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One Market, One Law: EU Enlargement in light of the economic theory of optimal legal areas

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**One Market, One Law: EU
Enlargement in light of the economic
theory of optimal legal areas**
by**

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Abstract:

Drawing on a new analytical framework provided by the economic theory of optimal legal areas, this paper identifies the factors determining the optimal size of the European Union. It applies this theory to the question of how enlargement affects the welfare of the current and the new members of the European Union as well as that of the non-qualified countries. A welfare analysis reveals that enlargement can be a pareto-superior move. But, it also shows that enlargement can impose a negative externality on those countries left behind. In this case the results of a Kaldor-Hicks test are mixed. Furthermore, it is shown that the enlargement decision of the Union is unlikely to maximize overall welfare.

JEL classification: D71, F02, F15, K33, P33

Key words: enlargement of the European Union, approximation of law, optimal legal areas.

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One Market, One Law: EU Enlargement in light of the economic theory of optimal legal areas^{**}

I. Introduction

Widening the European Union means increasing the area in which the so-called *acquis communautaire*, the entire body of existing EU legislation and practices, is applied. As the Commission in its "Agenda 2000. For a stronger and wider Union" declares, new members have to "take on the rights and obligations of membership on the basis of the *a c q u i s* as it exists at the time of accession; they will be expected to apply, implement and enforce the *acquis* upon accession; in particular the measures necessary for the extension of the single market should be applied immediately" (Bulletin of the European Union, [Supplement 5/97, 52]). Currently, several applicant countries, in particular the first wave countries Estonia, Hungary, Poland, Slovenia, Czech Republic, try to meet this challenge with the assistance of the European Union (for an excellent description of the oversight of the EU and an assessment of pre-accession see Pelkmans, Gros, Ferrer [2000, ch. 2]).

Many aspects of the enlargement issue have been discussed in the Economics literature, but, somewhat surprisingly, the approximation of law has to a large extent gone unnoticed. Studies based on established theories of economic integration focus on gains achieved from trade liberalization, which are attributed to two effects: (static) allocation effects, such as trade creation, trade diversion, capturing of trade rents, profit effects, scale effects and variety effects; (dynamic) accumulation effects altering the level of national resources (see Baldwin, Francois, Portes [1997]). These gains are then compared with the fiscal burden of enlargement in order to identify likely winners and losers (see for example Kohler [2000]; Baldwin, Francois, Portes [1997]). To the best of our knowledge this literature is not directly concerned with the approximation of the law. In their survey on the measurement of costs and benefits of accession to the EU-15 and selected countries in Central and Eastern Europe Mortensen and Richter do address the application of the *acquis* (see for example Mortensen and Richter [2000, pp. 14, 19, 107 and section IV.6]) and report results of attempts to empirically measure the costs of the adoption of the *acquis* (see for example [pp. 22, 23]), however, there

^{**} We would like to thank Christoph Bier and Roland Kirstein as well as the participants of the workshop "European integration, legal harmonisation and public policies" in Cortè for helpful comments.

is no indication of an economic model focusing on this issue (see also the list of main issues, determining the procedure of modeling the impact of accession to the EU on p. IV).

As Jorgensen and Richter mention, the techniques and models used to evaluate the costs and benefits of EU accession have typically been computable general equilibrium models, macro models, sectoral approaches, gravity models focusing on trade effects, and optimal currency area frameworks (see Jorgensen, Richter [2000, IV]). This paper addresses the enlargement issue from the point of view of a new analytical framework provided by the economic theory of optimal legal areas. For the purpose of this paper, an optimal legal area is defined as the group of economic agents for whom submitting to the same protective agency enforcing a legal order maximizes net benefits (benefits net of costs). In the spirit of the social contract theory as developed by the Virginia School (see Buchanan [1975], [1990]) and the theory of clubs (see Buchanan [1965]; Allen/Amacher/Tollison [1974], and Sandler/Tschirhart [1980]), states and state-like entities such as the European Union are viewed as law enforcement agencies, i.e., protective clubs, with finite membership. Using Kronman's terms, what the club provides is possessive and transactional security (Kronman [1985]). While for domestic, internal transactions one monopolist, the protective state, has the responsibility of enforcing law, international, external transactions establish contact with a multitude of legal systems in which a monopoly of power is claimed by each state within its boundary. Given a multipolar system of protective states organized around the principle of the territoriality of law, each protective state can only ensure the possessive and transactional security of its clients within its territory; it cannot ensure their possessive and transactional security beyond state borders. From this point of view – which characterizes the New Institutional Economics of International Transactions – enlargement is a kind of merger of protective states involving the approximation of law.¹

The new analytical framework provided by the economic theory of optimal legal areas is rich enough to formally represent not only the *acquis*, *acquis* adoption and adoption gaps, but also the administrative capacity determining the enforcement of the *acquis* (see tables 2.2a, 2.2b, 2.3a, 2.3b in Pelkmans, Gros, Ferrer [2000]). Since this theory is capable of deriving the optimal number and size of nations in the world, it can be used to determine the optimal size of the Union as a legal area. In this paper the optimal size of the Union is derived by taking account of the following economic parameters: the international allocation of human capital,

¹ The article by De Benedicts, Padoan [1994] considers the issue of EU enlargement towards Eastern Europe as a club enlargement problem. Optimal club size is determined by equating marginal benefits with the marginal costs of providing a club good. However, the article does not address the problem of the adoption of the *acquis*, and the model presented in the paper consists of a simple graph representing marginal cost and benefit curves.

the productivity of human capital, traditional trade barriers, administrative protectionism, differences in regulatory setting and legal orders, and the enforcement costs of a legal order. Whereas the costs of enlargement to the EU-15 are often or even exclusively discussed in terms of additional spending via various EU-funds, this paper focuses on the enforcement costs to both the EU-15 and the new members, starting from the observation that the overwhelming part of EU activities relates to regulation and liberalization, not to money (see Pelkmans, Gros, Ferrer [2000, 22]). Enforcement costs consist of (a) the costs of running the legal system mainly reflected by tax rates and litigation fees, (b) the costs of intermediaries, such as lawyers and lobbyists, (c) the privately incurred costs of protecting private property and transactions and, most important, (d) the costs of complying with the myriads of regulatory laws imposed on firms.²

The enforcement costs of a legal order present a major part of the transaction costs, broadly defined as the costs of running an economic system (Arrow [1969, 48]) which, besides enforcement costs, also include marketing costs and the costs of organizing firms.³ Clearly, the adoption of the *acquis* will entail considerable set up and running costs which cannot be neglected in a welfare analysis.⁴ Enlargement will also affect the transaction costs of the incumbent countries. A full fledged analysis of the welfare effects of enlargement requires a discussion of these transaction costs for two reasons. The first is its magnitude. The second is that the costs of enlargement to the East may depend on the extent to which the adoption of the *acquis* will stunt eastern growth and raise unemployment rates. As Baldwin, Francois, Portes rightly mention, "[t]he CEECs do need market economy rules, and there is some merit to adopting pre-set rules like the *a c q u i s* , but the *a c q u i s* is surely a sub-optimal set of rules for nations in the midst of their 'take off' stage of growth" (Baldwin, Francois, Portes [1997, 128]; see also Smith et.al. [1995], quoted there). Even if quantifying the costs of an

² According to a study conducted by Bier [1999] the production costs of the judicial sector (mainly the sum of a) and b)) for Germany amount to 86 Billion DM. 48 Billion were financed by the state budget, 37 are privately incurred production costs. The opportunity costs of time and the error costs due to judicial decisions are not included.

³ According to Wallis, North [1988] who measured the transaction costs of the US-economy in 1970, transaction costs range from 46.66 to 54.71 % of GDP. The lower figure does not include value added of the public sector; it comprises marketing costs and the costs of organising firms. However, marketing costs as well as the costs of organising firm are largely influenced by the law.

⁴ The costs of complying with the *acquis* vary from one area to another (see Mortensen and Richter [2000, 22]). Mortensen and Richter [2000, 22, 23] conclude that "the financial implications of all this may be considerable, amounting in the case of the low-income CEECs to several per cent of their annual GDP: a cost that will have to be sustained over an extended period." They quote a recent estimate, according to which the total cost of applying the EU standards and norms would, for Hungary, be in the range of 50-120 per cent of one year's GDP (see footnote 24, on p. 23). See also European Commission DG 11: Compliance Costing for approximation of EU environmental legislation in the CEEC, April 1997. However, these are set up costs which do not count in the medium and long run. In any case, they are fixed and sunk costs.

inefficient legal order is seemingly impossible (see Baldwin, Francois, Portes [1997, 128]) – and in any case not intended by this paper – a suitable theoretical enlargement model must allow for their analytical representation. Having done this, one could try to calculate these costs on the basis, for example, of the factors identified and measured by Wallis and North [1988] or Bier [1999].

This paper also tries to identify the factors determining the winners and losers in the Union enlargement and it tries to answer the question whether enlargement improves overall welfare. Given the historical and geographical facts, the paper's focus is on the impact of enlargement on the welfare of the current members of the EU and the Middle and Eastern European applicant countries. Whether the EU-15 and the candidates gain or lose from enlargement depends on two effects. The first is the income effect, whose sign is determined by the difference between per capita income after and before enlargement. The second is the cost effect whose sign depends on the difference between per capita enforcement cost of a legal order after and before enlargement. The paper identifies the parameter constellation under which countries are better off or worse off according to the Pareto- and Kaldor-Hicks criteria. Three qualifications are in order. First, this is a theoretical paper. It does not provide empirical evidence. However, all the parameters and variables used in the analysis can be operationalised. Thus, the approach adopted in this paper allows for the derivation of empirically testable hypotheses. We will take up this issue when outlining the theory. Second, this paper addresses the enlargement issue from a purely economic point of view; so called political as well as military considerations are neglected. This is not to deny that eastern enlargement is a central pillar in Europe's post-cold war architecture (see Baldwin, Francois, Portes [1997, 128]). As Baldwin et.al. [1997, 128] put it: "geopolitical considerations constitute the engine driving enlargement, but the economic and financial considerations constitute the brake."⁵ Politicians are in the driver's seat, but rational decisions should be based on an overall assessment of the economic impact of enlargement, in particular with regard to the most politically sensitive budget costs. Neglecting economic costs of enlargement might prompt severe political crises (see ch. 7 in Pelkmans et.al. [2000]). It should be pointed out that geopolitical factors can be analyzed using a generalized version of

⁵ Pelkmans et.al. [2000, 73] speak of the "foreign-policy-driven enlargement strategy", dominated by the primacy of values, pan-European security and stability and an EU-performance-driven enlargement strategy, dominated by the refusal to 'water-down' EU-institutions, laws and decision-making and by the assurance that the Union's core assets (the IM, the Euro and the relevant common policies) will not be affected negatively in any way." These authors propose a "core IM acquis" as an operational concept to solve the internal market part of the dilemma (see ch. 4).

the model used here. Finally, the paper is concerned with the specific medium to long-run economic aspects of eastward enlargement.

The rest of the paper is organized as follows: Section II contains a rough outline of the theory of optimal legal areas. Section III derives the optimal degree of enlargement. Section IV identifies the winners and the losers of the enlargement. Section V compares the social planner solution with that chosen by the EU. Section VI concludes the paper.

II. An Economic Theory of Optimal Legal Areas

The economic theory of optimal legal areas is based on two functions: the per capita income production function and the per capita enforcement cost function of a legal order. Both per capita income and per capita enforcement costs of the legal order are assumed to be functions of

- the degree of specificity of property rights in terms of their content and personal assignment,
- the degree of enforcement of property rights,
- the degree of openness of the economy and
- the size of the club as determined by the number of parties subscribing to a legal order.

Enforcement costs also depend on whether the club is organized according to the territoriality or the personality principle.⁶ Since we are interested in the optimal size of the club we analyze per capita income and enforcement costs as a function of the size of the club (assuming the other variables to take on their optimal values).⁷

1. The income production function

Paraphrasing Adam Smith's famous statement that the division of labor is limited by the extent of the market one could say that the division of labor is limited by the size of the club. Since a deepening of the division of labor leads to higher wealth we can start with the assumption that per capita income increases with the size of the club. Connecting the division

⁶ Both principles represent techniques of enforcing the law. The territoriality principle means that enforcement is linked to a certain territory. It is "a strategy to control people and things by controlling area." (Sack [1986, 5].) But the protection by a nation's law can also be linked to the person as such (manifest in the form of 'national citizenship'), and determined independently of that person's present place of residence (see Schmidtchen/Schmidt-Trenz [1990]).

of labor with the number of economic transactions, we might alternatively say that the number of transactions increases with the size of the club, thereby increasing the wealth of the members. We further assume that the marginal return of a member is constant. Let Y denote per capita income and n the number of members of the club, then we have

$$(1) \ Y = Y(n), \quad \frac{\partial Y}{\partial n} > 0 \quad \frac{\partial^2 Y}{\partial n^2} = 0.$$

For a specification of this function we draw on the endogenous growth literature (see Romer [1986]), which emphasizes the relationship between aggregate human capital and factor productivity.

Divide the world into two potential areas, country x and the rest of the world. Assume that world population has mass 1. Define H_x as aggregate human capital in country x and $H_{\sim x}$ as aggregate human capital in the rest of the world (see for the following Alesina/Spolaore [1997, 1040]). Finally, assume that individual income in country x , denoted Y , depends on aggregate human capital as described in (2)

$$(2) \ Y = b_o + b_1 \cdot H_x + b_2 \cdot H_{\sim x}; \quad b_o, b_1, b_2 > 0$$

Equation (2) implies that individual income is given by a constant b_o plus a linear term in aggregate human capital, both at home and abroad. Parameters b_1 and b_2 stand for the aggregate human capital externality.

It is useful to reformulate equation (2). Let h denote total human capital in the world. Assuming that each individual is endowed with the same amount of human capital we get:

$H_x = n \cdot h$ and $H_{\sim x} = (1 - n) \cdot h$, with n denoting size of country x . Setting $b_2 = (1 - j) \cdot b_1$ leads to

$$(3) \quad Y = b_o + b_1 \cdot h[n + (1 - j)(1 - n)]$$

⁷ A comprehensive treatment of the theory of optimal legal areas can be found in Schmidt-Trenz/Schmidtchen [2000].

(3) is a linear function with slope $\frac{\partial Y}{\partial n} = b_1 \cdot j \cdot h$ and vertical intercept $b_0 + b_1(1-j) \cdot h$.⁸

We interpret parameter j as an indicator of the closeness of the economy of country x . It represents tariffs and nontariff barriers to trade. If $j = 1$, we have a completely closed domestic economy. Members of country x only interact with each other. The size of the market is identical to the size of the country. Thus, individual income is only determined by the domestic aggregate human capital. Since a larger country implies a larger market size, country size matters for domestic income.

If $j = 0$, we have the opposite case of a completely open economy. It does not matter for the per capita income in country x where a unit of human capital is located since there is no difference between the aggregate human capital externalities of domestic and foreign human capital (see Alesina/Spolaore [1997, 1041]). It follows that the size of the country is irrelevant for individual domestic income because it does not determine the size of the market (see Alesina/Spolaore [1997, 1040]).⁹ Equation (3) represents in a nutshell what we know from international economics: Barriers to trade – terms of trade effects aside – damage per capita income of a country. This damage is higher the smaller the country is. Moreover, equation (3) also represent the insight that welfare gains from trade "generally stem from imports rather than exports" (Baldwin, Francois, Portes [1997, 131]). Equation (3) also suggests to measure the volume of imports by $(1-j)(1-n)$. The volume of exports can only be represented by the analogue term in the income production function of the other country.

The curve labeled Y in figure 1 is a graphical representation of (3).

2. The enforcement cost function

The function $C = C(n)$ represents the individual cost contributions to the total costs of enforcing the legal order of country x .

⁸ The slope of the curve is determined by the difference of the marginal income productivity of a unit of human capital when belonging to x from its productivity when located in $\sim x$. Internalizing one additional unit increases income in country x by $b_1 \cdot h$ and decreases it by $b_1 h(1-j)$, since $dn = -d(1-n)$. Calculating the difference $b_1 \cdot h - b_1 h(1-j)$ gives the slope of the curve. $b_1 \cdot h(1-j)$ can be considered as being the marginal opportunity costs of internalizing a foreign unit of human capital. As long as the marginal product $b_1 \cdot h$ exceeds marginal opportunity costs income in country x increases. Note, that parameter j is a shift parameter of the Y -curve.

⁹ Note that the version of the income production function used here implies a separation of internal from external transactions in the sense that changing trade barriers does not affect the amount of internal transactions. Of course, a generalised income production function could take account of a substitution of external transactions by internal ones (and vice versa).

The enforcement cost C is comprised of two parts. One part reflects the costs incurred for enforcing the legal order *internally* among the social contract parties themselves (compatriots). This part includes costs of protecting the property rights, including the costs imposed on the firms by regulatory laws, the costs of safeguarding domestic contracts and the costs of dispute management. They can be measured as the sum of the following costs components: a) resources invested in the judicial sector of the economy, b) the costs of intermediaries (lawyers, lobbyists), c) privately incurred protection costs and d) firms' costs of compliance with regulation. The other part of enforcement costs takes account of the fact that the legal order needs to be defended *externally*, i.e., against strangers to the legal order (non-compatriots). This could come about in two ways. A state could attack members of another state in order to appropriate their wealth or enslave them or, if there are transactions between individuals belonging to different states, either tortuous acts, contract or criminal conflicts may arise. Thus, private international transactions may result in conflict and ultimately in war unless there is a „superclub“ dealing with such problems on an international scale. Both factors make up the transaction costs of running a multitude of states.

Internal enforcement costs can be interpreted as a function of the number of voluntary and involuntary, i.e. tortuous and criminal, transactions performed among the members of the club. Let IC and T , respectively, denote internal enforcement costs and this number, then we have $IC = IC[T(n)]$, with $\frac{\partial IC}{\partial n} > 0$.¹⁰ Like internal enforcement costs, the external

enforcement costs can be written as a function of the number of transactions between members of the club and foreigners. With EC denoting external enforcement costs and taking the number of transactions as a function $T(n, j)$ we get $EC = EC[T(n, j)]$, with $\frac{\partial EC}{\partial n} < 0$ and

$\frac{\partial EC}{\partial j} < 0$. The number of external transactions decreases with the club size and also decreases

with higher barriers to trade leading to a reduction in external transaction costs.¹¹

¹⁰ This property is due to the increased division of labour associated with larger club size. Wallis, North show that transaction costs doubled from 26.09 % of GDP in 1870 to roughly 50 % in 1970. They conclude that the relative increase of transaction costs is necessary in order to reap the gains of a deeper division of labour and higher specialisation (see Wallis, North [1988, 122]). Wallis, North [1988, 122-123] mention three sources driving this development: the number of transactions concluded on anonymous markets increase, increasing firm size implying higher co-ordination cost, and changing political systems. We feel that these sources are also active when increasing club size. If the number of potential legal conflicts rises proportionally to the number of possible interactions, then – according to the formula $n(n-1)$ – an additional member means an exponential rise in conflicts.

¹¹ Stylised facts give support to these properties of the external enforcement cost function. As is well known, big countries, such as the US, by virtue of its size and diversity of resources, rely less on international trade than smaller countries.

Adding up the internal and external enforcement costs gives overall enforcement costs C . The following equation represents such a cost function

$$(4) \quad C = c_1 \cdot n^2 + c_2 [(1-j)(1-n)]^2, \text{ with } c_1, c_2 > 0.$$

The first term on the right hand side describes internal enforcement costs. This part of the C -function increases exponentially in n , which might be due to congestion effects of additional members. (See fig. 1 for a graphic representation of this function.) The second term on the right hand side of (4) stands for the enforcement costs associated with a club member's external transactions. This function is downward sloping in the way as presented in fig. 1.

The curve of the overall enforcement costs per capita can be derived by vertical aggregation of the IC - and EC -curves. Given the properties of the internal and external enforcement cost functions, as shown in fig. 1, the C -function is u -shaped.¹² We assume that the territoriality principle rather than the personality principal is applied as enforcement technology. As has been shown elsewhere (see Schmidtchen/Schmidt-Trenz [1990]) the territoriality principle is the efficient one. With the personality principle in place the C -function would have to be shifted upwards in fig. 1.

3. The optimal size of a nation state

State size is optimal if the net gain from membership is at a maximum. Graphically, the slope of the cost curve C must be equal to the slope of the income production curve Y . That is the case with $n = n^*$ (see fig. 1).

¹² The condition for the u -shape is: $\frac{\partial C}{\partial n} < 0$ for $n = 0$ and $\frac{\partial C}{\partial n} > 0$ for $n = 1$. Since $\frac{\partial C}{\partial n} = 2c_1 \cdot n - 2c_2(1-j)^2(1-n)$ both conditions hold. Note that the enforcement cost function as it is set up rules out a substitution of external transactions by internal ones if trade barriers increase (and vice versa). As with the income production function (see fn. 9), a generalized version would allow for this possibility.

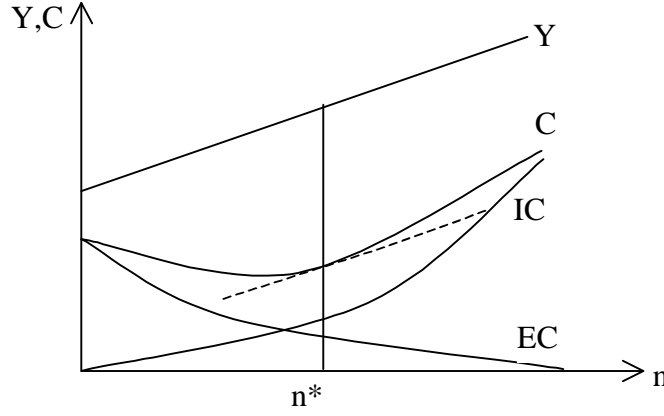


Figure 1: Optimal Size of the State

The curves in fig. 1 labeled Y , C , IC and EC represent, respectively, the income function and the total, internal and external enforcement cost functions. With the help of n^* the optimal number and size of nations in the world can be determined.

As can easily be seen, it is the u -shape of the enforcement cost function that is responsible for a finite optimal size of states.¹³

Assuming risk neutrality, the optimal size n^* can algebraically be calculated by setting equal the partial derivatives of the Y -function (3) and the C -function (4) with respect to n , which yields the first order condition for a maximum. Solving for n leads to

$$(5) \quad n^* = \frac{c_2(1-j)^2 + b_1 j h / 2}{c_1 + c_2(1-j)^2}.$$

(5) shows how optimal membership size depends on the parameters of the model. It allows for the following interpretation:

- $n = 0$ can never be an optimum.
- With $2c_1 < b_1 \cdot j \cdot h$, the optimal state size is $n^* = 1$.
- An increase (decrease) of c_1 implies a smaller (bigger) optimal size. The reason is that a change of the internal enforcement costs leads to a substitution of membership for non-

¹³ For a more thorough discussion of this point see Bean [1973, 204], Auster/Silver [1979, 29], and Moss [1980, 25]. As an analogy to the theory of the firm, Bean [1973, 204] assumes such a shape. Auster/Silver [1979, 28 f.] point out that opportunism becomes more important with growing membership. In this context, compare Williamson [1967]. He confirms that “the management factor is responsible for a limitation to firm size” (Ibid, p. 123). Moss (ibid p. 25), however, argues that: “[u]nless something is said about tastes or technology of providing public services, it would seem that the optimal size of the ‘protective state’ is the world population”. Nozick [1974, 30] also seems to focus on increasing returns to scale.

membership: with lower c_1 membership becomes more attractive relative to non-membership, and vice versa with rising c_1 .

- Analogously, an increase (decrease) in the external enforcement costs parameter c_2 implies a bigger (smaller) optimal size n^* .¹⁴
- A higher human capital externality (higher b_1) implies higher optimal size of the state because the marginal product of internal human capital rises relative to the external one (the income production function becomes steeper).
- $j = 0$ implies $n^* = \frac{c_2}{c_1 + c_2} < 1$.¹⁵

At this point a short remark about the nature of the club good provided by a protective state seems in order. The club good provided by a protective state does not consist of the gross income resulting from membership in the club, rather it consists of the internal and external protection of property rights. In contrast to public goods a club good is excludable (i.e. it is possible to prevent its consumption by non-members of the club) and it is non-rival up to a certain size of the club when congestion occurs (the net gain of any one individual will be negatively affected by the presence of more members of the club). Note that the world remains in anarchy if $n = 0$. In anarchy the net gain of a representative individual is smaller than $Y(0) - C(0)$, which creates the incentives to think about forming a protective state in the first place.

III. Enlargement

1. The modified model

a) The assignment of the world population

We now turn to an application of the theory of optimal legal areas. If there were no costs of creating a politico-economic system on a world-wide scale, and with homogeneous world population then the number and size of the nations could be structured in an efficient manner.

¹⁴ $\frac{\partial n^*}{\partial c_2} > 0$ if $2c_1 > b_1 \cdot j \cdot h$.

¹⁵ This result contradicts the Alesina/Spolaore [1997] proposition that with free trade country size does not matter since it does not determine the size of the market.

All that is needed is to divide world population by n^* .¹⁶ However, this is not the world as we know it. We cannot create a system of states from scratch. Restructuring involves costs. World population is not homogeneous and history plays a role. In regard to history think of the cold war and the iron curtain, two factors that operated as constraints to a purely economic determination of the size of the Union. The political challenge nowadays is not how to implement the grand design, but how to manage the enlargement of the Union. This does not make the model of the preceding section useless, but it has to be modified in the following way. Before enlargement, world population is assigned to three groups of states: the European Union (*E*-countries, EU-15), the Middle and Eastern European countries (*M*-countries) and the rest of the world (*R*-countries), which have size n_E , n_M and n_R , respectively. Since $n_E + n_M + n_R = 1$ and $n_E, n_M, n_R \geq 0$ there is an upper limit of potential members of the Union which amounts to $n_E = 1 - n_M - n_R$.

We then take the fall of the iron curtain as a factor allowing for a restructuring of the initial assignment of the world population. Enlargement leads to splitting up the former *M*-group into two subgroups, namely new members, denoted *Q* with group size n_Q , and outsiders, denoted *D* with group size n_D . Fig. 2 shows the pattern of this restructuring and the respective group sizes.

¹⁶ If the total number of agents is not an integer multiple of the optimal club size (i.e., if there will be a "population residual"), the objective of global welfare maximisation calls for club sizes bigger than those requested by the individual preferences of the club members. See i.a., Pauly [1970] and Ng [1974]. An important question is: which is the "natural" (non-cooperative) equilibrium that results (see Pauly [1967] and [1970])? If, for example, the optimal club size is as big as two thirds of the population, the club outsiders have an incentive to pay bribes to some insiders (club members) in order to make them leave and join a new club. Such a bribery attempt could, however, be answered by a similar attack from the remaining club members. Possibly there would be no equilibrium at all in such a situation.

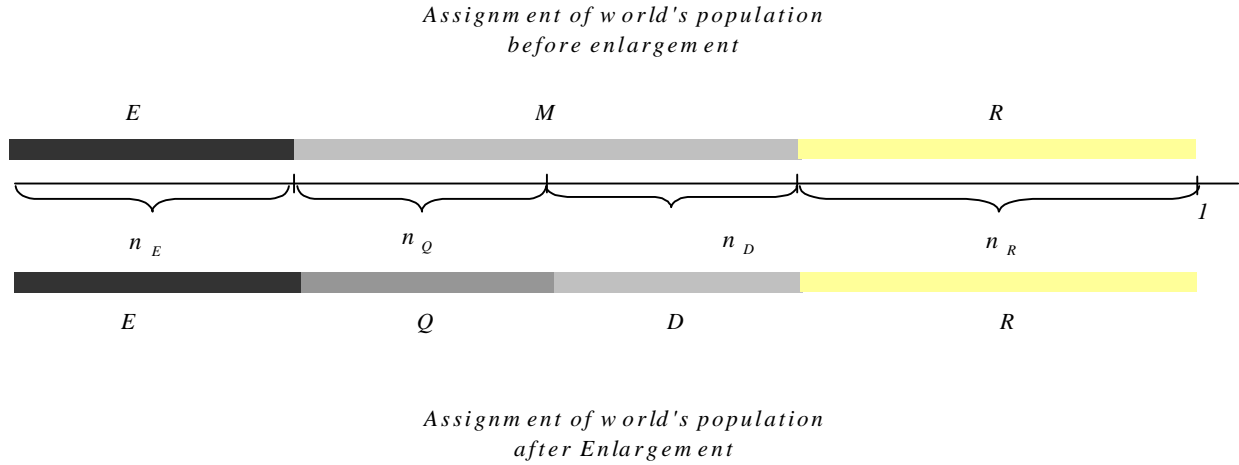


Figure 2: Assignment of world's population before and after enlargement

The upper part of figure 2 shows the initial assignment of the world population, the lower part the assignment after enlargement has taken place. The respective group sizes are indicated in between. A rough calculation leads to the following figures starting with world population 6.000 m (mass 1):

$$\begin{aligned}
 n_E &= 6 \% && (= 370 \text{ m for EU-15}) \\
 n_Q &= 1 \% && (= 62 \text{ m for first wave countries}) \\
 n_D &= 0,07 && (= 42 \text{ m when identifying second wave countries with outsiders}) \\
 n_R &= 92,93 && (= 5.260 \text{ m rest of the world})
 \end{aligned}$$

b) The modified income production function

We also explicitly take account of differences in the legal orders by introducing a parameter $0 < \alpha \leq 1$ which represents the effects of regulation of economic activities as well as of private law on the productivity of human capital. To illustrate: $\alpha < 1$ reflects legal order induced distortions in the sense of malfunctioning markets, missing markets, and a structure of the economy that does not represent preferences and factor endowments. As a consequence, the economy produces below its production possibility frontier. Borrowing from the theory of the firm, $\alpha < 1$ stands for X-inefficiency on an economy wide scale. Group *E*'s legal order is assumed to be better than that of the *Q*-, *R*- and *D*-groups, formally $1 \geq \alpha_E > \alpha_Q > \alpha_R > \alpha_D$. This ranking is the after enlargement ranking (before enlargement $\alpha_Q = \alpha_D$); $\alpha_E > \alpha_Q$ can represent several things: the already mentioned fact that the *acquis* is a sub-optimal set of rules for the new members, adoption gaps (see Pelkmans, Gros, Ferrer [2000, sect. 2.4])

or inefficient administering of the *acquis* (see for the current state of affairs Pelkmans, Gros, Ferrer [2000, sect. 2.5]). The higher \mathbf{a} is, the higher the productivity of the human capital will be. Productivity serves as a measure of the quality of a legal order. This convention opens up the possibility of a very simple representation of legal order differences.¹⁷ We assume that in the case of different \mathbf{a} s the minimum value is binding. That means, the worst legal order determines the added value of international transactions. The income production function now looks like $Y_i = b_0 + b_1 \cdot h [\alpha_i \cdot n_i + \sum \min \{\alpha_k, \alpha_i\} \cdot n_k]$, with $i, k = E, Q, D, R$ and $k \neq i$.

Traditional trade barriers are denoted j_i , $i = E, Q, R, D$. Stylized facts suggest ranking the barriers to trade after enlargement in the following way: $0 \leq j_E = j_Q < j_R < j_D \leq 1$ (before enlargement we have $j_Q = j_D$). This ranking represents a scenario in which the EU is the area with the lowest degree of trade protection.

As for the traditional barriers to trade, denoted j , we assume that in the case of two countries having different levels of traditional trade barriers, i.e. $j_k \neq j_i$, with $k, i = E, Q, R, D$ and $k \neq i$, the higher trade barriers are binding for both countries. Barriers to trade damage imports, and because imports are generally the source of gains of welfare, barriers to trade reduce welfare in both countries $k \neq i$. The general nature of this effect is captured by our assumption. Of course, one could alternatively assume, that a weighted average of the amounts of trade barriers is used (with the population as weights).¹⁸ The income production function now looks like $Y_i = b_0 + b_1 \cdot h \cdot [\mathbf{a}_i \cdot n_i + \sum \min \{\mathbf{a}_k, \mathbf{a}_i\} \cdot \min \{(1 - j_k), (1 - j_i)\} \cdot n_k]$, with $i, k = E, Q, D, R$ and $k \neq i$.

This expression shows that the per capita income of country "i" depends on the amount of domestic human capital $h \cdot n_i$ weighted by \mathbf{a}_i and the weighted sum of the amounts of foreign human capital $h \cdot n_k$, with $\min \{\mathbf{a}_k, \mathbf{a}_i\}$ and $\min \{(1 - j_k), (1 - j_i)\}$ as weights.

Whereas both the differences in the quality of legal orders and traditional trade barriers affect national income negatively (see the formula Y_i), the causal chain is different. Trade barriers reduce the volume of transactions. Legal order differences reduce the "quality" of an

¹⁷ Differences of the legal order are captured by the income functions (via the α -parameters). The rationale is simply this: Per capita income of a group does not only depend on its command of human capital, but also from the quality of the domestic and foreign institutions. Bad institutions induce technical and allocative inefficiencies which count as opportunity costs. Alternatively, one could treat the quality of a legal order as a factor influencing the enforcement costs (or both income and enforcement costs).

¹⁸ Take note that the degree of openness in this model cannot be represented by traditional measures such as the ratio of exports/imports to GDP, because exports and imports are not explicitly represented in the model. Instead the degree of openness is measured by parameter j .

international transaction in terms of its surplus.¹⁹ As the income production function reveals, the quality of human capital, reflected by b_1 , is assumed to be identical all over the world. The reason is that, in the medium and long run, convergence of the economies involve closing ideas and object gaps (see Romer [1993]; Barrell and te Welde [2000]): "The closing of the ideas gap is achieved by transferring technological know-how, while the closing of the object gap involves the accumulation of necessary equipment and capital for production." (Barrell, te Welde [2000, 274]).²⁰

The modified formula of Y_i allows for the following interpretation:

- If country i improves its legal order and $\min \{\alpha_k, \alpha_i\} = \alpha_k$, the income of country i increases due to higher productivity of the internal transactions.
- If country i improves its legal order and $\min \{\alpha_k, \alpha_i\} = \alpha_i$, the income of country i increases due to higher productivity of the internal and the external transactions.
- If country i reduces its barriers to trade it improves its income if $\min \{[1-j_k], (1-j_i)\} = (1-j_i)$.

These results fit into the allocation effect and accumulation effect framework in the following way:

If a reduction of j_i increases income only in country i there is no allocation effect. If it increases income in countries i and k , with $i \neq k$, we have an allocation effect. This effect can be due to trade creation, trade diversion, appropriation of trade rents or to "new" allocation effects resulting from imperfect competition and scale economies. Since trade between EU-15 and the CEECs consists mainly of two-way trade in similar products (see Baldwin, Francois, Portes [1997, 130]), reciprocal liberalization leads to improved exploitation of scale economies (see Baldwin, Francois, Portes [1997, 131]).

As Baldwin, Francois, Portes [1997, 135] also mention, allocation effects tend to have much lower impact on GDP than accumulation effects. Translated into our model this would mean

¹⁹ Note that differences of legal orders can also be viewed as barriers to international transactions. Whereas the legal rules of each protective state can be judged - at least in principle - as unequivocal, in the international arena we do find a serious „impossibility of rights“. Collisions of norms and gaps between different norm systems appear, an accord in court decisions is often coincidental, and the assistance of the judicial and penal institutions in foreign countries is not at all, a matter of course. Thus, the nationalisation of law and law enforcement results in a specific kind of attenuation of property rights and the emergence of a special kind of risk, that has been called constitutional uncertainty in international transactions. This kind of uncertainty gives rise to co-ordination problems of a special kind reflected in corresponding transaction costs. Harmonisation of the law and enlargement can be considered as means for the reduction of these transaction costs. There are other means such as the law of conflict (for an analysis see Schmidtchen [1995]) and the tools of private ordering such as reputation, hostage giving and internalisation by multinational firms (see Schmidt-Trenz, Schmidtchen [1991]).

²⁰ See also Sinn [2000, 302]: "As knowledge can freely be transferred, the new and old member countries use the same linear homogeneous production function." Factors, such as inferior states of capital stocks and technology,

that the $j_{i,k}$ are rather low. Consequently, given the, on average, already low level of trade barriers, a further reduction close to zero has only limited effects.

What Baldwin, Francois, Portes call accumulation effects of trade liberalisation are not easily integrated into the model. However, the α -parameters suggest a channel through which a modified accumulation effect might work. According to Baldwin, Francois, Portes [1997, 135], accumulation effects lead to changes in the amount of goods that can be produced by the same labour force. They identify accumulation effects with an alteration of national resources - especially capital stocks -, but this alteration is only one way to increase labour productivity. Another way is improvement of the legal order. Thus, a higher α has an effect similar to what Baldwin, Francois, Portes would call accumulation effect. We could even apply the Baldwin et.al. definition of an accumulation effect in a more direct way by interpreting enlargement as an increase in national resources, in this case not of real capital but of human capital. From this perspective, the accumulation rates for the E-countries differ from those of the Q-countries. From the E-countries' point of view n_Q is added to n_E , giving an accumulation rate of n_Q/n_E . From the Q-countries' point of view n_E is added to n_Q , giving an accumulation of n_E/n_Q . Of course $n_Q/n_E < n_E/n_Q$ which delivers the explanation for the following statement by Baldwin, Francois, Portes [1997, 129, 130]: "International integration boosts incomes by expanding the set of opportunities facing consumers and firms. Typically, this expansion of opportunity enables consumers and firms to arrange their affairs more efficiently, which result in higher output and income. East-west integration in Europe will plainly expand the CEE's opportunities much more than it will expand those of the EU, so we should expect the integration to have a larger percentage impact on the GDP of the CEECs."

c) The modified enforcement cost function

We assume that the enforcement cost function C_i is not affected by the introduction of the parameter \mathbf{a} . It still consists of two parts, one representing the internal and the other one the external enforcement costs. However, external enforcement costs now must be separately indicated for each group of foreign countries. This allows for a representation of the enforcement cost effects from restructuring the group sizes due to the enlargement of the EU. Take note that the costs which most concern the European Commission, namely the set up

can be changed rapidly, "since installing new machines and adopting new technology are relatively simple given the high level of education in the CEECs." (Baldwin, Francois, Portes [1997, 129].)

and operation costs of the acquis, can be represented by the parameters of the enforcement cost function.

d) The network of transactions

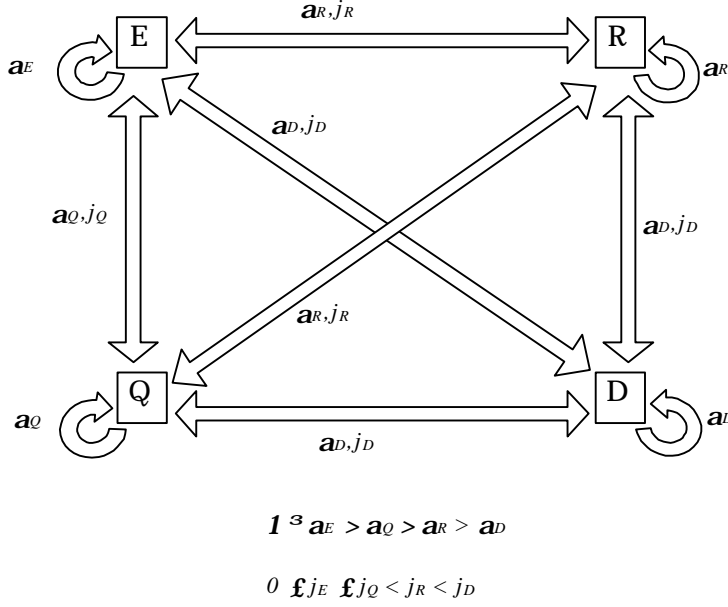


Figure 3: Network of transactions

Fig. 3 shows the network of transactions within and among the four groups of countries E , Q , R and D . Double headed arrows represent the international transactions between two countries connected by each arrow. The curved arrows stand for internal transactions. All internal markets are assumed to be operating without any trade barriers.²¹ The parameters attached to "international" arrows reflect our assumption that the lower a and the higher j is binding. Consider, for example, the international transactions between the E -group and the D -group. We presume the D -group's legal order having lower quality and the D -group imposing higher barriers to trade, i.e. $a_E > a_D$ and $j_E < j_D$. Therefore a_D and j_D are the parameters, determining the productivity of international transactions; they are attached to the double arrow connecting the E - and D -group. As for the internal transactions, only the quality of the national legal order is of importance. It may be noted that the ranking of j_i and a_i is only a matter of empirical evidence. Whatever this evidence, it can be represented by the model.

²¹ The model can be generalised in order to allow for trade barriers also to hinder internal transactions.

e) The general feature of the model

Before proceeding to the calculation of optimal degrees of enlargement several remarks are in order.

The model presented here is a general rather than a partial equilibrium model. It divides world population into the four groups which are the relevant actors in international business affairs; therefore the model allows the representation of any reshuffling of world population. Moreover, the model represents all internal as well as external transactions among all groups; therefore the model makes any restructuring of transactions possible and allows the derivation of the impact on incomes and enforcement costs in all groups (taking account of a substitution of internal enforcement costs by external enforcement costs). Furthermore, barriers to trade among all groups are reflected by parameters; therefore the model enables us to analyse the impact of a modification of trade barriers on income and enforcement costs in all groups. Finally, the model contains parameters referring to the legal orders of all groups in the world and makes parameterisation of all kinds of legal order differences concerning the economic quality of a legal order possible. Thus, the model includes all variables and parameters which are necessary and sufficient to determine the change of the welfare of the world population and its subgroups caused by any degree of enlargement. In particular, the model allows the calculation of optimal degrees of enlargement from each group's point of view. Thus, it does not rule out conflicting interests as to the optimal degree of enlargement of the EU. It is this richness of the model that also allows addressing the question of whether optimal enlargement from the EU's point of view agrees with the enlargement decision of a social planner.

Pelkmans, Gros, Ferrer [2000, 15] discuss the reservations voiced about the increasing "diversity" of the Union after enlargement. For them the principal sources of this diversity consists of two components: "Firstly, much greater disparities in per capita income and development with the present EU of fifteen Member States (EU-15). Secondly, the lack of capacity, both economic and institutional, to absorb and usefully exploit the so-called *acquis communautaire*". As we will see, disparities in per capita income can be captured by an adequate formulation of the income production functions. Weak administrative capacity, weak judiciary and corruption - generally, lower standards of adoption, implementation, surveillance and enforcement in the CEECs - can be modelled by assuming

adequate values of the \mathbf{a}_i -parameter.²² Thus, the model is able to address the concerns of the Pelkmans, Gros, Ferrer-study that enlargement might lead to an untenable diversity in the Union and in the end to an "erosion" of the internal market (see Pelkmans, Gros, Ferrer [2000, ch. 3]). Diversity can simply be defined by $\mathbf{a}_E \neq \mathbf{a}_Q$ and $j_E \neq j_Q$. This diversity might be untenable if the income of the incumbents would decrease with enlargement. One way of modelling this effect is to introduce a negative external effect in the following way: $\mathbf{a}_E = \mathbf{a}_E(\mathbf{a}_Q)$, with $d\mathbf{a}_E / d(\mathbf{a}_E - \mathbf{a}_Q) < 0$. This might also be a fine measure of the "erosion" of the internal market.

2. Optimal degrees of enlargement

In this section we derive the optimal degrees of enlargement from the point of view of the present members of the Union, denoted n_{QE}^* , the new members of the Union, denoted n_{QQ}^* , and the outsiders, denoted n_{QD}^* . Obviously, the calculation implies the knowledge of both the income production function, $Y_i = Y_i(n_Q)$, and the enforcement cost function, $C_i = C_i(n_Q)$, of the respective groups, $i = E, Q, D$.

a) Optimal degree of enlargement from the point of view of the old members

For the sake of simplicity we assume the legal order of the EU as being of highest quality, i.e. $\mathbf{a}_E = 1$, and the internal market working perfectly.

With four groups of states in the world the income production function for the EU-15 then looks as follows:

$$(6) \quad Y_E = b_0 + b_1 h \cdot [n_E + \mathbf{a}_Q n_Q + \mathbf{a}_D (1 - j_D)(n_M - n_Q) + \mathbf{a}_R (1 - j_R) n_R]$$

Income of the Union originates from four sources: from internal transactions with the incumbents, i.e., $b_1 \cdot h \cdot n_E$; from internal transactions with the newcomers, i.e., $b_1 \cdot h \cdot \mathbf{a}_Q \cdot n_Q$; from external transactions with the D -group, i.e., $b_1 \cdot h(1 - j_D) \cdot \mathbf{a}_D(n_M - n_Q)$ and, from external transactions with the rest of the world, i.e., $b_1 \cdot h \mathbf{a}_R (1 - j_R) \cdot n_R$. The contribution of

²² One should not forget that compliance with the *acquis* in the EU-15 is far away from being perfect (see Pelkmans, Gros, Ferrer [2000, sect. 3.4]).

the human capital of the newcomers, outsiders and the rest of the world to EU-15 income is discounted by the parameters \mathbf{a}_Q , \mathbf{a}_D , \mathbf{a}_R and $(1 - j_D)$ and $(1 - j_R)$.²³

The parameters α_D , α_R and \mathbf{a}_Q are productivity weights for human capital. The first two parameters reflect our assumption that the legal order of the Union is of higher quality than that of the outsiders and the rest of world. The parameter \mathbf{a}_Q reflects the degree to which the new members are acquainted with the acquis. The contribution of a new member to the Union income might be smaller than that of an old members on the ground that his acquaintance with the acquis is imperfect. This factor is captured by the parameter $\mathbf{a}_Q \leq \mathbf{a}_E$.

The following function represents the enforcement cost function:

$$(7) C_E = c_1(n_E + n_Q)^2 + c_2 [(1 - j_D)(n_M - n_Q) + (1 - j_R)(1 - n_E - n_M)]^2, \text{ with } c_1, c_2 > 0$$

The first term on the right hand side indicates internal enforcement costs and it shows the crowding effect associated with increasing membership. The first and second term in the square brackets represent enforcement costs of international transactions with D - and R -countries, respectively. Because of $dn_Q = -dn_D$, an increase in Union size implies decreasing external enforcement costs.

We assume that the EU had reached its optimal size, denoted n_E^* , given the constraint of an effective iron curtain.²⁴

Calculating the optimal degree of enlargement, denoted $n_{Q_E}^*$, means solving the following maximisation program:

$$\text{Max } GE = Y_E - C_E$$

n_Q

$$\text{s.t. } n_Q \leq n_M$$

$$n_E = n_E^* \text{ The solution is}$$

²³ Equation (6) implies that the new members have the overall capacity to compete effectively in the enlarged internal market, i.e. there is no difference in the quality and per capita amount of hard and soft infrastructure between the EU-15 and the newcomers. The fact is, however, that the infrastructure of the newcomers is worse than that of the EU-15, providing the rationale for the Structure Funds. Extension of $\alpha_Q \cdot n_Q$ in (6) to $(1 - j_Q) \alpha_Q \cdot n_Q$, with $0 \leq j_Q < 1$, allows for a modelling of these differences.

²⁴ We took n_E^* rather than an arbitrary n_E as a starting point for two reasons: Firstly, we wanted to avoid distinguishing lots of cases; secondly, the EU got larger in the past but stopped growing. It seems reasonable to assume that the optimal size had been reached.

Note that equations (6) and (7) can also be used for a calculation of $n_E^* \cdot n_E^*$ is the solution to the following maximisation program: Max $G_E = Y_E - C_E$, subject to: $n_E \leq 1 - n_M$ and $n_Q = 0$. Both constraints reflect the fact that, given the iron curtain, it was impossible for the M -countries to join the Union. The formula for the optimal size of the Union $n_E = n_E^*$ is: $n_E^* = \frac{b_1 \cdot h[(1 - \mathbf{a}_R(1 - j_R))] + 2c_2[(1 - j_D)(1 - j_R)] \cdot n_M + (1 - j_R)^2(1 - n_M)}{2(c_1 + c_2(1 - j_R)^2)}$.

$$(8) \ n_{Q_E}^* = \frac{b_1 h [\mathbf{a}_Q - \mathbf{a}_D (1 - j_D)] + 2c_2 [(1 - j_D)^2 n_M + (1 - j_D)(1 - j_R) n_R] - 2c_1 n_E}{2c_1 + 2c_2 (1 - j_D)^2}$$

(8) allows the derivation of the following comparative statics results:²⁵

- The higher α_Q , the higher $n_{Q_E}^*$. This effect is worked out via the income production function. With higher α_Q the marginal returns of enlargement increase. With a given enforcement cost function optimal enlargement goes up.
- The higher α_D , the lower $n_{Q_E}^*$. A higher α_D means lower marginal returns from enlargement. The reason is that the difference in the human capital externality between member states and non member states decreases. With a given enforcement cost function the optimal size of the Union decreases.
- The higher (lower) c_1 , the lower (higher) $n_{Q_E}^*$. Higher (lower) c_1 means that the internal enforcement cost function shifts upwards (downwards) and becomes steeper (flatter). With a given income production function (note that the income production function does not depend on c_1) the marginal gain of enlargement decreases (increases) with higher (lower) c_1 .
- The lower (higher) j_R , the higher (lower) $n_{Q_E}^*$. The reason is that with lower (higher) j_R the volume of transactions with the R -countries increases (decreases), which leads to an increase (decrease) of the external enforcement costs. Due to our set up, the costs of transacting with D -countries are affected in the same way.²⁶
- The higher (lower) n_M , the higher (lower) $n_{Q_E}^*$.
- The higher (lower) n_E^* , the lower (higher) $n_{Q_E}^*$.

²⁵ We do not present results for parameters j_D and c_2 , because they cannot be derived in a straightforward way. Both parameters appear in the nominator as well as in the denominator with the same sign, which would require additional restrictions on parameter values in order to do the comparative statics.

²⁶ But note, that with j_D unchanged, the number of transactions with D remains the same. Economising on external enforcement costs requires a reduction of the number of transactions with the D -countries if the number of transactions with R -countries goes up (due to lower j_R). Given j_D there is only one possibility to reduce this number of external transactions, namely by transforming them into internal ones. That is what an increase of $n_{Q_E}^*$ means. A similar rationale holds for a reduction of the transactions volume with the R -countries due to an increase of j_R .

b) Optimal degree of enlargement from the point of view of the new members

The income production function for the new members looks as follows:

$$(9) Y_Q = b_0 + b_1 h [a_Q n_E^* + a_Q n_Q + a_D (1 - j_D)(n_M - n_Q) + a_R (1 - j_R) n_R]$$

This function has the same structure as that for the old members. The only difference is that the productivity of transactions with the old members has been discounted by the factor a_Q (see first term in the square brackets). The second, third and fourth terms in the square brackets represent, respectively, the contribution to the per capita income of the new members from their own human capital, the human capital of the outsiders and the rest of the world.

Inserting (6) into (9) leads to

$$(9a) Y_Q = Y_E - (1 - a_Q) n_E^* b_1 h$$

Consequently, Y_E and Y_Q differ only by a term that does not depend on n_Q , which means that the slopes of the Y_Q and Y_E curves are identical for each n_Q . Furthermore, this term is positive, i.e. $Y_Q < Y_E$, if the acquis is not perfectly adopted by the Q -countries ($a_Q < 1$). Thus, this model nicely captures the fact that the candidates are poorer than the EU-15 on average. Taking GDP per capita at purchasing power standards, the first wave is on average at a level approximately 50 per cent of the EU-15 average (see Pelkmans, Gros, Ferrer [2000, 101]).²⁷

In addition, the enforcement cost function is identical for the old and new members, since we have assumed that the costs depend only on the number of transactions, but not on the a -values. With C_Q denoting the enforcement costs to the new members, this assumption implies

$$\frac{\partial C_Q}{\partial n_Q} = \frac{\partial C_E}{\partial n_Q}. \text{ Given this, it is not necessary to formulate the maximisation program for the}$$

new members, since the marginal gains and costs from enlargement correspond to those of the current members.

²⁷ According to Baldwin, Francois, Portes [1997, 129] the EU-15 are on average two and a half times richer than the Visegrad -5 (Czech Republic, Hungary, Poland, Slovak Republic, Slovenia).

From $\frac{\partial Y_Q}{\partial n_Q} = \frac{\partial Y_E}{\partial n_Q}$ and $\frac{\partial C_Q}{\partial n_Q} = \frac{\partial C_E}{\partial n_Q}$ we get $n_{QQ}^* = n_{QE}^*$, which means that a new member of the

Union does not disagree with a current member as to the degree of optimal enlargement. If the cost function of the new members is different from that of the old ones we would get $n_{QQ}^* \neq n_{QE}^*$.

c) Optimal degree of enlargement from the point of view of the outsiders

Outsiders are those countries that comprise the group of countries, belonging to n_M , which the EU-15 will not grant Union membership initially. Their income production function looks as follows:

$$(10) Y_D = b_0 + b_1 h [\mathbf{a}_D (n_M - n_Q) + \mathbf{a}_D (1 - j_D) (n_E^* + n_Q) + \mathbf{a}_D (1 - j_D) n_R]$$

The first term in the square brackets indicates what the transactions among the D -countries themselves contribute to their per capita income. The second and third term in the square brackets do the same for the transactions with the larger Union and the rest of the world, respectively.

The enforcement cost function is

$$(11) C_D = c_1 (n_M - n_Q)^2 + c_2 [(1 - j_D) (n_E^* + n_Q) + (1 - j_R) n_R]^2$$

The first term on the right hand side of (11) stands for the internal enforcement costs. The terms in the square brackets represent external enforcement costs for transactions with the Union (first term) and the rest for the world (second term).

The maximisation program for the outsiders looks as follows:

$$\text{Max } G_D = Y_D - C_D$$

n_Q

which yields

$$(12) n_{QD}^* = \frac{[-\mathbf{a}_D j_D b_1 h] - 2c_2 (1 - j_D)^2 n_E^* - (1 - j_R)(1 - j_D) 2c_2 n_R + 2c_1 n_M}{2c_1 + 2c_2 (1 - j_D)^2}$$

(12) allows for three conclusions. First, there is no guarantee that the outsiders' optimal degree of enlargement coincides with that of the current and new members.²⁸ Second, $n_{QD}^* < 0$ is possible, which implies that a reduction in the size of the Union would be optimal from the D -countries' point of view. Third, the optimal degree n_{QD}^* depends on the relative size of M - and E -countries. The bigger n_E^* relative to n_M , the smaller n_{QD}^* .

Obviously, the model allows for the possibility of conflicts among the members of the M -group (first wave and second wave countries), which splits up in two subgroups if $n_Q^* > 0$. If leaving the M -club and entering the new club affects the net benefit of an outsider adversely, an outsider would oppose the intended enlargement.

IV. The winners and the losers

In this section we discuss the impact of enlargement on the welfare of the old and the new members, the outsiders and the whole group (excluding the R -countries). Let G_E , G_Q and G_D denote the per capita welfare of the old members, the new members and the outsiders, respectively. Define $G_i = Y_i - C_i$, $i = E, Q, D$. What we are interested in is the change of G_i , ΔG_i , calculated as the difference between G_i resulting from a certain enlargement n_Q , i.e. $G_{i(n_Q=n_Q)}$, and the G_i of the status quo, which is $G_{i(n_Q=0)}$. This leads to

$$(13) \Delta G_i = Y_{i(n_Q=n_Q)} - Y_{i(n_Q=0)} - C_{i(n_Q=n_Q)} + C_{i(n_Q=0)}$$

²⁸ For example,

$n_{QD}^* < n_{QQ}^* = n_{QE}^*$ if

$$n_M \cdot (2c_2(1-j_D)^2 - 2c_1) > -[2c_2(1-j_D)^2 - 2c_1]n_E^* - 4c_2(1-j_D)(1-j_R)n_R - b_1h \cdot a_Q(1-j_Q) - a_D(1-2j_D)$$

This condition holds for all $(2c_2(1-j_D)^2 - 2c_1) > 0$.

If $(2c_2(1-j_D)^2 - 2c_1) < 0$ we need as an additional condition

$$n_M < \frac{4c_2(1-j_D)(1-j_R) \cdot n_R + b_1h[a_Q(1-j_Q) - a_D(1-2j_D)] - n_E^*}{2c_1 - 2c_2(1-j_D)^2}$$

1. The old members

Does enlargement improve the welfare of the current members of the Union?

The answer to this question can be found by looking at the partial derivatives of their income production (6) and enforcement cost (7) functions at the position $n_Q = 0$. With $n_Q = 0$, Union size amounts to $n_E^* + n_Q = n_E^*$, and the value of the derivatives at this size is what matters.

Since the partial derivative of the income production function, $\frac{\partial Y_E}{\partial n_Q} = b_1 \cdot h[\mathbf{a}_Q - \mathbf{a}_D(1 - j_D)]$,

is always positive, enlargement improves the per capita income of the old members of the Union. The reason is that the human capital of the n_Q -group has higher income productivity when located within the Union than when outside of it. This is due to a trade barriers effect, $j_Q < j_D$, and a legal order effect, $\mathbf{a}_Q > \mathbf{a}_D$. However, whether enlargement makes sense also depends on the change of the enforcement costs with respect to n_Q , which is

$$\frac{\partial C_E}{\partial n_Q} = n_Q \cdot [2c_1 + 2c_2(1 - j_D)^2] + 2c_1 \cdot n_E^* - 2c_2(1 - j_D)^2 \cdot n_M - 2c_2(1 - j_D)(1 - j_R) \cdot n_R.$$

At $n_Q = 0$ this change depends on the internal enforcement costs, captured by the term $2c_1 n_E^*$, compared with the external enforcement costs, captured by the terms $-2c_2(1 - j_D)^2 \cdot n_M - 2c_2(1 - j_D)(1 - j_R) \cdot n_R$. Denoting $\frac{\partial Y_E}{\partial n_Q} - \frac{\partial C_E}{\partial n_Q}$ as marginal gain of

enlargement, enlargement improves the position of the old members if this marginal gain is positive, enlargement impairs their position if this marginal gain is negative. The first situation leads to $n_{Q_E}^* > 0$, whereas the second situation means $n_{Q_E}^* = 0$.²⁹

²⁹ The model presented here explicitly takes account of the fact that enlargement comes along with opportunity costs. The increase in enforcement costs is the analogue of the opportunity cost of capital (r^*) mentioned in Rodrik's comment on the Baldwin et.al. paper (see Rodrik [1997, 172]). Rodrik also mentions political and bureaucratic costs of enlargement which can be captured by our enforcement cost function, but which are typically underestimated in the literature: "With a substantial expansion of membership, the EU bureaucratic machinery is likely to become even more unwieldy. (Think, for example, of the added cost of preparing translations of all EU documents in seven new languages.) Reaching decisions on a unanimous or qualified – majority basis is likely to become more difficult. Furthermore, the greater diversity of needs and preferences within the EU is likely to make the single market and EMU more problematic throughout. Political and bureaucratic gridlock in an enlarged EU is a real danger that should be taken seriously." (Rodrik [1997, 172/173]). In the Kohler-study (Kohler [2000]) political and bureaucratic costs are not mentioned at all. Moreover, this study does not address the problem of a substitution of external transaction costs by internal ones. The same holds for the Baldwin et.al. study. These authors also mention difficulties arising in trying to model single market access:

"The complexity of single market access makes it impossible for us to model it explicitly in a general equilibrium model. The standard solution to this problem is to model single market access crudely as a reduction in the real cost of trade. In our simulations, we quantify this as a 10 % reduction in real costs of all CEEC-EU trade." (Baldwin et.al. [1997, 138].) Kohler's analysis is based on a similar assumption (see Kohler [2000, 125 and table 2]).

The following calculations of ΔG_E and $\frac{\partial \Delta G_E}{\partial n_Q}$ deliver a more precise picture.

Recalling (6) and (7) gives

(14)

$$\Delta G_E = n_Q \cdot [b_1 h [\mathbf{a}_Q(1 - j_Q) - \mathbf{a}_D(1 - j_D)] - 2c_1 \cdot n_E^* + 2c_2(1 - j_D)^2 n_E^* + 2c_2(1 - j_D)(1 - j_R)n_R] - n_Q^2(c_1 + c_2(1 - j_D)^2)$$

(14) determines the change of the per capita welfare of the old members assuming the status quo, i.e. $n_Q = 0$, as a benchmark. The first term on the right hand side represents the income effects, whereas the other terms reflect the cost effects of enlargement, for any given n_Q . Note, $\Delta G_{E(n_Q=0)} = 0$.

Taking the partial derivative of (14) with respect to n_Q delivers a function indicating the change of the per capita welfare for an alternatively given n_Q :

$$(15) \quad \frac{\partial \Delta G_E}{\partial n_Q} = b_1 h (\mathbf{a}_Q(1 - j_Q) - \mathbf{a}_D(1 - j_D)) - 2c_1 \cdot n_E^* + 2c_2 [(1 - j_D)^2 n_M + (1 - j_D)(1 - j_R)n_R] - 2n_Q(c_1 + c_2(1 - j_D)^2)$$

This function reaches its maximum at $n_{Q_E}^*$. Function (15) is shown in fig. 4 (assuming a set of parameters that implies $n_{Q_E}^* > 0$).

2. The new members

The net gain of a new member can be determined by a comparison of its net welfare from being a member of the enlarged Union to its net welfare from remaining an outsider. That is, we adopt a pre-enlargement perspective. Let $\Delta Y_Q = Y_{Q(n_Q=n_Q)} - Y_{D(n_Q=0)}$ and $\Delta C_Q = C_{Q(n_Q=n_Q)} - C_{D(n_Q=0)}$ denote the income effect and the cost effect of Union membership, respectively. If $\Delta Y_Q > \Delta C_Q$ membership pays off, otherwise the outsider position is the better option.

Both effects can easily be calculated by using the respective income and enforcement cost functions.

Using (9) and (10) leads to

$$(16) \Delta Y_Q = b_1 h \left[\begin{aligned} & n_E^* (\mathbf{a}_Q - \mathbf{a}_D (1 - j_D)) + n_Q \cdot [\mathbf{a}_Q (1 - j_Q) - \mathbf{a}_D (1 - j_D)] - n_M \cdot \mathbf{a}_D \cdot j_D \\ & + n_R (1 - j_R) (\mathbf{a}_R - \mathbf{a}_D) \end{aligned} \right]$$

The first term in the square brackets represents the income gain stemming from transactions with the old members of the Union, the second and third terms reflect the gain from transactions among the new members and the last term stands for the gain from transacting with the rest of the world.

Besides the income difference, ΔY , the difference of the enforcement costs, $\Delta C_Q = C_{Q(n_Q=n_Q)} - C_{D(n_Q=0)}$, must be considered.

Recalling (7) and (11) we get

$$(17) \Delta C_Q = n_E^* \cdot (c_1 - c_2 (1 - j_D)^2) - n_M^2 (c_1 - c_2 (1 - j_D)^2) - 2c_2 (1 - j_D) (1 - j_R) n_R (n_E^* - n_M) \\ + n_Q^2 (c_1 + (1 - j_D)^2) + n_Q \cdot [2c_1 \cdot n_E^* - 2c_2 (1 - j_D)^2 n_M - 2c_2 (1 - j_D) (1 - j_R) n_R]$$

Combining (16) and (17), we have

$$(18) \Delta G_Q = b_1 h \left[\begin{aligned} & n_E^* [\mathbf{a}_Q - \mathbf{a}_D (1 - j_D)] - n_M \cdot \mathbf{a}_D \cdot j_D + n_R (1 - j_R) (\mathbf{a}_R - \mathbf{a}_D) \\ & - (c_1 - c_2 (1 - j_D)^2) (n_E^* - n_M^2) + 2c_2 (1 - j_D) (1 - j_R) n_R (n_E^* - n_M) \\ & - n_Q^2 \cdot (c_1 + c_2 (1 - j_D)^2) \\ & + n_Q \cdot [b_1 h \cdot [\mathbf{a}_Q (1 - j_Q) - \mathbf{a}_D (1 - j_D)] - 2c_1 \cdot n_E^* + 2c_2 (1 - j_D)^2 n_M + 2c_2 (1 - j_D) (1 - j_R) n_R] \end{aligned} \right]$$

The first three terms on the right hand side of (18) are constant terms. The other terms of (18) are functions of n_Q .

A comparison of the ΔG_E with the ΔG_Q function reveals:

$$(18a) \Delta G_Q = \text{constant} + \Delta G_E.$$

This means that for any given n_Q the difference in welfare of the new members compared to that of the old members remains the same, which implies that the slopes of both curves are the same for any given n_Q (the curves are parallel). Recalling (15), (18a) allows for the conclusion that welfare gains increase up to n_{QQ}^* .

As (18) shows, the change in welfare depends on a number of parameters, of which, given our purposes \mathbf{a}_Q and \mathbf{a}_D are of specific importance.

The higher (lower) \mathbf{a}_Q , the higher (lower) the welfare gain (and vice versa for \mathbf{a}_D).³⁰ These effects work out through the income production function.

Note that (18) allows for a convenient analysis of an issue which is currently under debate in several applicant countries. More and more countries realise that the adoption of the *acquis* becomes so costly that membership in the Union might not pay off. Among the sources driving these costs, the adoption of the strict environmental norms of the Union is of particular importance. Whatever the sources, their negative welfare effect can be captured by showing that the constant term in (18) could become negative.

This can occur for two reasons. First, \mathbf{a}_Q is smaller than $\mathbf{a}_D(1 - j_D)$ such that the first term in (18) becomes negative. This implies that the productivity of the human capital of the new members when transacting with current ones decreases compared to remaining outsiders. The reason could be that an *acquis* which is tailor-made for the old members may not necessarily be the efficient legal order for the new members. Thus, adopting the *acquis* generates opportunity costs.

The second factor having a negative impact on ΔG_Q works through the enforcement cost function. It is reasonable to assume that $c_{1Q} > c_{1D}$ and $c_{2Q} > c_{2D}$, with subscripts Q and D indicating parameter values for the Q - and D -status, respectively. Taking account of this difference would lead to a somewhat more complex version of (18). However, it should be obvious that the constant term will become smaller.

Function (18) is shown in figure 4, assuming a positive constant factor.

3. The outsiders

In a similar way the impact of enlargement on the welfare of the outsiders can be analysed.

³⁰ Note that this result is not necessarily a contradiction to the earlier mentioned fact of the *acquis* being an inefficient legal order for "start-up" countries. The relevant comparison has to focus on the quality of the *acquis* relative to that of the old legal orders of these countries.

Let $\Delta Y_D = Y_{D(n_Q=n_Q)} - Y_{D(n_Q=0)}$ and $\Delta C_D = C_{D(n_Q=n_Q)} - C_{D(n_Q=0)}$ denote the income effect and the cost effect of enlargement, respectively.

From the income production function (10) we get

$$(19) \Delta Y_D = -b_1 \cdot h \cdot n_Q \cdot \mathbf{a}_D \cdot j_D$$

Due to a trade barriers effect enlargement affects income adversely. Consider what happens if a former member of the *M*-group enters the EU. As a member of the *M*-group its human capital contributed to the per capita income of this group without a discounting due to trade barriers. As a member of the Union this same amount of human capital also contributes to the income of the rest of the *M*-club. But, whereas the transactions *b e f o r e* joining the Union were internal ones, they are now external transactions, which means that due to barriers to trade the contribution to the income of the outsiders must be discounted. Of course, this is an outgrowth of what is known as trade diversion.³¹ If there were no trade barriers, i.e. with $j_D = 0$, income of the outsiders would not be affected in a negative way (see partial derivative). We know from the traditional literature that economic integration can also be accompanied by a trade creation effect. The new and the old members of the Union become wealthier which might positively affect the income of the outsiders. However, the model structure implies a trade creation effect of zero. This is due to the trade barriers created by differences between legal orders.

As for the enforcement costs effect of enlargement we get from (11)

$$(20) \Delta C_D = n_Q^2 \cdot (c_1 + c_2(1 - j_D)^2) + n_Q \cdot [2c_2(1 - j_D)^2 n_E^* + 2c_2(1 - j_D)(1 - j_R)n_R - 2c_1 n_M]$$

On the enforcement costs side we have two countervailing effects: On the one hand internal enforcement costs decrease; on the other hand external enforcement costs go up (see (11)). If aggregate enforcement costs, i.e. C_D , increase the outsiders would clearly belong to the losers of enlargement – a fact that would be mirrored by $n_{QD}^* \leq 0$.

However, even if C_D were to decrease the outsiders would lose if the downturn of the income outweighs this cost effect. In any case, the sign of the optimal degree of enlargement from the

³¹ Baldwin et.al. (1997: 133) mention that "enlargement is likely to lead to an important increase in CEEC agricultural protection against third-country suppliers".

point of view of the outsiders, namely n_{QD}^* , reflects the net impact of enlargement on the welfare of the outsiders.

We now turn to a determination of the change of the welfare of the outsiders.

Let $\Delta G_D = \Delta Y_D - \Delta C_D$ denote the net impact of enlargement on the welfare of the outsiders.

From (19) and (20) we get

$$(21) \quad \Delta G_D = n_Q \cdot \left[2c_1 n_M - b_1 h \cdot \mathbf{a}_D j_D - 2c_2 (1 - j_D)^2 n_E^* - 2c_2 (1 - j_D)(1 - j_R) n_R \right] - n_Q^2 (c_1 + c_2 (1 - j_D)^2)$$

From (21) it follows that the net impact from enlargement is always negative if the term in square brackets is zero or negative. Since the term including n_M is the only one with a positive sign, the size of n_M relative to n_E and n_R is decisive. However, even if the term in square brackets is positive, there is no guarantee that the outsiders will gain from enlargement, since the second term in (21) has a negative sign.

(21) allows for the following interpretation:

- \mathbf{a}_D and ΔG_D are negatively correlated. This effect is worked out through the income production function. The source for the negative correlation can be found in trade barriers affecting the transactions between n_Q and the outsiders. (Note that before enlargement occurred there existed no trade barriers for transactions within the M -group.) The effect mentioned is the stronger the higher \mathbf{a}_D and j_D .
- The higher n_M , the higher ΔG_D . This effect is worked out through the internal enforcement costs function, which is strictly increasing in n_M . Note with n_M being small, ΔG_D might become negative.
- The higher n^* , the lower ΔG_D . The effect is worked out through the external enforcement costs function.
- The impact of j_D on ΔG_D is unclear.

The change of the net welfare from enlargement is given by

$$(22) \quad \frac{\partial \Delta G_D}{\partial n_Q} = r - 2n_Q (c_1 + c_2 (1 - j_D)^2), \text{ with } r \text{ standing for the terms in the square brackets}$$

of (21).

Function ΔG_D is depicted in fig. 4 for two different scenarios:

$n_{QD}^* \leq 0$ (see curve labelled ΔG_{D1})

$n_{QD}^* > n_{QE}^* = n_{QO}^*$ (see curve labelled ΔG_{D2}).

5. The overall balance

The current members of the Union have the right to decide whether and to what extent enlargement takes place. We should expect that they choose a n_Q which maximises their welfare.

As for the new members, equation (18), i.e. $\Delta G_Q = \text{constant} + \Delta G_E$, tells us that it depends on the constant whether ΔG_Q is positive or negative. Obviously, with $\Delta G_Q > 0$ the new members reap gains from enlargement. In this case, possible losers can only be found in the group of outsiders. However, (18) allows for $\Delta G_Q < 0$. In this case, $n_{QO}^* = 0$ would be optimal.³²

In fig. 4 we present a situation, in which enlargement pays off for the current members of the Union, i.e. $n_{QE}^* > 0$, and joining the Union also improves the welfare of the new members, i.e. $n_{QO}^* > 0$. This is only one of nine different enlargement scenarios (see Schmidt-Trenz, Schmidtchen [2000]). The generally held view that the gain to the new members exceeds that of the present ones is captured by the ΔG_Q -curve lying above the ΔG_E -curve. With scenario ΔG_{D1} the outsiders clearly loose from enlargement. Only in scenario ΔG_{D2} are all three groups winners. Thus, we would have a Pareto improvement.

The adding up of the gain functions of the old members, the new members, and the outsiders, using the respective group size as a weight, delivers the net gain function for the entire group. Let ΔG_W denote the welfare gain of the entire group, then we have $\Delta G_W = n_E^* \cdot \Delta G_E + n_Q \cdot \Delta G_Q + n_D \cdot \Delta G_D$. In fig. 4 this function is depicted for $\Delta G_D = \Delta G_{D1}$ (see curve ΔG_{W1}) and $\Delta G_D = \Delta G_{D2}$ (see curve ΔG_{W2}).

³² Nevertheless, it might happen that all M -countries apply for membership. A sketch of this idea must suffice. Assume that some countries apply for membership even if their welfare as calculated above is negatively affected. The reason for doing this could be the expectation of getting money from Brussels of an amount which makes the applicant better off. If successful, the outsiders may suffer a welfare loss as indicated by ΔG_{D1} . If their loss from remaining outsiders is higher than the welfare loss from joining the Union they have an incentive to apply for membership even if there is no welfare gain (compared to the situation with $n_Q = 0$). Accepting some welfare loss in order to avoid a bigger one is economically rational. Similar results can be derived if ΔG_Q is assumed to be an average (of negative value) which allows for the possibility of some applicant countries having positive welfare gains from enlargement whereas others have negative ones.

Note that ΔG_{W1} has its maximum at the right of n_{QE}^* . This is because the marginal effect on group welfare, which is positive, outweighs the inframarginal effect, which is negative. To illustrate: The (positive) marginal effect at n_{QE}^* is given by the amount $\Delta G_Q - \Delta G_{D1}$ (see the length of the dotted line). The marginal increase in membership of the Union generates a negative external effect on the outsiders, which is to be calculated by multiplying $\frac{\partial \Delta G_{D1}}{\partial n_Q}$ (at n_{QE}^*) by the group size n_D .

The function ΔG_{W2} has its maximum even further to the right of n_{QE}^* , since in this case enlargement generates not only a positive marginal effect for those leaving the D -group, but it also generates a positive externality for the outsiders, to be calculated by multiplying $\frac{\partial \Delta G_{D2}}{\partial n_Q}$ (at n_{QE}^*) and groupsize n_D .

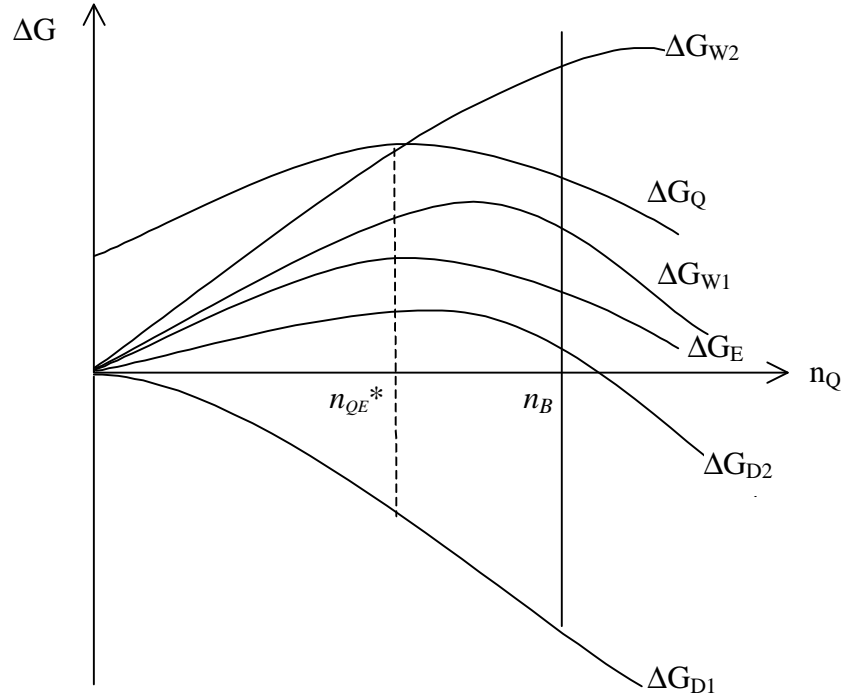


Figure 4: Winners and losers from enlarging the EU

As it turns out, in both cases there is a positive net gain for the whole group, since, at n_{QE}^* , the gains of the old and new members outweigh the losses of the outsiders, i.e. $\Delta G_W = n_E^* \cdot \Delta G_E + n_Q \cdot \Delta G_Q + n_D \cdot \Delta G_D > 0$.³³ Thus, we would have a Kaldor-Hicks improvement. The winners could, hypothetically, compensate the losers while still being better off. But take note, whether the gain for the whole group is positive or not depends on the positions of the curves and the respective weights. Thus, there is no guarantee that overall welfare increases according to the Kaldor-Hicks criterion. Of course, a more precise analysis should be based on the partial derivative of ΔG_W with respect to n_Q . Since this derivative includes a great many terms we do without it.

We excluded from our welfare analysis the rest of the world on the ground that the enlargement mainly affects the welfare of the old and the new members of the EU as well as the non qualified countries. However, there could be spillovers. For example, the rest of the world will probably gain if $a_R > a_D$. This is due to a kind of trade creation effect which is associated with the increase in the productivity of the human capital of the Q -countries following adoption of the *acquis*. If the barriers to trade between the D - and the R -group are

higher than the barriers between the EU and the R -group, i.e. $j_D > j_R$, the rest of the world also benefits from adding the stock of human capital of Q -countries to that of the old members of the EU. Both effects can be read off from fig. 3. In that figure enlargement would mean increasing size of Q at the expense of the size of D . Since $a_R > a_D$ and $j_R > j_D$ the R -group benefits from this reassignment (compare the double arrow connecting D and R with that connecting Q and R).

V. Comparing the Union with the social planner decision

The social planner is a fictitious figure that always maximises overall welfare. Overall welfare is maximised if the partial derivative of the gain function for the whole group with respect to n_Q is zero:

$$(23) \quad \partial \Delta G_W / \partial n_Q := n_Q \cdot \frac{\partial \Delta G_Q}{\partial n_Q} + \Delta G_Q + n_E \cdot \frac{\partial \Delta G_E}{\partial n_Q} + n_D \cdot \frac{\partial \Delta G_D}{\partial n_Q} + \Delta G_D = 0$$

The first term, $n_Q \cdot \frac{\partial \Delta G_Q}{\partial n_Q}$, represents the change in the net gain of all infra-marginal new members of the Union, whereas ΔG_Q stands for the change of the net gain of the marginal member. A similar interpretation holds for the D -group. The term $n_E \cdot \frac{\partial \Delta G_E}{\partial n_Q}$ reflects the marginal net gain of the old members of the Union.

The social planner always acts by taking account of all positive and negative effects of enlargement. That is what (23) means.

If the Union were interested in maximising its own welfare, it would act according to the following condition:

$$(24) \quad n_E \cdot \frac{\partial \Delta G_E}{\partial n_Q} = 0.$$

(24) means that the Union only cares about how the enlargement affects the welfare of the old members.

³³ Note that higher n_Q implies lower n_D .

From (23) it follows that the Union decision would match the social planner decision if and only if

$$(25) \Delta G_Q + \Delta G_D = -n_D \cdot \frac{\partial \Delta G_D}{\partial n_Q} \text{ (see the proof in footnote 20).}^{34}$$

The sum $\Delta G_Q + \Delta G_D$ reflects the benefits for both the marginal new member and the marginal outsider. The right hand side of (25) represents the infra-marginal losses of the outsiders. If, for any given n_{QE}^* , the left hand side is greater than the right hand side, then the marginal benefits at n_{QE}^* exceed the marginal costs. From the point of view of the entire group welfare, size n_{QE}^* is too small. The opposite result holds if the right hand side of (25) is greater than the left hand side.

In both scenarios shown in fig. 4 the Union size n_{QE}^* is too small from the point of view of group welfare. At n_{QE}^* the slopes of both net gain functions for the whole group, i.e. ΔG_{W1} and ΔG_{W2} , are still positive which implies that increasing Union size beyond n_{QE}^* would improve group welfare. But, as fig. 4 also reveals, such a move beyond n_{QE}^* would impair the welfare gain of both the old and the new members.

VI. Conclusion and outlook

This paper draws on the theory of optimum legal areas in order to study the enlargement of the European Union. Optimal degrees of enlargement are identified for the incumbents, the newcomers and the outsiders. The welfare analysis reveals that enlargement can be a Pareto-superior move. But, it is also shown that enlargement can impose a negative externality on the countries left behind. Despite this negative externality, enlargement can be a Kaldor-Hicks

³⁴ From (23) and (24) we get $n_Q \cdot \frac{\partial \Delta G_Q}{\partial n_Q} + \Delta G_Q + n_D \cdot \frac{\partial \Delta G_D}{\partial n_Q} + \Delta G_D = n_E \cdot \frac{\partial \Delta G_E}{\partial n_Q} = 0$

Since $\frac{\partial \Delta G_Q}{\partial n_Q} = \frac{\partial \Delta G_E}{\partial n_Q}$ (both curves are parallels), it follows:

$\Delta G_Q + n_D \cdot \frac{\partial \Delta G_D}{\partial n_Q} + \Delta G_D = 0$, which implies (25).

superior move, but it cannot be ruled out that the whole group of countries can be made worse off in the Kaldor-Hicks sense. In any case, it is questionable whether the incumbents optimal degree of enlargement coincides with that of the whole group.

The burden on the EU budget has acquired a disproportionate prominence in the public debate on Eastern enlargement (see Baldwin et.al. [1997, 149]). We do not want to go into details in this area. What can be said, however, is this: whereas the rationale for the transfers in the context of Common Agricultural Policy is problematic, the structural funds can be justified on dynamic efficiency grounds: "For the economic union to function properly, Structural Funds should be utilized in the framework of well-prepared and justified programmes for infrastructure (both hard and soft), environment, energy efficiency, possibly nuclear decommissioning and other aspects which raise the overall capacity to compete effectively in the enlarged internal market. It is this efficiency-based approach which holds the key to an improved economic performance – read: catch-up growth – of the candidate countries." (Pelkmans et.al. [2000, 23]). A way to model the catch-up growth issue is to introduce an additional parameter in the income production function which discounts the income productivity of the new members.

The analysis did not deal with the important issue of the setup costs of a new legal order and the costs of an EU institutional reform necessary for a workable larger Union. The impact of the setup costs, which are sunk costs, could be analyzed with the help of a dynamic version of the model presented here. The set up costs are the costs of investment in a new legal order that are worth being sunk if the net returns are higher than the quasirents from the old legal order. The costs of institutional reform can be captured by an adequate modification of the internal enforcement cost function.

If it should turn out that the set up costs and the costs of institutional reform are all but negligible (see the figures mentioned by Mortensen and Richter 2000), institutional alternatives to enlargement and the approximation of law must be found. Trade liberalization comes to mind. The theory of optimal legal areas could also be applied to the question whether the road to free trade is superior to the road to enlargement.

Finally, it should be mentioned that the taking over of the *acquis* by the CEECs does not require a joining of the EU. The *acquis* represents knowledge that is freely available. There are no intellectual property rights attached to it. The CEECs could imitate those parts of the *acquis* which are believed to be efficient law and could reject the inefficient ones. It has been argued that the prospect of Union membership is necessary for the CEECs to start and maintain strong efforts of radical institutional renewal and reform. We do not want to deny

that EU membership helps to solve a time inconsistency problem. However one should not forget that, even without political enlargement, the CEECs have a strong incentive to invest in an efficient institutional infrastructure. Economic integration does not necessarily imply setting up a political superstructure.

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