.

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[32] This idea was introduced by Ginsburgh, Ortuno-Ortin and Weber (2005).

[33] The distance between two languages is based on the number of words (from a given list of words) that are cognate, i.e. that descend from a common ancestral word. Such distances are often criticized since they do not take into account words that have more or less recently been borrowed from another language. English and French, for example, share many words that have been borrowed from each other. However, Janson (2003, pp. 157-158) points out that though "90 percent of the words in an English dictionary are of French, Latin or Greek origin, [i]f one counts words in a text or in a recording of speech, the proportion of Germanic words is much higher, for they are the most frequent ones, while most of the loans that figure in a dictionary are learned, rare items."

These three sequences of sets which minimize EU27's global rate of disenfranchisement will be used in our analysis of political feasibility of linguistic reform.

3.3 Attitudes of EU25's Citizens Towards Languages

Before proceeding to the political constraints on the official set of languages, it is instructive to consider the attitudes of EU27 citizens towards linguistic issues and individual languages. The patterns are mixed. On the one hand, 54 percent of the EU27 population *tend to agree* that the European institutions should adopt a single language to communicate with European citizens, 69 percent think that all Europeans should speak a common language and 83 and 49 percent believe that everyone should be able to speak one or two languages, respectively, in addition to their mother tongue. On the other hand, 72 percent also think that all languages should be treated equally (see Table 5). Hence, a clear majority of Europeans holds a generally pragmatic attitude towards linguistic policies, recognizing that ensuring effective communication may require either that the EU would use a single language or that EU citizens must learn and use foreign languages. At the same time, however, a clear majority also supports equal treatment of all languages.

Another interesting question is concerned with "which two languages, apart from your mother tongue, do you think are the most useful to know for your personal development and career". Details are given in Table 5 for the four languages that are cited by more than 15 percent of the EU27 population. The languages that are considered useful by non-native speakers are English (67 percent), French (25 percent), German (22 percent), Spanish (15 percent). These are followed by Russian (3.4 percent, cited almost exclusively in post-communist countries), Italian (3.2 percent) and Chinese (1.5 percent). Beyond that, usefulness drops to less than one percent. [34]

Insert Table 5.

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[34] The following languages were mentioned by more than 0.5 but less than 1 percent: Arabic (0.7%), Dutch (0.7%), Portuguese (0.5%), and Swedish (0.5%).

A further insight on attitudes towards potential linguistic reform can be gained by means of a regression analysis. Table 6 reports results of logistic regressions, with the above-discussed attitudes as dependent variables. The explanatory variables include basic socio-economic characteristics such as gender, age, marital status, education, occupation and residence in rural vs urban area. In addition, we include also the respondents' height and body mass index (BMI, we also include a squared term for this indicator) as proxies for respondents income and social class.[35] Finally, we also include a measure of self-declared political orientation.

Several interesting patterns stand out. Individuals with secondary or tertiary education or those who are still students are less likely to agree that the EU should use a single language and that all languages should be treated equally. They are more likely to agree, however, that everyone should speak one or two language in addition to their mother tongue. Similarly, those with managerial occupations are less likely to endorse a single language for the EU and equal treatment for all languages and, along with white-collar workers, are more likely to agree that everyone should learn one additional language. Apparently, those with higher education and/or higher skills are more in favor of multilingualism and, somewhat surprisingly, less in favor of equal treatment of all EU languages. A similar pattern emerges for height and BMI.[36] Given that we use height and BMI as proxies for income and social class, these results are consistent with those for education and occupation.

Insert Table 6.

4   Political Feasibility of Linguistic Reform

The tools introduced in the preceding subsections can be used to identify which subsets of official languages would enjoy sufficient political support. A closer examination of

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[35] The literature on physical stature (see Steckel, 1995) finds that differences in height can be largely attributed to the quality of nutrition and health care in early infancy and again during adolescence: well-off children receive better quality of both food and health care and therefore grow into taller adults.[35] Similarly, weight relative to height as measured by the body-mass index (weight in kilograms divided by height in meters squared) typically displays a U-shaped correlation with income: both those with relatively low and high BMI are typically less well off (put differently, well off individuals are less likely to be either malnourished or overweight or obese).

disenfranchisement rates, distances between languages and optimal sets shows that not all languages play an equally important role within the EU. At the same time, it is clear that a unique official language will hardly be sufficient as it would result in too high an extent of disenfranchisement, leaving over 60 percent of the EU population 'in the dark'. Similarly, a solution based on English, French and German, would still leave 38 percent of the EU population disenfranchised (26 if we adopt a forward-looking approach and consider the young generation only, 17 percent if we consider linguistic proximity), which many would see as unacceptably high. Moreover, implementing a single or a limited number of official languages would leave the majority of many countries disenfranchised. On the other hand, the status quo with extensive multilingualism resulting (at present) in 23 official languages is, to say the least, not very efficient.

The decision on the set of official languages is inevitably a political one and boils down to deciding what extent of disenfranchisement is tolerable. All European countries accept a certain degree of disenfranchisement (regional languages in particular are often neglected) and it would be natural for the EU to do likewise. Whether the optimal set should contain one , six or more languages, however, is difficult to justify.

Before the Nice Treaty, most EU decisions were made by unanimity. While the Nice Treaty extended the range of issues for which qualified majority voting (QMV) is used, the EU language regime remains subject to the unanimity rule. As a result, Malta and Estonia have the same weight as Italy and Poland, despite their vastly different populations. Similarly, Maltese and Estonian, at least in theory, enjoy the same status within the EU as Italian and Polish. While this emphasis on national interests is understandable (and indeed unavoidable) given the institutional framework adopted by the EU, it is also inherently undemocratic. In the context of linguistic policies, it implies that a Maltese or Estonian citizen weighs in more heavily than a Pole or Italian. Furthermore, as the EU expands, agreement by unanimity becomes increasingly difficult[37] and therefore the EU has been gradually moving towards greater application of QMV. Hence, if the EU is to avoid becoming overwhelmed with dozens of languages, it

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[36] Taller respondents are less likely to agree that the EU should use a single language or that everyone in the EU should speak a common language. Both those who are relatively tall and those with an intermediate BMI are less likely to endorse equal treatment of all EU languages.

[37] See, for example, Baldwin et al. (2004).

may have to shift the emphasis from national concerns to those of individual citizens; this would also enhance the democratic legitimacy of EU policies.

Decision making on linguistic reform under unanimity is trivial: any country set to lose out in the wake of the reform would need to be sufficiently compensated in order to throw its support behind the reform proposal. QMV, on the other hand, is analytically more complex and indeed interesting as it necessitates that countries form coalitions in favor or against the reform. Therefore, and in line with the trend towards wider application of QMV, we now examine under which conditions a linguistic reform could pass, assuming that QMV is used.[38]

Under QMV, each member state has a fixed number of votes, with an EU-wide total of 345. For a decision to pass, the following three requirements apply: (a) the proposal must backed by a majority of states (14 out of 27), (b) it must be supported by 248 out of the 345 votes, and (c) the states backing the votes must represent at least 62% of the EU population (i.e. 303 million).

Formally, let Q be a collection of all subsets in the EU that satisfy all three QMV criteria. Obviously, if a subset of countries J belongs to Q, then every other subset J' that contains J also belongs to Q. Now for every set of official languages T and disenfranchisement rate r, denote by $W(T,r)$ the set of countries whose disenfranchisement rate, given T, does not exceed r:

$$W(T,r)=\{j \in EU : D^j(T) \leq r\} \tag{4.1}$$

Obviously, the set $W(T,r)$ is increasing with respect to inclusion and with respect to the value of r. That is, if $T \subset T'$ then $W(T,r) \subset W(T',r)$ for every r and for every set of languages T, $W(T,r) \subset W(T,r')$ whenever $r < r'$. For our analysis it is important to identify the pairs (T,r) for which the corresponding set of countries $W(T,r)$ satisfies all three QMV criteria, that is $W(T,r) \in Q$.

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[38] The QMV rules that we apply are those stipulated by the Nice Treaty which are the ones currently in effect. These rules were to be modified by the Constitutional Treaty. The latter's ratification, however, was abandoned in the wake of negative verdicts of the French and Dutch referenda. As a consequence, the Nice Treaty rules are set to remain in effect potentially indefinitely.

Using the sequences of languages derived in Section 3.2, for every value of the disenfranchisement rate r we define the minimal number of languages $m^*(r)$ that guarantees that the set of countries $W(T_{m^*(r)}, r)$ satisfies the QMV criteria:

$$m^*(r) = \min\{m : W(T_m, r) \in Q\} \tag{4.2}$$

Column (2) of Table 7 presents the results of our calculations for the three sequences discussed in Section 3.2 based on all respondents (Panel A of Table 4), young generation aged 15-29 only (Panel B of Table 4), and all respondents, accounting for distances between languages (Panel C of Table 4).[39]

Insert Table 7.

Consider for instance the first case in which all respondents are taken into account. Assume that representatives of the countries for which the chosen set of languages results in a disenfranchisement rate smaller than or equal to 20 percent would vote for the proposal. Then 14 (more than one half of the 27) countries would vote in favor of 9 languages (E, GE, FR, IT, SP, PL, RO, HU and PT); these 9 languages would obtain 254 votes (that is more than 248) and the countries would comprise 399 million citizens (that is more than 303 million). The proposal meets QMV and would be accepted. So would the proposal for disenfranchisement rates that are larger than 20 percent, but the proposal would fail if countries consider the 20 percent disenfranchisement level as being too large.

Overall, the results show the following:

(i)   All respondents. A linguistic reform would be possible if it maintains between seven (English, German, French, Italian, Spanish, Polish, Romanian) and eleven (the previous ones plus Hungarian, Portuguese, Czech and Greek) official languages, for between 40 and 10 percent acceptable rates of disenfranchisement, respectively).

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[39] Detailed results are available upon request.

(ii)   Young generation aged 15-29 only. Between three (English, French, German) and seven (English, French, German, Italian, Spanish, Polish and Romanian) official languages would be required to make the reform politically feasible (again depending on which rate of disenfranchisement is seen as acceptable).

(iii)   All respondents, accounting for distances between languages. For low rates of disenfranchisement (less than 10 percent), seven languages are needed: English, French, Polish, German, Italian, Hungarian and Spanish); three languages, English, French and Polish, would do if a disenfranchisement rate of 30 percent were deemed acceptable.

The new Constitution (which was rejected in referenda held by France and the Netherlands) stipulates that the principle of voting by qualified majority will generally be applied but member states will have the possibility of exercising veto over foreign policy, defense and taxation issues. A new QMV rule replaces the Nice rule. The Constitution-Treaty QMV rules require at least 55 percent of the members of the Council, comprising at least 15 of them and representing member states comprising at least 65 percent of the population of the Union. Column (3) of Table 7 shows that the minimal number of languages acceptable under the Constitutional QMV rules would be roughly of the same order of magnitude as under the Nice Treaty QMV.

Both provisions, those of the Nice Treaty and of the European Constitution, assign too much power to some countries, while preventing others (in particular, middle-sized countries) from receiving their fair share of voting power. This deficiency in assigning voting weights can be rectified by the so-called square-root law of Penrose (1946) or simply, the Penrose law,[40] which suggests that each country should be assigned a voting right proportional to the square root of its population. In column (4) of Table 7 we use Penrose weights. The shaded cells are those where a 62 percent majority vote for various disenfranchisement rates is obtained. This would allow restricting the number of official languages quite substantially and suggest that a regime with six official languages (English, French, German, Italian, Spanish and Polish) would be accepted.

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[40] See also Laurelle and Widgren (1998).

5 Concluding Remarks

In this paper we analyze the effects of linguistic policies and of a potential linguistic reform in the EU. The policy of official multilingualism is one of the most fundamental principles of the Union and is guaranteed by its treaties. Extensive multilingualism at a time when the EU is expanding its membership however translates into rapidly rising costs of translation and interpretation, which may have important human, legal and economic implications. Multilingualism is associated also with non-monetary costs such as delays in implementation of new laws and regulations, erroneous or confusing translations and potential conflicts arising from the fact that all translated versions of international treaties are considered legally binding even if they may occasionally lend themselves to different legal interpretations. Last but not least, the need for multiple translation and the associated delays and costs is a factor explaining why fewer patents are registered in Europe than in the US or Japan, thus potentially causing Europe to miss out on claims to valuable innovations and discoveries.

Our analysis offers a formal framework to address the merits and costs of extensive multilingualism. First, for any given number of languages, we determine the set of languages that minimizes linguistic disenfranchisement across the Union. This allows us to construct a nested sequence of official languages, in fact, a menu of possible choices for a policy-making and for a potential linguistic reform.

It is very unlikely, however, that all 27 member states would be unanimous (as currently required by EU law) in accepting to reduce the number of official languages, unless those populations whose languages are not part of the official language set are properly compensated.[41] In this paper, we ask therefore what would be the minimal number of official languages required under three alternative voting rules: the qualified-majority-voting provisions of the Nice Treaty, the proposed Constitutional Treaty or the Penrose law. It turns out that under the currently valid QMV rules (i.e. as stipulated by the Nice Treaty), the EU would need to maintain at least a seven-language regime. Moreover, this would be a feasible choice only if countries were ready to accept disenfranchisement as high as 40 percent. In the future, a slightly more restrictive six-language scenario would also be feasible, requiring only a 30-percent disenfranchisement

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[41] See Fidrmuc and Ginsburgh (2006) for such a proposal and its consequences.

threshold. The official EU languages then would be English, French, German, Italian, Spanish and Polish.

Note that in this group, there is at least one language belonging to each of the main branches of Indo-European languages (Romance, Germanic and Slavic). The language set excludes the small group of two Baltic languages (Latvian and Lithuanian), Greek, as well as the three non Indo-European languages (Finnish, Hungarian and Maltese). The fact that all large languages groups are represented implies that translations to the other languages belonging to the same group would be made somewhat easier. An oddity is the over-representation of Romance languages (French, Italian and Spanish). This results from the combination of two effects. First, the number of speakers of each of these languages in the EU is rather large. Second, the countries in which these three languages are native tend to ignore most other European languages (see Table 2).

If implemented, the six-language scenario would result in relatively modest overall disenfranchisement of 16 percent. Adding more languages would lower disenfranchisement further but the gains attributable to each additional language would be small and limited to the native country of that language. Importantly, the six-language scenario could be seen as broadly consistent with the Europeans' preference for linguistic pragmatism as well as equal treatment of languages (see Table 5): the languages included are all spoken in large EU member countries with populations of approximately 40 million or more. If more languages were to be included, the next two should optimally be Romanian and Hungarian. That, however, would be difficult to justify: since Romanian would add a fourth Romance language and one spoken by *only* 21 million people while Hungarian is spoken by 12 million people (in Hungary and to some extent in Slovakia) while leaving out other languages spoken by similar numbers of people (most notably Dutch, spoken by 22 million). This group of six languages would be almost the same if account is taken of linguistic distances (Hungarian would be number 6, with Spanish relegated to the seventh place). Finally, an appropriate disenfranchisement rate to incorporate national pride considerations could be based entirely on the number of native speakers of each language.[42] A sequence constructed based on this notion would obviously lead to the same optimal set, since the six languages belong to the most populated countries (and include German-speaking Austria and the 40 per cent of

Belgians whose native language is French). These countries account for 75.7 per cent of the EU population.

It goes without saying that members of the European Parliament should be given the latitude to speak the official language of their country and no restriction should apply to them whatever the final reduced choice of the EU official languages. Therefore simultaneous interpretation from and to all official member countries' languages should be continued. There is much less reason to continue this rule in other bodies (where it is in fact not always used in practice, see Appendix 1) or for translations of documents. Individual countries should have the opportunity to do this if they feel the need. This raises three questions: (a) where should the translations into official languages be performed; (b) which version of a document should be binding and (c) who should pay for the translation into those languages that will loose official status. It is reasonable to assume that the translations into the restricted set of official languages should be centralized at the Commission, and that these would be the binding versions in case of diverging legal interpretations.

The amounts that are saved by the Commission, given that there will be less to translate could be transferred to those countries whose languages have lost official status. Fidrmuc and Ginsburgh (2006) suggest transferring the full cost (that is, roughly the total translation cost borne today by the EU, divided by the number of languages less one) to each country. Other ways of calculating the transfers (based on each country's disenfranchisement rate for example) could be envisaged too. Each country would then have the liberty to use the transfer at its own discretion. The Commission would end up not saving on the cost of interpretation and translation but countries would be given the right incentives and possibly be held responsible for their own shortcomings.

A linguistic reform, such as the one suggested in our paper, will change the incentives for acquiring skills in non-native languages. This will, in turn, change the dynamics, and the possibility to change the set of official languages after a certain number of years should be built into the basic Treaty or Constitution.

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[42] Introduced as population-based disenfranchisement, see Ginsburgh, Ortuno-Ortin and Weber (2005).

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Table 1. Linguistic Groups in the EU27 and EU29 (in millions)

	EU Mother's Tongue		EU All speakers		EU G and VG skills		Worldwide		Multiplier	
	Home (1)	All (2)	Home (3)	All (4)	Home (5)	All (6)	Native (7)	All (8)	EU (6)/(2)	World (8)/(7)
Official EU27										
Bulgarian	7	7.1	7.6	8	7.6	7.8	n.a.	9	1.10	
Czech	10	10.3	10.2	12.7	10.2	12	n.a.	12	1.17	
Danish	5.2	5.3	5.4	6.8	5.4	6.4	5	5.3	1.21	1.06
Dutch	21.7	21.9	23.7	25.2	23.3	24	20	n.a.	1.10	
English	59.9	62.4	63.6	238	63.3	182.6	400	1500	2.93	3.75
Estonian	1.1	1.2	1.3	1.5	1.2	1.3	1	n.a.	1.08	
Finnish	5	5.2	5.2	6.1	5.2	5.7	4.7	6	1.10	1.28
French	59.9	60.7	69.3	128	67.8	97.2	72	122	1.60	1.69
German	83	85.3	89.9	147.9	89.6	121.7	n.a.	120	1.43	
Greek	11.7	12	11.8	14.1	11.8	12.9	12	n.a.	1.08	
Hungarian	10	11.9	10.1	13.5	10.1	13	n.a.	14.5	1.09	
Irish	0.4	0.6	0.8	1.2	0.6	0.9	0.03	n.a.	1.50	
Italian	55.8	57.7	56.9	71.6	56.8	64.8	57	63	1.12	1.11
Latvian	1.7	1.7	2.2	2.4	2.1	2.2	n.a.	1.5	1.29	
Lithuanian	3	3.2	3.4	3.6	3.4	3.6	n.a.	4	1.13	
Luxembourgish	0.4	0.4	0.4	0.5	0.4	0.4	0.4	n.a.	1.00	
Maltese	0.4	0.4	0.4	0.4	0.4	0.4	0.3	n.a.	1.00	
Polish	37.4	39.2	37.6	41.9	37.6	40.9	n.a.	44	1.04	
Portuguese	10.5	11.4	10.5	13.3	10.5	12.2	175	187	1.07	1.07
Romanian	20.6	21	21.3	22.5	21.3	22.2	20	n.a.	1.06	
Slovak	4.7	5	5.3	7.8	5.2	7.2	5	n.a.	1.44	
Slovenian	1.9	2.2	2	2.9	2	2.8	2.2	n.a.	1.27	
Spanish	38.3	39.7	42.4	67.2	42.2	54.1	270	350	1.36	1.30
Swedish	8.6	8.9	9	12.4	9	10.8	n.a.	9.3	1.21	

Table 1. Linguistic Groups in the EU27 and EU29 (continued)

	EU Mother's Tongue		EU All speakers		EU G and VG skills		Worldwide		Multiplier	
	Home	All	Home	All	Home	All	Native	All	EU	World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(6)/(2)	(8)/(7)
Other										
Catalan	3.9	4.1	5.7	6.3	5.4	5.8	4	9	1.41	2.25
Basque	0.7	0.9	1.3	1.6	1.1	1.3	0.6	n.a.		
Galician	2.2	2.2	2.9	3.1	2.9	3	3	n.a.		
Other regional		4.3		18.8		13.8				
Croatian		0.6		2.1		1.7	4.8	n.a.		
Turkish		2.2		3.1		2.6	n.a.	59		
Russian		4.2		35.3		22.4	170	290	5.33	1.71
Arabic		1.6		3.4		2.5	200	n.a.		
Indian SC		1.3		3.2		2.6				
Other		1.8		16.1		6.3				

Notes: Columns (1)-(2) report the numbers of native speakers of each language in EU27, both in the native country or countries and outside the native countries, respectively. Columns (3)-(4) report the total number of persons who speak each language either as native speakers or because they learned it, again in the native countries and abroad, respectively. Columns (5)-(6) are analogous to columns (3)-(4) but only report those who are either native speakers or who assess their linguistic skills as good or very good (those with basic skills and those unable to assess their skills are not included). Finally, columns (7)-(8) contains worldwide numbers of speakers for each language according to Crystal (1999). Note that these are sometimes smaller than those given for more restricted areas in columns (1) to (12).

The native countries for English are the United Kingdon and Ireland, German is attributed to Germany and Austria, France, Belgium and Luxembourg are taken at the native countries for French, Dutch is native in the Netherlands and Belgium, and Greek is native in Greece and Cyprus. We assume that Catalan, Basque and Galician are only native to Spain and Hungarian to Hungary (although sizeable ethnic Hungarian minorities live in Slovakia and Romania). Indian SC includes the languages of the Indian sub-continent: Hindi, Urdu, Punjabi, Gujarati, and Bengali. Indian SC languages, Arabic and Russian are assumed not to be native in any of the EU27 countries.

Table 2. Disenfranchisement in European Languages: Native and Foreign Languages, Respondents with Basic or No Linguistic Skills (in percent)

	English	German	French	Italian	Spanish	Polish	Dutch	Turkish	Russian
Austria	55	1	94	95	98	100	100	99	99
Belgium	59	87	29	97	97	99	32	99	100
Bulgaria	84	94	96	99	99	100	100	90	75
Cyprus	49	98	95	99	99	100	100	100	99
Czech Rep.	84	81	98	100	100	98	100	100	85
Denmark	34	73	97	99	98	100	100	100	100
Estonia	75	92	100	100	100	100	100	100	32
Finland	69	95	99	100	100	100	100	100	99
France	80	95	1	95	93	100	100	100	100
Germany	62	1	92	99	98	98	100	98	92
Greece	68	94	95	98	100	100	100	99	98
Hungary	92	91	100	99	100	100	100	100	99
Ireland	1	98	91	100	99	99	100	100	100
Italy	75	96	90	3	97	100	100	100	100
Latvia	85	97	100	100	100	99	100	100	15
Lituania	86	96	99	100	100	87	100	100	26
Luxemburg	61	12	11	95	99	100	99	100	100
Malta	32	99	95	65	99	100	100	100	100
Netherlands	23	43	81	100	97	100	1	100	100
Poland	82	90	99	99	100	2	100	100	88
Portugal	85	98	91	99	96	100	100	100	100
Romania	86	97	90	98	99	100	100	100	98
Slovak Rep.	83	82	99	100	100	98	100	100	80
Slovenia	59	79	98	91	99	100	100	100	100
Spain	84	98	94	99	2	100	100	100	100
Sweden	33	88	97	99	99	100	100	100	100
United Kingdom	1	98	91	99	98	100	100	100	100
EU27	62.6	75.1	80.1	86.7	88.9	91.6	95.1	99.5	95.4
Croatia	71	85	99	93	99	100	100	100	99
Turkey	94	98	100	100	100	100	100	2	100
EU29	66.7	78.1	82.7	88.5	90.4	92.8	95.7	87.0	96.0

Notes: This table covers only the most widely spread languages in the EU27. Complete tables with all languages can be obtained from the authors upon request.

Table 3. Disenfranchisement by Age Groups, EU27 and EU29

	EU27					EU29				
	All	15-29	30-44	45-60	> 60	*All*	15-29	30-44	45-60	> 60
English	*63*	45	59	68	76	*67*	50	63	72	79
German	*75*	74	75	76	75	*78*	77	78	79	78
French	*80*	78	81	80	81	*83*	81	83	83	84
Italian	*87*	87	87	87	87	*89*	89	88	88	89
Spanish	*89*	87	89	90	89	*90*	89	91	91	90
Polish	*92*	92	92	92	92	*93*	93	93	93	93
Dutch	*95*	95	95	95	95	*96*	96	96	96	96
Turkish	*100*	99	99	100	100	*87*	87	87	87	87
Russian	*95*	96	95	95	96	*96*	97	96	95	97

Table 4. Disenfranchisement in the Sequence of Optimal Language Sets (in percent)

A. All respondents	1 EN	2 1 + GE	3 2 + FR	4 3 + IT	5 4 + SP	6 5 + PL	7 6 + RO	8 7 + HU	9 8 + PT	10a 9 + CZ	10b 9 + GR	10c 9 + RU	11 10a+ GR	12 11 + BG	13 12 + NL
EU27	62.6	49.3	37.8	29.5	22.4	16.4	12.9	10.9	9.2	7.7	7.7	7.7	6.2	5.0	4.0
EU29	66.7	55.0	45.0	37.7	31.6	26.4	23.4	21.7	20.2	18.8	18.9	18.9	17.5	16.4	15.6

B. Respondents under 30	1 EN	2 1 + FR	3 2 + GE	4 3 + IT	5 4 + SP	6 5 + PL	7 6 + RO	8 7 + HU	9 8 + PT	10 9 + CZ
EU27	44.6	34.5	25.8	19.9	14.4	10.4	7.8	6.3	5.1	3.9
EU29	50.3	41.5	33.8	28.7	24	20.5	18.2	17	15.9	14.9

C. All respondents, adjusted for linguistic distance	1 EN	2 1 + FR	3 2 + PL	4 3 + GE	5 4 + IT	6 5 + HU	7 6 + SP	8a 7 + GR	8b 7 + RO	9 7a + RO
EU27	43.1	24.0	16.6	11.4	9.0	6.9	5.2	4.0	4.1	2.9
EU29	49.5	32.9	26.3	21.7	19.6	17.8	16.4	15.3	15.4	14.3

Notes: One language is added in each column, as indicated in the second row. In some columns (e.g. 10a, 10b and 10c in Panel A), two or more languages result in approximately the same percentage reduction in disenfranchisement. The sequence is continued until no language reduces disenfranchisement by more than 1 percent of EU27 population. The languages included are all EU27 official languages and Russian. Russian is included for comparison only and does not enter the sequence as an EU language. Languages are abbreviated as follows: Bulgarian (BG), Czech (CZ), Danish (DK), Dutch (NL), English (EN), Finnish (FI), French (FR), German (GE), Greek (GR), Hungarian (HU), Italian (IT), Latvian (LV), Lithuanian (LT), Spanish (SP), Polish (PL), Portuguese (PT), Romanian (RO), Russian (RU), Slovak (SK), Swedish (SW). Panel A considers all respondents, Panel B only those 30 years of age or younger and Panel C considers all respondents but adjust the disenfranchisement rates to account for linguistic distance between languages. See text for more details.

Table 5. Attitudes on Linguistic Policies and Usefulness of Languages (in percent).

	Single EU Lang. (1)	Common Lang. (2)	One Add. Lang. (3)	Two Add. Lang. (4)	Treat All Equally (5)	English (6)	German (7)	French (8)	Spanish (9)
Austria	47	60	75	44	76	19	73	2	15
Belgium	59	75	92	60	72	68	83	9	54
Bulgaria	34	43	70	27	70	28	65	34	11
Cyprus	59	69	96	70	91	79	93	17	34
Czech Rep.	53	72	88	45	89	18	68	56	5
Denmark	44	54	91	48	74	93	92	56	7
Estonia	51	53	91	63	88	60	71	14	2
Finland	36	45	77	41	78	92	86	18	8
France	51	76	86	32	62	31	81	19	2
Germany	62	78	86	36	62	20	81	5	27
Greece	58	65	92	74	90	68	74	30	21
Hungary	65	66	83	68	67	13	57	52	3
Ireland	44	65	75	34	74	43	4	37	58
Italy	55	62	84	67	74	28	82	15	25
Latvia	58	63	92	65	69	39	70	17	3
Lituania	56	71	89	69	86	24	85	27	4
Luxemburg	48	71	89	52	71	41	37	60	82
Malta	50	76	85	55	94	40	88	5	12
Netherlands	48	75	90	35	61	89	93	48	19
Poland	69	74	89	75	90	27	70	45	5
Portugal	50	66	73	52	83	63	51	5	31
Romania	46	56	70	37	69	61	63	18	33
Slovak Rep.	44	61	84	31	78	22	70	60	4
Slovenia	54	50	80	47	87	77	79	61	4
Spain	56	71	79	63	69	26	72	11	32
Sweden	41	60	90	27	71	94	96	39	12
UK	48	69	79	49	80	47	4	29	63
EU27	54.3	69.4	83.4	49.4	72.3	37.5	67.3	22.3	25.0
Croatia	51	54	83	42	81	72	77	53	4
Turkey	50	70	80	64	81	26	83	40	10
EU29	53.8	69.3	82.9	51.1	73.5	36.3	69.4	24.9	22.9

Notes: Columns (1) through (5) report percentages that tend to agree with the following statements: "The European institutions should adopt one single language to communicate with European citizens," "Everyone in the European Union should be able to speak a common language," "Everyone in the European Union should be able to speak one language in addition to their mother tongue," "Everyone in the European Union should be able to speak two languages in addition to their mother tongue," and "All languages spoken within the European Union should be treated equally." Columns (6) to (9) report the percentages that mentioned each language in response to the question "Which two languages, apart from your mother tongue do you think are the most useful to know for your personal development and career?". Only languages that were mentioned by at least 15 percent of the EU27 population are included.

Table 6. Determinants of Attitudes on Linguistic Policies.

	Single EU Lang.		One Common Lang.		One Add.. Lang.		Two Add. Lang.		Treat All Equally	
Female	-0.098	(2.31)	0.019	(0.42)	0.240	(3.77)	0.000	(0.01)	0.037	(0.67)
Age	-0.011	(1.72)	-0.033	(4.95)	-0.014	(1.42)	0.002	(0.34)	-0.012	(1.53)
Age sqrd	0.0001	(1.71)	0.0003	(4.53)	0.0002	(1.97)	0.0001	(1.09)	0.0001	(1.30)
Married	0.019	(0.56)	0.108	(2.98)	0.039	(0.73)	-0.074	(2.08)	-0.087	(1.96)
Left-Right	0.042	(5.83)	0.023	(3.03)	0.021	(1.85)	0.022	(3.00)	-0.058	(6.06)
Sec. education	-0.109	(2.37)	-0.002	(0.04)	0.226	(3.45)	0.033	(0.70)	-0.272	(4.20)
Tert. Education	-0.321	(6.29)	-0.065	(1.20)	0.382	(5.01)	0.102	(1.93)	-0.657	(9.59)
Still student	-0.262	(3.06)	0.053	(0.57)	0.607	(4.40)	0.216	(2.43)	-0.766	(6.84)
Self-employed	-0.081	(1.28)	-0.029	(0.44)	0.228	(2.31)	0.031	(0.46)	-0.101	(1.21)
Manager	-0.110	(1.91)	0.066	(1.09)	0.346	(3.70)	0.091	(1.52)	-0.351	(4.99)
White collar	0.017	(0.31)	0.028	(0.46)	0.239	(2.71)	-0.065	(1.12)	-0.093	(1.28)
House person	0.006	(0.09)	0.070	(0.98)	-0.112	(1.17)	-0.009	(0.13)	-0.094	(1.03)
Unemployed	0.026	(0.34)	0.055	(0.68)	-0.019	(0.17)	0.001	(0.02)	0.108	(0.99)
Retired	0.200	(3.34)	0.122	(1.93)	0.081	(0.93)	0.015	(0.24)	-0.124	(1.57)
Height	-0.008	(3.33)	-0.007	(2.92)	0.004	(1.20)	-0.003	(1.35)	-0.010	(3.25)
BMI	0.031	(1.78)	0.020	(1.23)	-0.007	(0.57)	0.002	(0.15)	0.039	(3.41)
BMI sqrd	0.000	(1.34)	0.000	(1.26)	0.000	(0.07)	0.000	(0.02)	-0.001	(3.21)
Small/medium town	0.024	(0.66)	0.095	(2.44)	0.120	(2.19)	0.064	(1.72)	-0.029	(0.62)
Large town	0.009	(0.23)	0.041	(0.97)	0.229	(3.70)	0.148	(3.59)	-0.164	(3.21)
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	1.406	(2.71)	2.570	(4.73)	1.065	(1.45)	0.388	(0.77)	3.080	(5.02)
N	18784		18976		19175		18634		18665	
Wald chi2	687.430	0.00	825.640	0.00	465.370	0.00	1808.500	0.00	1174.400	0.00
Pseudo R2	0.028		0.037		0.037		0.079		0.076	

Notes: This table reports the results of logit regressions where the dependent variables correspond to the attitudes on linguistic policies reported in columns (1) through (5) of Table 7a. The omitted categories are: male, not married (single, divorced, widowed or cohabitating), primary education or less, manual worker, and living in rural area. Left-right is a self-declared measure of political orientation ranging from 1 (extreme left) to 10 (extreme right). Height measures how tall the respondent is (in centimeters). BMI is the body-mass index (weight in kilograms divided by height in meters squared). Height and weight are self-declared.

**Table 7. Minimal Number of Languages m* Satisfying QMV
for Given Disenfranchisement Rate r**

	r (1)	m*(r) Nice Treaty (2)	m*(r) Constitution (3)	m*(r) Penrose (4)
All respondents	10	11	11	8
	20	9	10	7
	30	8	9	6
	40	7	6	6
	50	7	4	5
Respondents under 30	10	7	7	6
	20	7	5	5
	30	6	4	5
	40	6	4	4
	50	3	3	3
All repondents and accounting for distances	10	7	7	6
	20	5	4	5
	30	3	3	2
	40	3	2	2
	50	3	2	2

Figure 1
The tree of Indo-European Languages Used in EU 27
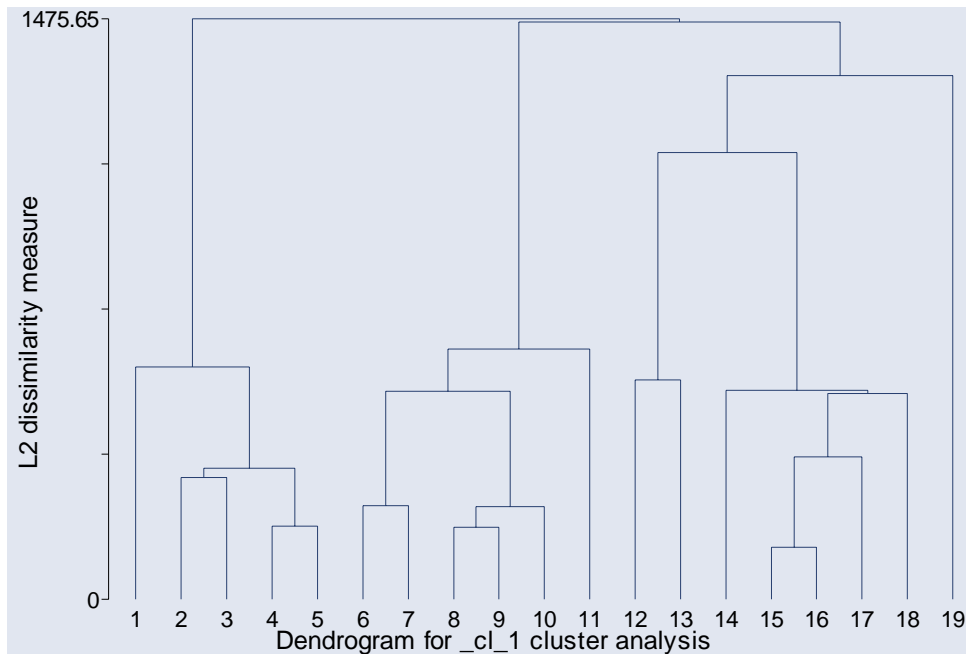
Note. 1 = Romanian, 2= Italian, 3 = French, 4 = Spanish, 5 = Portuguese, 6 = German, 7 = Dutch,
8 = Swedish, 9 = Danish, 11 = English, 12 = Lithuanian, 13 = Latvian, 14 = Slovene,
15 = Czech, 16 = Slovak, 17 = Polish, 18= Bulgarian, 19 = Greek (10 = Norwegian).

APPENDICES (NOT FOR PUBLICATION)

Appendix 1. Rules governing the use of languages in EU institutions

Article 1 of Council Regulation (EC) no 920/2005 of June 13, 2005 amending Regulation no 1 of April 15, 1958 determining the language to be used by the EEC specifies that the official and working languages of the institutions of the European Union are the 23 languages discussed in our paper. Article 2 adds that regulations and other documents of general application are drafted, and the *Official Journal of the European Union* is published in all official languages, and all the versions are authentic.

The Constitution does not set any rule regarding the usage of languages, but empowers the Council to "adopt unanimously a regulation laying down the rules governing the languages of the Union's Institutions languages...".The internal use of languages in the institutions is set through secondary legislation, and the decision is thus left to the Council, but has to be reached unanimously.

However, under article 6 of Council Regulation no 1 of 15 April 1958, each institution may stipulate in its rules of procedure "which of the languages are to be used in specific cases." The result is as follows.

The Parliament. Documents should be drafted in all official languages. Speeches delivered in one of the official languages shall be simultaneously interpreted into the other official languages

The Council. "Except as otherwise decided unanimoulsy by the Council on grounds of urgency, the Council shal deliberate and take decisions only on the basis of documents and drafts drawn up in the languages specified in the rules in force governing languages [that is the official languages]." (Article 14). If the document is not available in a certain official language, a delegation may oppose its discussion. In practice, documentation is often only drafted in English, French and, sometimes, German. However, a text may be adopted only if it is available in all languages.

The Commission. The Commission is given a wide degree of freedom in internal linguistic use: "the Commission shall, as necessary, lay down rules to give effect

to these Rules of Procedure [and] may adopt supplementary measures relating to the functioning of the Commission and of its departments..."

"Internally, when the European Commission staff hold meetings, no interpretation is provided: Officials are expected to be able to do without. The weekly meeting of the College of Commissioners has interpretation in English, French and German."

The Court of Justice. Cases can be dealt with in any of the 20 languages. Publications shall be issued in all 20 languages, though some judgments have appeared only in the language of the case.

The European Central Bank. Only one "working" language is guaranteed, English. Only when guidelines and instructions have to be officially published will all official languages be used.

The European Ombudsman. Any of the Treaty languages may be used in communications.

There is some lack of precision in the use of the words "official," "working" and "procedural" language. Article 1 of Council Regulation (EC) no 920/2005 of June 13, 2005 amending Regulation no 1 of April 15, 1958 uses both "official" and "working" without distinction. The addition of Irish has added some confusion, since from now on, the list of "languages of the Constitution" or "Treaty languages" includes Irish, while the list of "official and working languages" does not. In the literature concerning EU languages, the terms "official" and "working" are often used as synonyms. We will do the same, and reserve the term "procedural" for the language(s) used in practice in an institution of the EU.

See Pujadas (2006), corroborated by other sources.

Appendix 2. Voting Weights According to Qualified Majority Voting

The number of fixed votes given to each member states is as follows: 29 (France, Germany, Italy, UK), 27 (Poland and Spain), 13 (Netherlands), 12 (Belgium, Czech Republic, Greece, Hungary, Portugal), 12 (Austria, Sweden), 7 (Denmark, Finland, Ireland, Lithuania, Slovakia), 4 (Cyprus, Estonia, Latvia, Luxembourg, Slovenia), 3 (Malta), to which will be added as of January 2007, Bulgaria with 10 votes and Romania with 14, thus a total of 345. A proposal that passes QMV has to get 248 votes. The two other conditions are based on populations (62% of the EU27 population, that is 303 million) and number of countries (more than 50 percent, that is 14 countries).

See Miller (2004), www.parliament.uk/commons/lib/research/rp2004/rp04-054.pdf, last accesses on August 2, 2006 and en.wikipedia.org/wiki/qualified_majority_voting, last accessed on August 2, 2006.

Appendix 3. Additional Tables

Table 3a. Disenfranchisement by Age Groups, English, German and French, Respondents with Basic or No Linguistic Skills (in percent)

	English				German				French			
	15-29	30-44	45-59	> 60	15-29	30-44	45-59	> 60	15-29	30-44	45-59	> 60
Austria	41	45	58	78	1	0	0	1	85	95	95	99
Belgium	39	49	61	80	90	87	88	84	25	29	28	32
Bulgaria	57	83	94	99	87	94	95	98	95	96	96	97
Cyprus	18	33	61	72	98	95	100	97	91	93	96	97
Czech Rep.	64	81	90	97	80	83	83	76	98	99	98	97
Denmark	9	19	36	57	68	71	73	75	98	97	98	96
Estonia	33	67	87	94	85	92	94	93	100	100	100	100
Finland	29	55	76	92	95	94	93	95	97	99	99	100
France	67	74	84	90	95	95	95	95	0	1	2	1
Germany	38	53	67	78	1	2	2	1	88	94	92	94
Greece	40	56	80	93	93	94	95	93	94	95	96	97
Hungary	76	89	96	98	82	92	90	95	99	100	100	100
Ireland	2	1	1	0	94	97	100	99	85	89	96	97
Italy	54	77	84	93	94	96	96	97	85	90	93	93
Latvia	55	91	97	99	96	96	99	97	99	100	100	100
Lituania	49	89	95	99	93	96	95	98	99	100	99	100
Luxemburg	50	53	58	80	8	16	17	6	3	4	9	23
Malta	10	18	39	46	99	99	99	99	92	97	95	97
Netherlands	11	12	20	40	59	41	38	43	88	88	76	78
Poland	57	85	93	96	83	92	97	89	97	99	100	98
Portugal	62	74	87	99	99	97	97	100	87	87	89	97
Romania	69	82	96	99	97	98	98	97	82	91	92	97
Slovak Rep.	57	85	90	96	66	83	86	91	98	99	99	99
Slovenia	22	52	78	94	72	77	82	86	97	99	98	99
Spain	65	85	93	96	98	98	99	98	92	95	94	95
Sweden	5	17	37	61	89	90	87	88	96	97	98	96
UK	2	2	1	1	95	98	97	99	90	90	91	93
EU27	44.6	58.8	68.3	75.8	73.9	75.4	75.7	75.4	77.6	80.6	80.4	81.4
Croatia	34	68	85	97	76	87	86	90	99	98	98	99
Turkey	90	95	97	99	98	98	97	98	100	99	100	99
EU29	50.3	63.4	72.1	78.9	77.0	78.3	78.5	78.4	80.6	83.1	83.1	83.8

Table 3b. Disenfranchisement by Age Groups, Italian, Spanish, Polish, Respondents with Basic or No Linguistic Skills (in percent)

	Italian				Spanish				Polish			
	15-29	30-44	45-59	> 60	15-29	30-44	45-59	> 60	15-29	30-44	45-59	> 60
Austria	93	95	96	96	96	98	98	99	99	100	100	100
Belgium	98	96	97	96	97	96	99	97	100	99	99	100
Bulgaria	98	100	99	100	98	99	100	100	100	100	100	100
Cyprus	97	100	100	99	98	98	100	100	100	100	100	100
Czech Rep.	100	99	100	100	99	100	100	100	98	98	97	97
Denmark	99	99	99	99	94	98	99	97	99	100	99	100
Estonia	100	100	100	100	100	100	100	100	100	100	100	100
Finland	100	100	100	100	100	100	99	100	100	100	100	100
France	97	97	94	92	87	95	96	92	100	100	99	99
Germany	98	100	98	99	94	98	98	99	98	97	99	98
Greece	98	95	99	98	100	99	99	100	100	100	100	100
Hungary	99	99	99	100	99	100	100	100	100	100	100	100
Ireland	100	99	100	100	99	98	99	100	98	99	100	100
Italy	4	2	2	6	94	97	100	98	100	100	100	100
Latvia	100	100	100	100	100	100	100	100	99	98	99	99
Lituania	100	100	100	100	99	100	100	100	86	90	81	89
Luxemburg	98	95	94	95	99	99	98	99	100	100	100	100
Malta	43	50	75	78	99	99	100	99	100	100	100	100
Netherlands	99	99	100	99	98	95	97	98	100	100	100	100
Poland	99	98	99	99	100	100	100	100	2	2	1	3
Portugal	99	99	100	99	94	92	96	99	100	100	100	100
Romania	97	96	99	100	96	98	100	100	100	100	100	100
Slovak Rep.	99	100	100	100	99	100	100	99	98	98	98	98
Slovenia	90	89	90	93	97	99	100	100	100	100	100	100
Spain	98	99	98	100	2	2	2	2	100	100	100	100
Sweden	99	99	99	100	96	98	99	99	99	100	99	100
UK	99	98	99	99	98	97	98	98	98	100	100	100
EU27	86.9	86.6	86.5	87.2	87	89	89.9	89.4	91.5	91.6	91.7	91.7
Croatia	90	92	94	96	97	99	98	100	100	100	100	100
Turkey	100	100	100	100	100	100	100	100	100	100	100	100
EU29	88.6	88.3	88.3	88.8	88.7	90.5	91.2	90.9	92.6	92.7	92.9	92.8

Table 3c. Disenfranchisement by Age Groups, Dutch, Turkish, Russian. Respondents with Basic or No Linguistic Skills (in percent)

	Dutch				Turkish				Russian			
	15-29	30-44	45-59	> 60	15-29	30-44	45-59	> 60	15-29	30-44	45-59	> 60
Austria	100	100	99	100	98	99	100	100	99	99	99	99
Belgium	33	33	30	33	97	100	100	100	100	100	100	100
Bulgaria	99	100	100	100	87	90	90	94	84	69	65	83
Cyprus	100	100	99	100	100	100	100	99	99	98	97	100
Czech Rep.	100	100	100	100	100	100	100	100	97	85	79	84
Denmark	99	99	100	100	100	100	100	100	99	99	100	99
Estonia	100	100	100	100	100	100	100	100	54	15	17	38
Finland	100	100	100	100	100	100	100	100	99	98	98	100
France	100	100	100	100	100	100	100	100	100	100	100	100
Germany	99	100	100	100	96	98	99	100	90	92	93	94
Greece	100	100	100	100	100	99	99	98	97	98	99	99
Hungary	100	99	100	100	100	100	100	100	99	98	98	99
Ireland	100	100	100	100	100	100	100	100	99	99	100	100
Italy	100	100	100	100	100	100	100	100	100	100	100	100
Latvia	100	100	100	100	100	100	100	100	20	7	9	23
Lituania	100	100	100	100	100	100	100	100	40	10	8	39
Luxemburg	99	98	98	99	100	100	100	100	100	100	99	100
Malta	100	99	100	99	100	100	100	100	100	100	100	100
Netherlands	1	0	1	1	100	100	100	100	100	99	100	100
Poland	100	100	100	100	100	100	100	100	91	89	82	91
Portugal	100	100	99	100	100	100	100	100	100	100	100	100
Romania	100	100	100	100	100	100	100	100	99	100	98	96
Slovak Rep.	100	100	100	100	100	100	100	100	93	80	72	79
Slovenia	100	100	100	100	100	100	100	100	99	100	99	100
Spain	100	100	100	100	100	100	100	100	100	99	100	100
Sweden	99	99	100	100	99	100	100	100	100	99	99	100
United Kingdom	100	100	100	100	99	99	100	100	100	99	100	100
EU27	95	95.1	95.1	95.2	98.9	99.4	99.6	99.8	96	95	94.5	96
Croatia	100	100	100	100	100	100	100	100	100	100	98	98
Turkey	100	100	100	99	2	1	1	3	100	100	100	99
EU29	95.7	95.7	95.8	95.7	86.6	86.9	87.1	87.5	96.5	95.6	95.3	96.5

Table 4. Disenfranchisement in the Sequence of Optimal Language Sets (in percent)

Number	1	2	3	4	5	6	7	8	9	10a	10b	10c
		1 +	2 +	3 +	4 +	5 +	6 +	7 +	8 +	9 +	9 +	9 +
Languages	EN	GE	FR	IT	SP	PL	RO	HU	PT	CZ	GR	RU
Austria	55	0	0	0	0	0	0	0	0	0	0	0
Belgium	59	56	18	18	18	18	18	18	18	18	18	18
Bulgaria	84	81	79	79	78	78	78	78	78	77	77	61
Cyprus	49	49	49	48	48	48	48	48	48	48	0	47
Czech Rep.	84	69	69	69	69	67	67	66	66	0	66	59
Denmark	34	31	31	31	31	30	30	30	30	30	30	30
Estonia	75	70	70	70	70	69	69	69	69	69	69	21
Finland	69	67	67	67	67	67	67	67	67	67	67	67
France	80	77	1	0	0	0	0	0	0	0	0	0
Germany	62	1	1	1	1	1	1	1	1	1	1	0
Greece	68	64	63	63	63	63	63	63	63	63	0	61
Hungary	92	85	85	85	85	85	84	0	0	0	0	0
Ireland	1	1	1	1	1	1	1	1	1	1	1	1
Italy	75	74	69	1	1	1	1	1	1	1	1	1
Latvia	85	83	83	83	83	82	82	82	82	82	82	12
Lituania	86	82	82	82	82	71	71	71	71	71	71	20
Luxemburg	61	8	1	1	1	1	1	1	1	1	1	1
Malta	32	31	31	31	31	31	31	31	31	31	31	31
Netherlands	23	18	18	18	18	18	18	18	18	18	18	18
Poland	82	77	76	76	76	1	1	1	1	1	1	0
Portugal	85	84	81	81	79	79	79	79	0	0	0	0
Romania	86	85	81	80	79	79	1	1	1	1	1	1
Slovak Rep.	83	72	72	72	72	70	70	57	57	44	57	46
Slovenia	59	50	50	45	45	45	45	45	45	45	45	45
Spain	84	84	81	80	1	1	1	1	1	1	1	1
Sweden	33	33	33	33	33	33	33	33	33	33	33	33
UK	1	1	1	1	1	1	1	1	1	1	1	1
EU27	62.6	49.3	37.8	29.5	22.4	16.4	12.9	10.9	9.2	7.7	7.7	7.7
Croatia	71	62	62	60	60	60	60	59	59	59	59	59
Turkey	94	93	93	93	93	93	93	93	93	93	92	93
EU29	66.7	55.0	45.0	37.7	31.6	26.4	23.4	21.7	20.2	18.8	18.9	18.9

Table 4 (continued). Disenfranchisement in the Sequence of Optimal Language Sets (in percent)

Number	11 10a+ GR	12 11 + BG	13 12 + NL	14a 13 + FI	14b 13 + SW	15 14a+ SW	16a 15 + LT	16b 15 + SK	17 15a+ SK	18a 17 + LV	18b 17 + DK	19 18a+ DK
Languages												
Austria	0	0	0	0	0	0	0	0	0	0	0	0
Belgium	18	18	0	0	0	0	0	0	0	0	0	0
Bulgaria	77	2	2	2	2	2	2	2	2	2	2	2
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0
Czech Rep.	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	30	30	30	30	30	30	30	30	30	30	0	0
Estonia	69	69	69	65	69	65	64	65	64	64	64	64
Finland	67	67	67	0	63	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0	0	0	0	0
Germany	1	1	1	1	1	1	1	1	1	1	1	1
Greece	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	1	1	1	1	1	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	1	1	1	1	1	1
Latvia	82	82	82	82	82	82	81	82	81	10	81	10
Lituania	71	71	71	71	71	71	1	71	1	1	1	1
Luxemburg	1	1	1	1	1	1	1	1	1	1	1	1
Malta	31	31	31	31	31	31	31	31	31	31	31	31
Netherlands	18	18	0	0	0	0	0	0	0	0	0	0
Poland	1	1	1	1	1	1	1	1	1	1	1	1
Portugal	0	0	0	0	0	0	0	0	0	0	0	0
Romania	1	1	1	1	1	1	1	1	1	1	1	1
Slovak Rep.	44	44	44	44	44	44	44	1	1	1	1	1
Slovenia	45	45	45	45	45	45	45	45	45	45	45	45
Spain	1	1	1	1	1	1	1	1	1	1	1	1
Sweden	33	33	33	32	0	0	0	0	0	0	0	0
UK	1	1	1	1	1	1	1	1	1	1	1	1
EU27	6.2	5.0	4.0	3.3	3.3	2.7	2.2	2.2	1.7	1.3	1.3	1.0
Croatia	59	59	59	59	59	59	59	59	59	59	59	59
Turkey	92	92	92	92	92	92	92	92	92	92	92	92
EU29	17.5	16.4	15.6	14.9	15.0	14.4	14.0	14.0	13.5	13.2	13.3	13.0

Notes: One language is added in each column, as indicated in the second row. In columns 10a, 10b and 10c, 14a and 14b, 16a and 16b, and 18a and 18b, two or more languages result in approximately the same percentage reduction in disenfranchisement. The sequence is continued until no language reduces disenfranchisement by more than 1 million EU27 citizens. The languages included are all EU27 official languages and Russian. Russian is included for comparison only and does not enter the sequence as an EU language. Languages are abbreviated as follows: Bulgarian (BG), Czech (CZ), Danish (DK), Dutch (NL), English (EN), Finnish (FI), French (FR), German (GE), Greek (GR), Hungarian (HU), Italian (IT), Latvian (LV), Lithuanian (LT), Spanish (SP), Polish (PL), Portuguese (PT), Romanian (RO), Russian (RU), Slovak (SK), Swedish (SW).

Table 5. Disenfranchisement in the Sequence of Optimal Language Sets, Age Group under 30 (in percent)

| Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11a | 11b |
| | | 1 + | 2 + | 3 + | 4 + | 5 + | 6 + | 7 + | 8 + | 9 + | 10 + | 10 + |
Languages	EN	FR	GE	IT	SP	PL	RO	HU	PT	CZ	GR	BG
Austria	40	40	1	1	1	1	1	1	1	1	1	1
Belgium	39	8	8	8	8	8	8	8	8	8	8	8
Bulgaria	56	56	53	53	53	53	52	52	52	52	51	3
Cyprus	18	18	18	18	18	18	17	17	17	17	1	17
Czech Rep.	64	64	52	52	52	50	50	50	50	0	0	0
Denmark	9	8	6	6	6	5	5	5	5	5	5	5
Estonia	33	33	29	29	29	29	29	29	29	29	29	29
Finland	29	29	29	29	29	29	29	29	29	29	29	29
France	67	0	0	0	0	0	0	0	0	0	0	0
Germany	38	38	0	0	0	0	0	0	0	0	0	0
Greece	40	40	36	36	36	36	36	36	36	36	0	36
Hungary	76	76	64	64	64	64	63	0	0	0	0	0
Ireland	2	2	2	2	2	2	2	2	2	1	1	1
Italy	54	51	49	1	1	1	1	1	1	1	1	1
Latvia	55	55	54	54	54	53	53	53	53	53	53	53
Lituania	49	49	45	45	45	36	36	36	36	36	36	36
Luxemburg	50	2	1	1	1	1	1	1	0	0	0	0
Malta	10	10	10	10	10	10	10	10	10	10	10	10
Netherlands	11	11	10	10	10	10	10	10	10	10	10	10
Poland	57	56	50	49	49	1	0	0	0	0	0	0
Portugal	62	60	60	60	59	59	59	59	0	0	0	0
Romania	68	62	62	61	59	59	2	0	0	0	0	0
Slovak Rep.	57	57	39	39	39	38	38	31	31	23	23	23
Slovenia	22	22	17	15	15	15	15	15	15	15	15	15
Spain	65	63	63	62	1	1	1	1	1	1	1	1
Sweden	5	5	5	5	5	5	5	5	5	5	5	5
UK	2	2	2	2	2	1	1	1	1	1	1	1
EU27	44.6	34.5	25.8	19.9	14.4	10.4	7.8	6.3	5.1	3.9	3.1	3.1
Croatia	90	90	89	89	89	89	89	89	89	89	89	89
Turkey	34	33	26	25	25	25	25	25	25	25	25	25
EU29	50.3	41.5	33.8	28.7	24	20.5	18.2	17	15.9	14.9	14.1	14.2

Table 5 (continued). Disenfranchisement in the Sequence of Optimal Language Sets, Age Group under 30 (in percent)

Number	12	13	14a	14b	14c	14d	14e	18
								13 +
	11a+	12 +	13 +	13 +	13 +	13 +	13 +	FI/SK/L
Languages	BG	NL	RU	FI	SK	LT	LV	T/LV
Austria	1	1	1	1	1	1	1	1
Belgium	8	0	0	0	0	0	0	0
Bulgaria	3	2	2	2	2	2	2	2
Cyprus	1	1	0	1	1	1	1	1
Czech Rep.	0	0	0	0	0	0	0	0
Denmark	5	5	5	5	5	5	5	5
Estonia	29	29	15	27	29	29	29	27
Finland	29	29	28	1	29	29	29	1
France	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0
Greece	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0
Ireland	1	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	1	1
Latvia	53	53	11	53	53	53	7	7
Lituania	36	36	18	36	36	0	36	0
Luxemburg	0	0	0	0	0	0	0	0
Malta	10	10	10	10	10	10	10	10
Netherlands	10	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0
Romania	0	0	0	0	0	0	0	0
Slovak Rep.	23	23	23	23	0	23	23	0
Slovenia	15	15	15	15	15	15	15	15
Spain	1	1	1	1	1	1	1	1
Sweden	5	5	5	5	5	5	5	5
UK	1	1	1	1	1	1	1	1
EU27	2.3	1.8	1.4	1.5	1.5	1.5	1.5	0.7
Croatia	89	89	89	89	89	89	89	89
Turkey	25	25	25	25	25	25	25	25
	1	1	1	1	1	1	1	1
EU29	8	0	0	0	0	0	0	0

Notes: One language is added in each column, as indicated in the second row. In 11th place (columns 11a and 11b), Greek and Bulgarian result in approximately the same percentage reduction in disenfranchisement and if either is chosen as the 11th language, the other becomes the 12th language. Similarly, four EU languages as well as Russian qualify for the 14th position; column 18 therefore assumes that the four preceding EU languages (Finnish, Slovak, Latvian and Lithuanian) enter the sequence simultaneously. The sequence is continued until no language reduces disenfranchisement by more than 1 million EU27 citizens. The languages included are all EU27 official languages and Russian. Russian is included for comparison only and does not enter the sequence as an EU language.

Table 6. Disenfranchisement in the Sequence of Optimal Language Sets Accounting for Linguistic Distance (in percent)

Number	1	2 1 +	3 2 +	4 3 +	5 4 +	6 5 +	7 6 +	8a 7 +	8b 7 +	9 7a +
Languages	EN	FR	PL	GE	IT	HU	SP	GR	RO	RO
Austria	23	23	23	0	0	0	0	0	0	0
Belgium	33	8	8	3	3	3	3	3	3	3
Bulgaria	64	62	29	28	28	28	28	28	28	28
Cyprus	41	40	40	39	39	39	39	0	39	0
Czech Rep.	59	58	19	16	16	15	15	15	15	15
Denmark	14	14	13	9	9	9	9	9	9	9
Estonia	60	60	35	34	34	28	28	28	28	28
Finland	65	65	65	64	64	45	45	45	45	45
France	60	0	0	0	0	0	0	0	0	0
Germany	26	26	24	0	0	0	0	0	0	0
Greece	55	54	53	50	50	50	50	0	50	0
Hungary	88	87	86	84	84	0	0	0	0	0
Ireland	1	1	1	1	1	1	1	1	1	1
Italy	57	15	15	14	1	1	1	1	1	1
Latvia	65	64	27	27	27	27	27	27	27	27
Lituania	64	64	27	26	26	26	26	26	26	26
Luxemburg	28	3	3	0	0	0	0	0	0	0
Malta	31	31	31	31	30	30	30	30	30	30
Netherlands	9	9	9	3	3	3	3	3	3	3
Poland	61	60	1	1	1	1	1	1	0	0
Portugal	64	24	24	24	18	18	10	10	10	10
Romania	66	35	35	34	28	26	25	25	1	1
Slovak Rep.	59	59	19	17	17	13	13	13	13	13
Slovenia	41	39	20	17	16	16	16	16	16	16
Spain	64	22	22	22	18	18	1	1	1	1
Sweden	14	14	14	10	10	10	10	10	10	10
UK	1	1	1	1	1	1	1	1	1	1
EU27	43.1	24.0	16.6	11.4	9.0	6.9	5.2	4.0	4.1	2.9
Croatia	51	49	22	20	19	19	19	19	19	19
Turkey	93	93	93	92	92	92	92	92	92	92
EU29	49.5	32.9	26.3	21.7	19.6	17.8	16.4	15.3	15.4	14.3

Table 6 (continued). Disenfranchisement in the Sequence of Optimal Language Sets Accounting for Linguistic Distance (in percent)

Number	10a 9 + CZ	10b 9 + FI	10c 9 + BG	12 10a + FI/BG	13a 12 + SW	13b 12 + PT	14 13a+ PT
Languages							
Austria	0	0	0	0	0	0	0
Belgium	3	3	3	3	3	3	3
Bulgaria	20	23	2	2	2	2	2
Cyprus	0	0	0	0	0	0	0
Czech Rep.	0	14	14	0	0	0	0
Denmark	9	9	9	9	4	9	4
Estonia	15	11	15	11	11	11	11
Finland	45	0	45	0	0	0	0
France	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0
Greece	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0
Ireland	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	1
Latvia	8	8	8	8	8	8	8
Lituania	13	13	13	13	13	13	13
Luxemburg	0	0	0	0	0	0	0
Malta	30	30	30	30	30	30	30
Netherlands	3	3	3	3	3	3	3
Poland	0	0	0	0	0	0	0
Portugal	10	10	10	10	10	0	0
Romania	1	1	1	1	1	1	1
Slovak Rep.	3	10	10	3	3	3	3
Slovenia	15	16	16	15	15	15	15
Spain	1	1	1	1	1	1	1
Sweden	10	10	10	10	0	10	0
UK	1	1	1	1	1	1	1
EU27	2.1	2.1	2.2	1.3	1.1	1.1	0.9
Croatia	19	19	19	19	19	19	19
Turkey	92	92	92	92	92	92	92
EU29	13.6	13.6	13.7	13.0	12.7	12.8	12.6

Notes: One language is added in each column, as indicated in the second row. In columns 8a and 8b, 10a, 10b and 10c, and 13a and 13b, two or more languages result in approximately the same percentage reduction in disenfranchisement. The sequence is continued until no language reduces disenfranchisement by more than 1 million EU27 citizens. The languages included are all EU27 official languages and Russian. Russian is included for comparison only and does not enter the sequence as an EU language. Languages are abbreviated as follows: Bulgarian (BG), Czech (CZ), Danish (DK), Dutch (NL), English (EN), Finnish (FI), French (FR), German (GE), Greek (GR), Hungarian (HU), Italian (IT), Latvian (LV), Lithuanian (LT), Spanish (SP), Polish (PL), Portuguese (PT), Romanian (RO), Russian (RU), Slovak (SK), Swedish (SW).

Table 8. Votes According to the Rules of the Nice Treaty, All Respondents

Percent disenfr.	1 E	2 1+ GE	3 2+ FR	4 3+ IT	5 4+ SP	6 5+ PL	7 6+ RO	8 7+ HU	9 8+ PT	10a 9+ CZ	10b 9+ GR	11 10a GR
	Number of Countries											
10	2	5	6	7	8	9	10	11	12	13	14	15
20	2	6	8	9	10	11	12	13	14	15	16	17
30	3	6	8	9	10	12	13	14	15	16	17	18
40	6	9	11	12	13	14	15	16	17	18	19	20
50	7	11	13	14	15	16	17	18	19	21	20	22
	Votes											
10	36	79	108	137	164	191	205	217	229	241	245	257
20	36	92	133	162	189	216	230	242	254	266	270	282
30	49	92	133	162	189	223	237	249	261	273	277	289
40	69	112	153	182	209	236	250	262	274	286	290	302
50	73	120	161	190	217	244	258	270	282	301	294	313
	Population (millions)											
10	64	155	216	274	317	356	378	388	399	409	410	421
20	64	172	243	301	344	382	405	415	425	435	437	447
30	80	172	243	301	344	388	410	420	431	441	442	453
40	95	186	257	316	359	397	419	430	440	450	451	461
50	96	189	260	319	362	400	422	432	443	458	454	469

Notes: Shaded cells show the number of countries, votes and millions of citizens that are larger than or equal to the relevant minimum threshold required by the QMV rules to accept a reform. The number of languages varies between 1 and 11 (horizontal). The percent disenfranchisement (first column) refers to the highest disenfranchisement rate that countries would accept in order to support the reform. The rates are parametrized from 10 to 50 per cent. "All respondents" refers to those who have a good or very good knowledge of the language(s). There are two equivalent configurations for ten languages, denoted 10a and 10b. Column 11 then contains both 10a and 10b.

Table 9. Votes According to the Rules of the Nice Treaty, Respondents under 30

Percent disenfr.	1 E	2 1+ FR	3 2+ GE	4 3+ IT	5 4+ SP	6 5+ PL	7 6+ RO	8 7+ HU	9 8+ PT	10 9+ CZ	11a 10 GR	11b 10 BU
Number of Countries												
10	5	8	11	12	13	14	15	16	17	18	20	19
20	7	10	13	14	15	16	17	18	19	20	21	22
30	9	12	15	16	17	18	19	20	21	23	24	24
40	14	16	17	18	19	21	22	23	24	25	25	26
50	16	17	20	20	21	22	23	24	25	25	25	26
Votes												
10	56	101	153	182	209	236	250	262	274	286	302	296
20	73	118	161	190	217	244	258	270	282	294	306	304
30	84	129	172	201	228	255	269	281	293	312	324	322
40	151	184	191	220	247	281	295	307	319	331	331	341
50	162	191	254	254	281	293	307	319	331	331	331	341
Population (millions)												
10	79	150	257	316	359	397	419	430	440	450	462	458
20	95.9	167	260	319	362	400	422	432	443	453	464	460
30	103	175	267	325	368	406	429	439	449	465	476	472
40	217	278	283	342	385	426	449	459	469	479	479	487
50	221	281	383	383	426	436	459	469	479	479	479	487

Notes: Shaded cells show the number of countries, votes and millions of citizens that are larger than or equal to the relevant minimum threshold required by the QMV rules to accept a reform. The number of languages varies between 1 and 11 (horizontal). The percent disenfranchisement (first column) refers to the highest disenfranchisement rate that countries would accept in order to support the reform. The rates are parametrized from 10 to 50 per cent. Speakers under 30" refers to speakers who are at most 29 years old.

Table 10. Votes According to the Rules of the Nice Treaty, All Respondents, Accounting for Linguistic Distance

	1	2	3	4	5	6	7	8	9	10a	10b
		1+	2+	3+	4+	5+	6+	7+	8+	9+	9+
	E	FR	PL	GE	IT	HU	SP	GR	RO	CZ	GR
	Number of Countries										
10	3	6	7	11	12	13	15	17	18	21	21
20	5	9	13	15	17	18	18	20	21	25	25
30	8	13	20	20	22	24	24	26	26	26	27
40	10	17	24	24	24	25	25	26	25	26	26
50	12	17	24	25	25	27	27	27	27	27	27
	Votes										
10	49	94	121	177	206	218	257	273	287	310	305
20	66	140	190	229	268	280	280	296	310	335	332
30	109	218	289	289	306	322	322	338	338	338	345
40	124	243	314	314	314	326	326	338	326	338	338
50	132	243	314	326	326	345	345	345	345	345	345
	Population (millions)										
10	80	152	190	295	354	364	417	429	451	469	464
20	95	225	281	371	425	435	435	447	469	483	481
30	186	369	438	438	461	472	472	484	484	484	489
40	197	394	463	463	463	473	473	484	473	484	484
50	200	394	463	474	489	489	489	489	489	489	489

Notes: Shaded cells show the number of countries, votes and millions of citizens that are larger than or equal to the relevant minimum threshold required by the QMV rules to accept a reform. The number of languages varies between 1 and 11 (horizontal). The percent disenfranchisement (first column) refers to the highest disenfranchisement rate that countries would accept in order to support the reform. The rates are parametrized from 10 to 50 per cent. "All respondents, accounting for linguistic distance" considers all respondents and correct disenfranchisement to account for linguistic distance.

Table 11. Votes According to The Penrose Law

	Number of countries												Sum of sq. roots of populations											
No. of languages	1	2	3	4	5	6	7	8	9	10a	10b	11	1	2	3	4	5	6	7	8	9	10a	10b	11

All (speakers)

% disenfr	1	2	3	4	5	6	7	8	9	10a	10b	11	1	2	3	4	5	6	7	8	9	10a	10b	11
		1+	2+	3+	4+	5+	6+	7+	8+	9+	9+	10a		1+	2+	3+	4+	5+	6+	7+	8+	9+	9+	10a
	E	GE	FR	IT	SP	PL	RO	HU	PT	CZ	GR	GR	E	GE	FR	IT	SP	PL	RO	HU	PT	CZ	GR	GR
10	2	5	6	7	8	9	10	11	12	13	14	15	10	22	30	38	44	51	55	58	62	65	66	69
20	2	6	8	9	10	11	12	13	14	15	16	17	10	26	37	45	51.7	57.9	62.6	65.8	69	72.2	73.2	76.4
30	3	6	8	9	10	12	13	14	15	16	17	18	14	26	37	45	52	60	65	68	71	75	75	79
40	6	9	11	12	13	14	15	16	17	18	19	20	20	32	43	51	58	64	69	72	75	78	79	82
50	7	11	13	14	15	16	17	18	19	21	20	22	21	35	46	53	60	66	71	74	77	83	81	86

Speakers Š 30

% disenfr	1	2	3	4	5	6	7	8	9	10	11a	11b	1	2	3	4	5	6	7	8	9	10	11a	11b
		1+	2+	3+	4+	5+	6+	7+	8+	9+	10	10		1+	2+	3+	4+	5+	6+	7+	8+	9+	10	10
	E	FR	GE	IT	SP	PL	RO	HU	PT	CZ	GR	BU	E	FR	GE	IT	SP	PL	RO	HU	PT	CZ	GR	BU
10	5	8	11	12	13	14	15	16	17	18	20	19	16	27	43	51	58	64	69	72	75	78	82	81
20	7	10	13	14	15	16	17	18	19	20	21	22	21	32	46	53	60	66	71	74	77	80	84	83
30	9	12	15	16	17	18	19	20	21	23	24	24	24	36	49	57	63	69	74	77	81	86	89	89
40	14	16	17	18	19	21	22	23	24	25	25	26	44	52	55	62	69	77	82	85	88	91	91	94
50	16	17	20	20	21	22	23	24	25	25	25	26	46	54	70	70	77	80	85	88	91	91	91	94

All (distances)

% disenfr	1	2	3	4	5	6	7	8	9	10a	10b	1	2	3	4	5	6	7	8	9	10a	10b
		1+	2+	3+	4+	5+	6+	7+	8+	9+	9+		1+	2+	3+	4+	5+	6+	7+	8+	9+	9+
	E	FR	PL	GE	IT	HU	SP	GR	RO	CZ	GR	E	FR	PL	GE	IT	HU	SP	GR	RO	CZ	GR
10	3	6	7	11	12	13	15	17	18	21	21	14	26	32	49	57	60	70	74	78	86	85
20	5	9	13	15	17	18	18	20	21	25	25	19	38	52	64	73	77	77	81	85	93	92
30	8	13	20	20	22	24	24	26	26	26	27	32	60	79	79	84.8	89.1	89.1	93.3	93	93	96
40	10	17	24	24	24	25	25	26	25	26	26	36	68	87	87	87	90	90	93	90	93	93
50	12	17	24	25	25	27	27	27	27	27	27	38	68	87	90	90	96	96	96	96	96	96