THE BREAK UP OF NATIONS:
A POLITICAL ECONOMY ANALYSIS

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ABSTRACT

The Break up of Nations: A Political Economy Analysis*

This paper analyses the tendency for nations to break up as a result of a trade-off between the aggregate efficiency losses from separation and the redistributive gains to the majority, which can occur in *all* regions, even when there are no transfers across these regions. We show that accommodating changes in fiscal policy in the unified nation may not always prevent separation, because differences in income distribution across regions mean some regions prefer more and some less redistribution; fiscal autonomy under a federal constitution may not necessarily prevent separation because of the effects of fiscal competition; linguistic imperialism in the provision of public goods may reduce the incentives to separate; perfect factor mobility eliminates the incentives to separate.

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NON-TECHNICAL SUMMARY

This paper analyses the incentives of nations with democratic political institutions to separate into several new countries.

The starting point of our analysis is to suppose that from an economic efficiency point of view it is never desirable for a nation to separate into several independent parts. A united nation is always more efficient since free trade among regions is guaranteed, duplication costs in defence and law enforcement are avoided, and local public goods provision (such as transportation and communication networks, or common standards) can be coordinated. Furthermore, any benefits of decentralization that might be obtained in a world with several nations can always be achieved within a unified nation by replicating the administrative structure of a world with several nations. Thus, if the most efficient economic arrangement always prevails, we would see only one nation with a suitable degree of decentralization of authority among regions. The benefits of unification are not evenly distributed among all citizens, however. In each region there may be winners from regional independence as well as losers. In a democratic context, the question then is whether there is a majority in favour of independence of the region or not. Thus, the question we ask in this paper is when does majority voting give rise to respectively separation, regional autonomy or unification?

In a unified nation, regions do not have total freedom in their choice of policies. In particular, they are constrained in their choice of fiscal policies. Separation removes any constraints imposed by the union and may thus give rise to fiscal policies that are closer to the wishes of the majority of voters in the region. In this paper we focus primarily on regional conflicts over fiscal policy arising from differences in income distribution across regions. This implies that the median voters in the regions generally have different preferred tax rates, and that the equilibrium tax rate in the union will generally not coincide with the preferred tax rate in each region. Thus, when contemplating a move towards independence the median voters in each region must weigh the efficiency benefits of the union against the benefits of having a government 'closer to the people' (i.e. a policy of redistribution that is closer to their preferences). Thus, a region with very low income inequality may want to break away from a nation with high income inequality and high tax rates in order to impose lower tax rates and redistribution; while a region with high income inequality may want to separate in order to impose more redistribution than in the unified country.

Given that separation invariably leads to efficiency losses, the median voter in the union may be prepared to make tax concessions to avoid separation. If the problem is only to reduce a positive transfer from a rich region to a poor region then a lower accommodating tax rate can always prevent separation. If the problem is to reconcile tax preferences between two regions with similar *per capita* income but very different income distributions, however, separation may be unavoidable because of contradictory pressures for tax accommodation.

Another way of avoiding full separation is to allow each region to determine its own redistribution policy independently within a federal state. We show that fiscal competition may constrain a region's freedom to set its most desired tax rate sufficiently to make independence (with capital controls at the borders) preferable.

Differences in *per capita* income and income distribution across regions persist only if at least one factor of production is not perfectly mobile. Indeed, under perfect mobility of all factors, the regions set the same tax rates in equilibrium and have the same *per capita* and median income (under both autonomy and independence), so that any attempt to break away from the union in order to implement a different redistribution policy is self defeating.

When linguistic conflicts are combined with economic conflicts one might expect the likelihood of separation to be greater. We show that this is not always the case, however. It is shown in particular that if the benefits of linguistic imperialism are sufficiently great, a rich imperialistic region may require fewer economic concessions from the other regions to stay in the union. In the absence of any linguistic conflict, however, the rich region may be more willing to separate.

1. Introduction.

This paper is concerned with the incentives of nations with democratic political institutions to separate into several new countries. Following the demise of communism the entire map of Europe, from the Atlantic coast to the Urals, is in the process of being redrawn and issues of separation, unification and the redrawing of borders are yet again at the forefront of European concerns. Many of the issues raised by this process are primarily of a political, cultural or linguistic nature. However, there are also important economic considerations that bear on this problem. The objective of this paper is to analyse some important economic and political determinants of the process of unification and separation of nations.

The starting point of our analysis is to suppose that from an economic efficiency point of view it is never desirable for a nation to separate into several independent parts. A united nation is always more efficient since free trade among regions is guaranteed, since duplication costs in defence and law enforcement are avoided, and since local public goods provision (such as transportation and communication networks, or common standards) can be coordinated. Furthermore, any benefits of decentralization that might be obtained in a world with several nations can always be achieved within a unified nation by replicating the administrative structure of the world with several nations. Thus, if the most efficient economic arrangement was always prevailing, we would see only one nation with a suitable degree of decentralization of authority among regions. However, the benefits of unification are not evenly distributed among all citizens. In each region there may be winners from regional independence as well as losers. In a democratic context, the question then is whether there is a majority in favour of independence of a region or not. Thus, the question we ask in this paper is when does majority voting give rise to respectively separation, regional autonomy or unification?

In a unified nation, regions do not have total freedom in their choice of policies. In particular, they are constrained in their choice of fiscal policies. Separation removes any constraints imposed by the union and may, thus, give rise to fiscal policies that are closer to

2

the wishes of a majority of voters in the region. In this paper, we focus primarily on regional conflicts over fiscal policy arising from differences in income distribution across regions. The role of government is reduced to the provision of publicly provided private goods and to redistribution of income. The amount of redistribution and taxation is determined through voting. Specifically, we consider a model where agents vote over linear income tax schedules (as in the literature initiated by Foley (1967), Romer (1975) and Roberts (1977)). In such a model, poor agents favour high income tax rates and rich agents favour low income tax rates: the equilibrium tax rate is the one most preferred by the median (income) voter. In general, the income distributions in the regions are not identical. This implies that the median voters in the regions generally have different preferred tax rates and that the equilibrium tax rate in the union will generally not coincide with the preferred tax rate in each region. Thus, when contemplating a move towards independence the median voters in each region must weigh the efficiency benefits of the union againsts the benefits of having a *government "closer to the people"* (that is, a redistribution policy that is closer to their most preferred policy).

The paper is organised as follows: Section 2 describes the model and motivates our framework. Section 3 provides a simple expression for the trade-off faced by a median voter in each region. There are basically three important factors influencing a region's decision to separate, the most interesting being the difference in income distribution accross regions. Thus, a region with very low income inequality may want to break away from a nation with high income inequality and high tax rates in order to impose lower tax rates and redistribution and vice-versa a region with high income inequality may want to separate in order to impose more redistribution than in the unified country. Different preferences over redistribution in the UK and in the Netherlands, for example, are an important source of conflict which slows down the process of European Unification. This factor must be weighted against two other factors : the efficiency loss from separation and differences in income per capita across regions.

3

Given that separation invariably leads to efficiency losses, the median voter in the union may be prepared to make tax concessions to avoid separation. Section 4 considers to what extent tax accomodation can prevent separation. If the problem is only to reduce a positive transfer from a rich region to a poor region then a lower accomodating tax rate can always prevent separation. However, if the problem is to reconcile tax preferences between two regions with similar per capita income but very different income distributions. then separation may be unavoidable because of contradictory pressures for tax accomodation.

Another way of avoiding full separation is to allow each region to determine its own redistribution policy independently within a federal state. Section 5 considers under what circumstances this alternative may be preferred to independence or full unification. We show that fiscal competition may constrain a region's freedom to set its most desired tax rate sufficiently to make independence (with capital controls at the borders) preferable.

Differences in per capita income and income distribution accross regions persist only if at least one factor of production is not perfectly mobile. Indeed, section 6 establishes that under perfect mobility of all factors. the regions set the same tax rates in equilibrium and have the same per capita and median income (under both autonomy and independence), so that any attempt to break away from the union in order to implement a different redistribution policy is self defeating.

Section 7 extends the model by introducing a mild form of linguistic (or ethnic) conflict. When linguistic conflicts are combined with economic conflicts one might expect that the likelihood of separation may be greater. However, this section shows that this is not always the case. It is shown in particular that if the benefits of linguistic imperialism are sufficiently great, a rich imperialistic region may require less economic concessions from the other regions to stay in the union. In the absence of any linguistic conflict, however, the rich region may be more willing to separate. Finally, section 8 offers some concluding comments.

4

There is a small but growing literature in economics on the integration and disintegration of nations adopting a political economy approach. This literature includes Friedman (1977), Buchanan and Faith (1987), Casella and Feinstein (1990), Casella (1992), Feinstein (1992), Wei (1992), Persson and Tabellini (1993), and Alesina and Spolaore (1995). Our paper differs from this literature in that it focuses primarily on redistribution conflicts and on differences in income distribution accross regions as the source of the break up of nations. The club theory literature, which is concerned with the normative question of the optimal size distribution of nations and the optimal structure of regional government, is also related to our paper (see the classic work of Tiebout (1956), Buchanan (1965), Oates (1972) and Berglas (1974); recent developments following this line of enquiry include Scotchmer (1992), Dreze (1993) and Hochman, Pines and Thisse (1994), Bénabou (1992) and Fernandez & Rogerson (1992).

2. The Model.

We consider a nation with two regions A and B. The population and wealth (capital) in region $i = A, B$ are denoted by L_i and K_i. Labor supply in the whole nation is inelastic and is equal to $L = L_A + L_B$. The total capital stock in the nation is $K = K_A + K_B$ and regional output is given by $Y_i = K_i^\beta L_i^{1-\beta}$, where $0 < \beta < 1$. We define per capita regional output as $y_i = \dfrac{Y_i}{L_i} = k_i^\beta$ where $k_i \equiv \dfrac{K_i}{L_i}$.

To keep things as simple as possible we assume that product, labour and capital markets behave like competitive markets. The equilibrium wage rate s_i and the equilibrium return on capital r_i, when there is factor mobility inside but not across regions, are then given by:

$$s_i = (1 - \beta) y_i \text{ and } r_i = \beta(y_i / k_i) \tag{1}$$

When there is factor mobility across regions, factor prices (and thus capital-labor ratios and income per capita) are equalized

5

There is a continuum of agents who differ in their initial wealth endowments as well as labour skills. The capital and labour endowments of an individual v in region i are respectively K_{vi} and L_{vi}. An individual agent's income (or final wealth) is therefore:

$$w_{vi} = s_i L_{vi} + r_i K_{vi} \tag{3}$$

The income distribution in the whole nation is given by $h(w_v) = h_A(w_v) + h_B(w_v)$ with support $[0, \overline{w}]$. Total income is equal to total output, so that:

$$Y = \int_0^{\overline{w}} w_v h(w_v) dw_v \tag{4}$$

When the two regions separate and form independent nations, there are inevitably efficiency losses. The simplest way to see this is to observe that any allocation that is achieved under separation can be replicated in the unified nation by introducing the same degree of decentralization as under separation, however some allocations that are achieved under unification may not be available under separation.

We assume that these efficiency losses take the following form: under separation, an individual with income w_v gets $\alpha_i(w_v) \leq w_v$. In other words, no income group gets pre-tax income gains from separation, so that no income group has an incentive to separate in order to raise its pre-tax income. We thus exclude from our analysis motives for separation based for example on the appropriation of monopoly rents. This may in some instances be an important motive for separation. For the sake of exposition, however, we prefer to abstract from these issues in this paper.

The efficiency loss may be higher (thus $\alpha_i(w_v)$ lower) in one region than the other. Also, $\alpha_i(w_v)$ may be a function of the degree of economic disintegration (the existence of separate currencies, trade barriers, etc). Again, for simplicity we abstract from these considerations and assume that $\alpha_i(w) = \alpha.w$, $\alpha \leq 1$. One way of interpreting this assumption is that a

6

reduction in trade across regions after separation leads to an increase in production costs and consumer prices, which hurts all income groups in proportion to their income under unification.

Agents' preferences in this economy are over both private consumption, c_v, and consumption of public goods, g. For most public goods, such as universal health care, public schools, roads, parks etc, an individual agent can to some extent substitute consumption of the public good with consumption of an equivalent private good (private health care, private school, road or park). Throughout most of the paper we make the extreme simplifying assumption that the substitutability between private and public goods is perfect (the only distinguishing feature of the public good, then, is its non-excludability). Given this assumption an individual's utility function takes the following form:

$$U(c_v, g) = U(c_v + g) = c_v + g \tag{5}$$

One way to think of the public good, g, is as a lump sum transfer. The purpose of taxation, then, is pure redistribution. As our theory focuses on redistributional conflicts as the main source of political conflict, this is a relevant model to consider.

There are many ways of taxing and redistributing income. To keep the model tractable, however, we assume that the public good is financed with a linear income tax (as in the literature on voting on income taxes initiated by Romer (1975); see Roberts (1975) for a discussion of the difficulties arising when one allows for non-linear tax schedules). In other words, there is a unique tax rate, t, on individual income. Per capita expenditure on the public good is, thus, financed with a per capita tax of t.y. Now, given that (income) taxation usually involves deadweight losses we assume that all the proceeds from taxation cannot be spent on the provision of the public good. There is a "cost of public funds" given by $\frac{t^2}{2} y$.

Given all these assumptions, private and public consumption are:

7

$$c_v = (1-t)w_v; \quad g = \left(t - \frac{t^2}{2}\right)y \tag{6}$$

The most prefered income tax rate for an individual with income, w_v, in the unified nation is thus given by the rate which maximizes that individual's total after tax consumption:

$$t^*(w_v) = \frac{y - w_v}{y} \tag{7}$$

Individual preferences over tax rates and redistributive policies are clearly single-peaked here, so that a natural equilibrium tax rate under majority voting is the median voter's prefered tax rate. Under this equilibrium tax, the median voter's utility is given by:

$$U_m = w_m + \frac{1}{2}\frac{(y - w_m)^2}{y} \tag{8}$$

Any other agent with income, w_v, has the following utility under the median voter's most prefered tax rate:

$$U(w_v) = w_v + \frac{1}{2}\frac{(y - w_m)}{y}\left[(y - w_v) + (w_m - w_v)\right] \tag{9}$$

The indirect utility functions specified in equations (8) and (9) are useful in computing the utility gain or loss of individual agents under separation, as we shall see in the next section.

3. The Politics of Separation.

In this section we determine under what circumstances a majority of voters in one region (or in the whole nation) favours separation of the two regions into two separate states. We confine our analysis in this section to the case where there is no factor mobility accross regions. Differences in language and culture across regions may be an obstacle to labour mobility. Given our assumption on technology and factor markets, capital mobility in the unified country will imply equalization of income per capita across regions but not necessarily equalization of income distribution. We allow for the possibility of perfect capital mobility within the unified nation, but we assume that following separation both states put up barriers to capital mobility. We shall explain in later sections that it may be necessary to set up barriers to capital mobility in order to implement the most desired income taxation and redistribution policy in the region.

Throughout this section we suppose that separation occurs when a majority of voters is in favour of separation in at least one region. This assumption seems reasonable when the central government is too weak to prevent a secession through military means. An alternative assumption would be that separation occurs only if there is a majority in favour of separation in the whole nation. As will become clear, most of our results about separation can be adapted to this stronger condition for separation. Also, when in later sections, we take separation as the status quo and ask, when are the two independent nations in favour of unification, we actually apply the stronger requirement that a majority for unification exists in both nations. Thus, our analysis covers both cases. The main issue this paper abstracts from is how a conflict between the two regions is resolved when there is a majority in favour of separation in one region but a majority against separation in the nation as a whole.

We begin our analysis by asking the following question: assuming that the tax rate in the unified nation is $t = t * (w_m)$ (the prefered tax rate of the unified nation's median voter) when

9

will a majority in region i prefer to be independent and set its own fiscal policy rather than submitting to the unified redistribution policy ?

Under unification, an agent with income, w_v, gets a payoff, $U(w_v)$, as defined in equation (9). Under separation, that agent ends up in region i = A, B, where the equilibrium tax rate, t_i, prevails and obtains a payoff:

$$U_i(w_v) = \alpha \left[w_v + \frac{1}{2} t_i \left[(y_i - w_v) + (w_m - w_v) \right] \right]$$

(10)

Now, it is straightforward to verify that the difference, $U_i(w_v) - U(w_v)$, is either always increasing or always decreasing in w_v. When it is increasing, all agents in region i with income, w_v, above the median income in region i, w_{mi}, are in favour of separation whenever the median income agent in region i prefers separation, and all agents with income below the median income are in favour of unification whenever the median income agent is in favour of unification. When the difference in utilities is decreasing in income, the reverse is true. Whichever case prevails, the prefered regime of the median income agent in region i is the one favoured by a majority of voters in that region.

Thus, to see when separation arises in equilibrium it suffices to determine when the median (income) voter in at least one region, i = A, B, prefers the outcome under separation to that under unification. Now, under separation the equilibrium tax rate in region i, t_i, is the rate most favoured by the median voter, $t_i^* = (y_i - w_m)/y_i$ (where, w_m, denotes the median income in region i). With this tax rate the median voter in region i gets the following payoff under separation :

$$U_i(w_{mi}) = \alpha \left[w_{mi} + \frac{1}{2} \frac{(y_i - w_{mi})^2}{y_i} \right]$$

(11)

10

Recall that the median (income) voter in region i is not necessarily the same as the median voter in the unified nation. Therefore, the equilibrium tax rate in the unified nation is generally not the same as the most prefered tax rate of the median (income) voter in region i. Consequently, his payoff under unification is given by:

$$U(w_{mi}) = w_{mi} + \frac{1}{2}\frac{(y - w_m)}{y}\left[(y - w_{mi}) + (w_m - w_i)\right] \qquad (12)$$

Thus, the median voter in region i prefers separation to unification whenever,

$$\Delta = U_i(w_{mi}) - U(w_{mi}) \qquad (13)$$

Alternatively, substituting for $U_i(w_{mi})$ and $U(w_{mi})$ separation arises in equilibrium whenever:

$$\Delta = \frac{1}{2}\frac{(w_m - w_{mi})^2}{y} + \frac{1}{2}\left[\left(\alpha y_i - \frac{w_{mi}^2}{y}\right) - \left(y - \frac{\alpha w_{mi}^2}{y_i}\right)\right] > 0 \qquad (14)$$

Inspection of equation (14) reveals that there are three important effects determining a region's preference for separation in our model:

i) a *political effect* corresponding to the first term in the equation; this term can be seen as measuring the difference in preferences over fiscal policy between the median voter in region i and the median voter in the unified nation.

ii) an *efficiency effect* which is partially reflected in the second term of the equation; it is easy to see from this term that a reduction in α has a negative impact on Δ. In other words, the bigger the efficiency loss from separation the lower the benefits from separation to the median voter in region i.

iii) a *tax base effect* which is reflected in the difference between y_i and y. When $y_i < y$ there is an additional cost of separation for region i which is due to the loss in tax revenues

11

following separation. Vice-versa, when $y_i > y$ there may be a substantial tax benefit from separation since under separation, region i (the richer region) no longer provides a tax transfer to the poorer region. Tax transfers from region to region seem to be an important motive for separation in practice; thus, social security transfers are an important reason why Flanders may want to separate from Wallonia. Similarly, large positive net tax transfers have often been invoked by Punjabi separatists as an important benefit of separation.

To see the pure political effect at work, assume that there are no efficiency losses from separation ($\alpha = 1$) and that both regions have the same income per capita. In this special case one immediately obtains the following simple but striking result:

Proposition 1: If $y_A = y_B = y$ and $\alpha = 1$, then $\Delta > 0 \Leftrightarrow |w_m - w_{mi}| > 0$. In words, when there is no efficiency loss from separation and when per capita income is the same in both regions, separation arises whenever the income distributions in the two regions are such that the median incomes are different.

proof: Under the assumptions, $y_A = y_B = y$ and $\alpha = 1$, the net benefit of separation to the median voter in region i becomes:

$$\Delta = \frac{1}{2} \frac{(w_m - w_{mi})2}{y}, \text{ which is positive if and only if } |w_m - w_{mi}|. \text{ QED}$$

Proposition 1 is striking because it implies that in the absence of any efficiency losses, separation would (almost) always occur even when there are no net tax transfers between the two regions. Moreover, a majority in each region is in favour of separation. The reason is that

12

each region would like to see a tax policy implemented which is closer to the most prefered policy of the median voter in its region. In the more inegalitarian region, the majority of poor are in favor of separation in order to obtain more redistribution whereas in the more egalitarian region, the majority of rich want to separate to pay less taxes. Thus, Proposition 1 can be seen as a simple illustration of the well known notion of *government closer to the people*. The implications of this proposition can be far reaching, since it suggests that further separation within the regions may occur when the losses from separation are small.

Assume now that $\alpha < 1$, but maintain the assumption that $y_A = y_B = y$. It is , then, easy to see that the gain from separation is moderated by the efficiency loss given by the second term in equation (14), which under our new assumptions becomes $(\alpha - 1)\left(1 + \frac{w_{mi}^2}{y^2}\right)y < 0$.

A comparison of the two terms in equation (14) reveals the obvious but important implication of our model that the bigger the differences in income distribution across regions, the higher the tolerance for efficiency losses from separation. Also, our analysis suggests that it is quite possible that a majority in at least one region may gain from separation despite an overall efficiency loss to the nation and, more importantly, to each separating region . An obvious example of separation consistent with our analysis is the case of a rich region that wants to separate to stop paying transfers to a poor region. A less obvious example that emerges from our analysis is that of a poorer region wanting to separate to obtain a higher level of redistribution, despite a smaller tax base.

4. Fiscal Policy under the threat of secession.

In section 3 we considered when a majority of voters in at least one region would be in favour of separation, assuming that under unification the most prefered tax policy of the median voter (in the whole nation) is implemented. Our analysis has overstated the incentives towards separation to the extent that it has not allowed for changes in tax policy in the unified nation to forestall separation. In this section we do allow for such changes in tax policy and

13

ask how the equilibrium tax rate in the unified nation changes in response to a threat of secession, and whether separation occurs in equilibrium despite possible accomodating changes in tax policy in the unified nation.

To address these questions we consider a two-stage game, which captures the main aspects of preemptive tax changes to forestall separation. In the first stage of the game, the median voter in the unified nation chooses a tax rate, t. In the second stage, the median voters in each region choose whether to separate or not, taking as given the tax rate under unification chosen in the first stage. If they choose separation, they get to choose their most prefered tax rate in their respective regions. We choose this game formulation since, as in section 3, the most prefered outcomes of the median (income) voters in the regions are actually the outcomes chosen by a majority of voters in equilibrium in a voting game with competing platforms[1].

There may be two types of (subgame perfect) equilibria in the overall game. One where unification is the final outcome and the other where separation occurs. The main question we shall be concerned with here is for what parameter constellations separation occurs despite the possibility that accomodating tax rates may be set in the first stage.

To prevent separation, an accomodating tax rate, t, must satisfy the following two non-separation constraints:

$$\text{(NSC)} \qquad (1-t)w_{mi} + \left(t - \frac{t^2}{2}\right)y \geq \alpha\left[w_{mi} + \frac{1}{2}\frac{(y_i - w_{mi})^2}{y_i}\right] \quad , i = A, B. \qquad (15)$$

To see whether there exists a tax rate such that both constraints are satisfied, one can substitute for the tax rates maximizing the LHS of equation (15) to obtain the following conditions:

$$w_{mA} + \frac{1}{2}\frac{(y - w_{mA})^2}{y} \geq \alpha\left[w_{mA} + \frac{1}{2}\frac{(y_A - w_{mA})^2}{y_A}\right] \qquad (16)$$

$$w_{mB} + \frac{1}{2}\frac{(y - w_{mB})^2}{y} \geq \alpha\left[w_{mB} + \frac{1}{2}\frac{(y_B - w_{mB})^2}{y_B}\right] \qquad (17)$$

The LHS of equation (16) gives the maximum return under unification for the median (income) voter in region. At this is achieved with a tax of $t = (y - w_{mA})/y$. Similarly, the LHS of equation (17) gives the maximum return under unification for the median income voter in region B, obtained with a tax of $t = (y - w_{mB})/y$. Note that equations (16) and (17) are necessary conditions for unification. They are by no means sufficient since in general it is not possible to guarantee the maximum return under unification to the median (income) voters of both regions simultaneously. To see this, suppose that separation involves no inefficiencies ($\alpha = 1$) and that per capita income is the same in both regions ($y_A = y_B = y$.), then equations (16) and (17) must both hold with equality. But we know that both cannot in general hold simultaneously since this would require that $(y - w_{mA})/y = (y - w_{mB})/y$. We can, thus, conclude that in the case where there are no efficiency losses from separation and where per-capita income is the same in both regions, separation will always occur in equilibrium even if one allows for preemptive accomodating taxation in the unified nation. The basic point here is that an accomodating tax for region B may not be one for region A. This is why the main conclusions of section 3 remain broadly valid even when one allows for accomodating taxes.

To determine more generally when separation occurs in equilibrium and how accomodating taxes are set when it does not arise, it is useful to first consider the following case. Suppose that region A is richer than region B $(y_A > y_B)$ and that the income distributions in the regions and the amount of inefficiency from separation are such that median incomes in each region are given by $w_{mA} > w_m > w_{mB}$ and the most prefered tax policies of these agents under unification are given by $t_A^* < t^* < t_B^*$. There is a large set of income distributions

15

consistent with these assumptions. This case has the feature that the preferences of the two regions are conflicting: one region would like to impose higher taxes than those in the union and the other would like lower taxes. For the median voter in the unified country to be willing to make tax concessions, whether he lives in region A or B, this means that the rich in region A and the poor in region B are the most in favor of separation, for any accomodating tax rate[2]. The analysis of our game in this special case can be carried out straightforwardly by considering figure 1 below.

INSERT FIGURE 1a.

The different tax policies are plotted on the horizontal axis and the payoffs under unification to the respective median voters $\left((1-t)w_{m_i} +(t-t^2/2)y\right)$ are plotted on the vertical axis. The lines $\left(U_A(w_{mA}) \text{ and } U_B(w_{mB})\right)$ represent the payoffs under separation to respectively the median voter in region A and region B. Note that for a tax policy of $t = 1$, all median voters obtain the same payoff under unification; on the other hand, for $t = 0$, the ranking of payoffs reflects the assumed ranking of incomes, $w_{mA} > w_m > w_{mB}$. Finally, the curves joining the end points on the two vertical axes represent the payoff functions of the three median voters. Figure 1a. depicts a situation where the most prefered tax policy of the median voter in the union - t^* - can be set without either median voter in regions A or B choosing separation over unification under this taxation regime. Such an outcome would obtain when the inefficiencies of separation are large.

A reduction in the inefficiencies of separation (an increase in α) would induce an upward shift in the lines $U_A(w_{mA})$ and $U_B(w_{mB})$ with the effect that unification may no longer be sustainable without a preemptive accomodating tax change. We define by t_A^{max} and t_B^{min} the respectively highest (lowest) tax rates at which the median voter in region A (respectively, median voter in region B) are indifferent between separation and union. The next proposition establishes what equilibrium outcomes obtain in our special case for different values of α.

16

Proposition 2: For low values of α, unification obtains with no tax accomodation. For intermediate values of α unification may obtain only under tax accomodation; the equilibrium tax rate in the union is then either t_A^{max} or t_B^{min}, with the relevant tax rate being t_A^{max}, when $t^* > t_A^{max} > t_B^{min}$; and t_B^{min}, when $t^* < t_B^{min} < t_A^{max}$. Separation occurs for intermediate values of α, when $t_B^{min} > t_A^{max}$. Finally, for high values of α (close to one) separation always occurs.

proof: It is obvious from our preceding discussion that for α low enough the union is preserved even without accomodating taxes; similarly, it is obvious that separation occurs for high values of α, despite possible tax accomodations. For intermediate values of α, there may be parameter values for which $t_B^{min} < t_A^{max}$ and others where the reverse inequality holds (this can be seen from figures 1b, 1c and 1d).

If $t_A^{max} < t_B^{min}$, an accomodating tax cannot be found since at t^* both regions want to separate and under any increase in tax, region A is worse off, while under any reduction in tax, region B is worse off, so that for any tax rate one of the NSC's is violated.

If $t_A^{max} > t_B^{min}$, an accomodating tax can be found (see figures 1c and 1d). Also, it is always in the interest of the median voter under unification to set the accomodating tax. To see this, note that the median voter in the union cannot be better off under separation than under the union at the relevant accomodating tax, since under separation not only her income declines (due to separation inefficiencies) but also an even worse tax rate than the accomodating rate is being selected. Finally, to see which of the relevant cut-off tax rates, t_A^{max} or t_B^{min}, should be chosen is immediately obvious from figures 1c and 1d. QED

INSERT FIGURES 1b-d

17

Several conclusions may be drawn from our analysis. One obvious conclusion is that the threat of separation does not necessarily lead to lower accomodating taxes, as in Buchanan and Faith (1987). To give a concrete example, countries like Denmark or Holland may be reluctant to proceed further towards European unification for fear that they may be pressured to abandon their policies of high redistribution. To convince these countries to proceed towards a centralized tax system, or indeed further unification, minimum tax guarantees might have to be given. An alternative example might be that of the UK , where maximum tax guarantees might have to be given to get that member country to join in further unification steps. Obviously, if the minimum tax guarantees are incompatible with the maximum guarantees these countries cannot all be part of the same union.

A second implication is that the standard median voter model with linear income taxes may have to be amended to incorporate the possibility of accomodating taxes when one attempts to model more realistic political situations. Accomodating taxes may be necessary in the presence of various political threats such as separation threats (as in this model) or relocation threats, strike threats, etc. in other contexts.

Finally, our analysis sheds light on one potential role of opt-out clauses in the European integration process. If one adds a stage 0 to our two-stage game, in which the independent countries A and B can vote on unification, then our analysis can account for outcomes in which unification takes place (each country has a majority in favour of unification in stage 0) only if each country has the right to separate again at any time as long as a majority of voters in the country are in favour (the so called opt-out clause). The opt-out clause would actually never be exercised. Its only role is to constrain fiscal policy in the union (in our model, equilibrium taxes in the union would be either t_A^{max} or t_B^{min} under the opt-out clause, and t^* with no opt-out clause). By facilitating exit from the union it may be easier to achieve unification in the first place. Unification is more desirable from each country's point of view because each country has a stronger outside option.

We have focused our analysis in this section on a special case in which the constituencies supporting separation are the rich in region A (all voters with higher incomes than the median would vote in favour of separation whenever the median prefers that option) and the poor in region B (all voters with income lower than the median). There are two other relevant cases - one, where the constituencies in favour of separation are the poor in region A and the rich in region B, and the other, where the rich in both regions favour separation. We leave the analysis of these cases to the interested reader.

To close this section we report another type of comparative statics exercise than the ones we have developed so far. Instead of varying the inefficiency from separation holding the income distributions in each region fixed, we shall vary the income distributions, holding the inefficiency loss from separation fixed. Specifically, we shall vary the income dispersion in each region and consider the effects of changes in income inequality on the incentives to separate. Thus, if income inequality increases in both regions, keeping per capita income fixed, then both $\frac{w_{mA}}{y_A}$ and $\frac{w_{mB}}{y_B}$ decrease. The overall effect of this reduction is to make separation more likely as the following proposition indicates.

$\cdot$

Proposition 3: An increase in income inequality in each region, holding per capita income fixed, increases the likelihood of separation for any given efficiency loss from separation.

proof: As indicated above, an increase in income inequality, holding per capita income fixed lowers $\frac{w_{mi}}{y_i}$, $i = A, B$. This in turn implies that $U_i(w_{mi})$ increases for $i = A, B$, which has the effect of reducing the range of accomodating taxes $\left[t_B^{\min}, t_A^{\max} \right]$ (see Figures 1a-d). Holding $U_i(w_{mi})$ fixed, one can see that a decrease in w_{mA} and w_{mB} will also reduce $\left[t_A^{\max}, t_B^{\min} \right]$. Indeed, for any given $t \in [0,1]$, any reduction of w_{mi} by dw_{mi}, $U(w_{mi}) > U(w_{mi} - dw_{mi})$. Decreasing w_{mA} thus decreases $t_A^{\max}$ (even though t_A^* increases!). More obviously, by the same reasoning, a decrease in w_{mB} increases $t_B^{\min}$. These effects thus reinforce the effects of the increases in $U_i(w_{mi})$. This implies that unification is less likely to hold. QED

19

A recent study of income distributions in Eastern Europe by Atkinson and Micklewright (1992) has found some evidence of a general increase in income inequalities in this region. The above proposition indicates that this change in income inequalities is consistent with the observation of the break up of countries in the region. The intuition for this result is that an increase in inequality increases the scope for redistribution and therefore tends to exacerbate differences in preferences over redistribution policies.

5. Independence or a Federal constitution?

Our analysis so far has overstated the incentives towards separation in one other important respect. Indeed, when considering the option of staying in the union or becoming independent, we did not allow a region to go only half way and become an autonomous region within a federal state. If the efficiency losses from separation can be avoided by acquiring the status of autonomous region, it seems that autonomy should always be prefered to independence. In this section we provide one important explanation for why a region may prefer independence over autonomy despite the greater efficiency losses entailed by separation. To proceed further, however, we must define the notion of autonomy; in particular, how autonomy differs from separation.

In practice, regional autonomy involves greater discretion over regional government expenditure as well as greater financial independence from the central government. Typically, defence, foreign affairs, competition policy and monetary policy remain in the hands of the federal government. Every other aspect of government can in principle be left to the regional authorities. In practice, however, the federal government tends to take on more tasks: also, regional autonomy is often limited by restrictions on the regional government's ability to tax. We shall, nevertheless, allow for extreme forms of autonomy in which almost all tax revenues are decentralized to the regions. Given that defence, monetary and competition policy are left unmodeled here, autonomy means that all tax and redistribution policies are determined

independently in each region. The only difference between autonomy and independence is that in the former regime there is a single currency and free mobility of factors while in the latter case each country has its own currency and can in principle set up barriers to the mobility of labour or capital. We shall allow for only free mobility of capital; labour remains fixed (mobility of labour is discussed in section 6). Also, we shall assume that a move from centralization to autonomy involves no efficiency losses (partly because each region has the same currency) while a move to independence involves the usual efficiency losses.

To introduce the option of regional autonomy we need to modify the game considered in the previous section as follows: In the first stage there is a national vote on redistribution policy in the union, as before. In a second stage a referendum on autonomy takes place in each region. To make comparisons possible with section 3, we assume autonomy is adopted if it is favoured by a majority of voters in at least one region. Whatever the outcome of this referendum, regions can in a third stage decide whether to separate. Under autonomy, t_{FA} and t_{FB} are the regional tax rates in regions A and B respectively.

The key tradeoff between autonomy and independence, here, is that in the former regime, inefficiencies are avoided but regional fiscal policy is contrained by fiscal competition between the two regions. Under full independence, on the other hand, the country has greater freedom in setting its redistribution policy but it does not get all the efficiency gains that might arise from, say, a single market. This tradeoff is apparent in the European Union, where fiscal competition of countries like Luxemburg or the UK (who has opted out of both the social charter and the European exchange rate mechanism) constrains the fiscal policies of other member countries with high taxes and redistribution.

To highlight the effects of fiscal competition on regional tax policies we begin by considering the Nash equilibrium in regional taxes under autonomy. Given our assumptions on technology, labour and capital markets, we have in each region total output, equilibrium wage and interest rates under no taxation of:

21

$$Y_i = K_i^\beta L_i^{1-\beta}; \; s_i = (1-\beta)y_i; \; r_i = \beta\frac{y_i}{k_i} \tag{18}$$

Now, under perfect capital mobility the after-tax returns on capital in each region must be equal, so that:

$$r_A(1-t_A) = r_B(1-t_B) \tag{19}$$

This condition, in turn implies that the capital/labour ratios in each region satisfy the following relation in equilibrium:

$$\frac{1-t_A}{k_A^{1-\beta}} = \frac{1-t_B}{k_B^{1-\beta}} \tag{20}$$

One immediately sees from equation (20) that a lower tax rate in one region $(t_A < t_B)$ implies a higher capital labour ratio in that region. $k_A > k_B$. A Nash equilibrium in fiscal policies. under autonomy, is a pair (t_{FA}, t_{FB}) such that. t_{Fi} is each median voter's best response given the other region's choice of income tax. t_{Fj}. Thus, for any given t_{Fj}, region i's choice. t_{Fi}, is the solution to the following program:

$$\begin{aligned}
&Max \left[(1-t_i)w_{mi} + \left(t_i - \frac{t_i^2}{2} \right)v_i \right] \\
&t_i \\
&s.t. \; - \frac{(1-t_A)}{k_A^{1-\beta}} = \frac{1-t_B}{k_B^{1-\beta}}
\end{aligned} \tag{21}$$

and $- t_j$ given

The best response function of t_i to t_j is therefore the solution to the first order conditions :

$$w_{mi} - (1-t_i)y_i = (1-t_i)\frac{dw_{mi}}{d_{ti}} + \left(t_i - \frac{t_i^2}{2} \right)\frac{dy_i}{dt_i} \tag{22}$$

With no fiscal competition, the RHS of equation (22) is zero. However, in the presence of fiscal competition, any increase in domestic income taxes induces some capital flight, which in turn reduces domestic income. Thus, one should expect the RHS of equation (22) to be negative under fiscal competition. Now, we have:

$$\frac{dw_{mi}}{dt_i} = \beta(1-\beta)k_i^{\beta-1}\frac{1}{L_i}\left[L_{mi} - k_i^{-1}K_{mi}\right]\frac{dK_i}{dt_i} \tag{23}$$

$$\frac{dv_i}{dt_i} = \beta k_i^{\beta-1}\frac{1}{L_i}\frac{dK_i}{dt_i} \tag{24}$$

where $\dfrac{dK_i}{dt_i}$ is strictly negative[3]. Thus, an increase in domestic taxes does indeed have a negative impact on domestic per-capita income. However, the effect on the median voter's pre-tax income is ambiguous. The reason is that, while the labour income component of the median voter is negatively affected by the capital flight, the capital income component is positively affected. If the median voter gets his income primarily from returns on capital he may actually be better off as a result of the income tax increase and the resulting capital flight. The reason is that capital flight increases the marginal product of capital and reduces the marginal product of labour.

Now, if his relative capital endowment, $\dfrac{K_{mi}}{L_{mi}}$, is smaller than k_i, as seems plausible, then both terms in equation (22) are negative. We shall henceforth make the latter assumption. Perfect capital mobility, in the unified country before any vote on regional autonomy implies $k_A = k_B$ and thus $y_A = y_B = y$.

It is useful to begin the analysis by making the assumption that the two regions are actually identical, so that $w_{mA} = w_{mB}$. In that case the equilibrium tax rate under unification, t^*, is the most prefered tax rate of the median voters in each region. Also, if there are no efficiency losses from separation, the two median voters would then be indifferent between living in a

23

unified nation or living in an independent country. However, under autonomy, the two median voters would be worse off in this case. Indeed, under autonomy the unique Nash equilibrium in tax rates is such that the median voter in each region sets a strictly lower rate than t^*, as the next lemma indicates.

Lemma 1: Assume that $w_{mA} = w_{mB}$. Then, there exists a unique Nash equilibrium under fiscal competition with $t_{FA} = t_{FB} = t_F < t^*$. Furthermore, $\frac{dt_F}{dK} < 0$, when holding fixed $\frac{w_m}{y_i}$.

Proof : see the appendix

To understand this result it is easiest to consider Figure 2a below:

INSERT FIGURE 2a.

The best response functions of each region are increasing in the tax rate of the other region, and for any tax rate of the other region the best response is always lower than t^*. The effect of fiscal competition is, thus, to induce each region to set a tax rate below t^* (in order to attract capital from the other region) even if the other region sets a rate at or above t^*. Note also that an increase in K leaving $\frac{w_m}{y}$ (and thus t^*) fixed has the effect of lowering t_F. The implications of lemma 1 for full integration (unification), autonomy or independence are summarized in the proposition below:

Proposition 4: Assume that $w_{mA} = w_{mB}$ and assume that the efficiency loss from separation is small (α close to one). Then, unification and separation are both strictly preferred by both median voters to autonomy. Moreover, unification is preferred to separation, unless the efficiency loss from separation is equal to zero.

24

proof: see the above discussion.

The simple case where the two regions are identical and where there are no efficiency losses under separation provides an immediate illustration of the possibility that full independence may be strictly prefered to autonomy and also unification (or full integration) may be strictly prefered to autonomy. This example highlights one of the major drawbacks of the status of autonomy, namely the constraining effect of fiscal competition. One drawback of this example. however. is that it does not establish that separation may be strictly prefered by at least one region over both autonomy or unification.

To establish the latter possibility we need to consider situations where the income distributions in both regions are different (keeping per-capita income and capital the same, for simplicity). When the income distributions in both regions differ, the median voters in each regions no longer have the same income. Thus, assume without loss of generality that $w_{mA} > w_{mB}$: in other words, income is less evenly distributed in region B. In that case, fiscal competition between the two regions leads to the following outcome under autonomy:

Lemma 2: If $w_{mA} > w_{mB}$. then under autonomy the unique Nash equilibrium in taxes is such that: $t_{FA} < t_{FB} < t_B^*$, and the per capita capital stock is higher in region A than in region B. In addition. when the capital stock in the nation is increased. holding $\dfrac{w_{mi}}{y}$ constant, the equilibrium tax rates are reduced: $\dfrac{dt_{Fi}}{dK} < 0$.

proof: see the appendix.

INSERT FIGURE 2.b.

Note that fiscal competition always hurts region B. In fact. if the two regions only differ in the distribution of income and are otherwise identical (as is the case here), it is always the

25

more inegalitarian region (region B) that is most likely to choose separation over autonomy. Notice also that the fiscal competition constraint is tighter the greater the capital stock in the nation. One may, thus, conjecture that for a sufficiently high capital stock and a sufficiently low efficiency loss from separation, situations may arise where full independence is prefered to unification and also to autonomy by at least one median voter. The next proposition confirms this intuition.

Proposition 5 :For any $\left|w_{mA} - w_{mB}\right| > 0$, there exists $\tilde{\alpha} < 1$, such that

(i) $\forall \alpha \geq \tilde{\alpha}$, independence is preferred to unification by at least one region (despite accomodating taxes under unification).

(ii) $\forall \alpha \geq \tilde{\alpha}$, independence is preferred to autonomy in at least one region, when the capital stock in the nation is large: $K \geq K(\alpha)$. (where $K(\alpha)$ denotes the capital level at which region B is indifferent between autonomy and independence)

(iii) $\forall \alpha < \tilde{\alpha}$, unification is prefered to autonomy in both regions for all $K > \overline{K}$ (where, $\overline{K}(\alpha)$ denotes the capital level at which region B is indifferent between unification and autonomy).

Proof: see the appendix.

Thus, independence is likely to occur (whenever there are differences in income distribution between regions) when the level of capital is high and when the efficiency losses from separation are low. Indeed, when the efficiency loss is small the relative benefits of autonomy are small, and when the capital stock is high, the damaging effects of fiscal competition under autonomy are high. The results of Proposition 4 can be conveniently summarized in the figure below:

26

This figure illustrates that for low efficiency losses not only is separation likely, but also it can be avoided by allowing for autonomy. These cases correspond to the (A) triangle in the South-East region of figure 3. However, when the negative effects of fiscal competition (with high K) become larger, separation (S) cannot be prevented. Similarly, when the efficiency losses are high, separation can be avoided. Unification (U) will then be prefered to autonomy if fiscal competition is too important.

Our analysis in section 3 suggests that when autonomy is not an option, separation is more likely to occur when the differences in inequality between regions are large. A straightforward corollary of proposition 5 establishes that, even when autonomy is an option, increasing differences in inequality are likely to lead to separation:

COROLLARY: An increase in $(w_{mA} - w_{mB})$, everything else equal, lowers $\overline{K}(\alpha)$ and $K(\alpha)$ and thus, reduces the set of parameters for which autonomy arises in equilibrium.

Proof: see the appendix.

A greater difference in income distribution across regions, thus, tends to make autonomy less attractive. This is because with greater differences in inequality the more inegalitarian region suffers more from fiscal competition.

To conclude this section, we ask what would be the outcome if the initial situation was separation and a vote in both regions took place on integration into a federal state (autonomy). This question may shed some light on the process of European political integration. The answer to that question is relatively straightforward. As above, it suffices to consider region B's choice between separation and autonomy. We know from proposition 4 that autonomy will be rejected $\forall K > K(\alpha)$ and accepted otherwise (for $\alpha \geq \tilde{\alpha}$). Now, if full integration is

not an option, then the set U in figure 3 is partitioned into two subsets, S and A, with the subset S including all K above $K(\alpha)$ and the subset A including all K below $K(\alpha)$.

From this modified figure we can immediately infer that a gradual move towards full unification, with a first phase where countries are asked to choose between autonomy and separation, and a later stage where further moves towards unification might be contemplated, is not necessarily more likely to succeed than a rapid movement towards full unification, where countries are asked to choose immediately between independence and full unification. Indeed, when fiscal competition is severe, the inefficiencies of separation are not necessarily worse for the median voter than the constraints on fiscal policy under autonomy. In those situations, a move towards fiscal unification may actually be politically easier to implement than a move to a federal state. Alternatively, a vote on full political integration with opt-out clauses to autonomy may be preferable to a vote on a move to a federal state only.

6. Perfect factor mobility and the incentives to separate.

Our analysis, so far, has allowed for capital mobility but not labour mobility. In reality, capital mobility is generally much greater than labour mobility. Therefore, assuming no labour mobility seems like a good working hypothesis. Nevertheless, the reader may wonder what happens when both capital and labour are mobile. In this section we explain that under perfect factor mobility (of both capital and labour) attempts at separation (or autonomy) in order to impose another fiscal policy are self-defeating. Any difference in fiscal policy between regions induces movements in capital and labour which eventually lead to a change and harmonisation of fiscal policies.

Suppose, for now, that both capital and labour are perfectly mobile (under both autonomy *and* separation) and that capital and labour income are taxed in the country of investment or employment. This is not an unreasonable approximation of how taxation actually works in practice. Thus, if an individual moves with his labor endowments from region (or country) A to B under autonomy (or separation), he will pay the tax rate of region B and receive the government transfers of the residents in region B. Similarly, an individual moving his capital to a foreign country will have income on that capital taxed in the foreign country.

Because of perfect factor mobility, there is now an additional equilibrium condition stating that an individual with labor and capital endowments L_v and K_v must have the same after tax income irrespective of how he chooses to locate his factor endowments between regions A and B. Thus, an individual who has his labor and capital endowments in region A must have the same after tax income as if he moved all his factor endowments to region B:

$$\left[(1-t_B)\left[(1-\beta)y_BL_v+\beta\frac{y_B}{k_B}K_v\right]+\left(t_B-\frac{t_B^2}{2}\right)y_B\right]=$$
$$\left[(1-t_A)\left[(1-\beta)y_AL_v+\beta\frac{y_A}{k_A}K_v\right]+\left(t_A-\frac{t_A^2}{2}\right)y_A\right].$$

(25)

But, that individual can choose to have his capital endowment in a different region from where he works, so that equation (20) must also hold. Combining both equations we obtain the following equilibrium condition:

$$(1-\beta)L_v\left[(1-t_B)y_B-(1-t_A)y_A\right]=t_A\left(1-\frac{t_A}{2}\right)y_A-t_B\left(1-\frac{t_B}{2}\right)y_B.$$

(26)

To introduce perfect factor mobility, we modify the sequential game of the previous section by adding a final stage, after the unification, separation, or autonomy decisions have been taken and after the tax rates have been chosen, where each individual can choose to

locate his factor endowments wherever he wants. Even though tax rates are fixed at this point, tax revenues in each region may change as a result of capital mobility and labour migration. Indeed, the movement of factors affects the tax base of each region.

To see how factor mobility can affect final outcomes consider the situation where the two regions do not set the same tax rate: assume without loss of generality that $t_A > t_B$. Then, the highest income earners in region A, who are primarily concerned with reducing their tax burden, would move to region B. This, in turn, implies that the government's tax revenues in region A are reduced. The resulting reduction in public good supply in that region then induces individuals with lower incomes to also switch, and so on. Add to this the increased incentives to move capital from A to B, resulting from the positive effect on region B's return on capital from migration of workers from region A to B. One can extrapolate from these factor movements that when region A has a higher tax rate than region B there is eventually complete migration from region A to B. If such migration patterns were anticipated then region A may not want to set its taxes at that level. The factor movements induced by differential tax rates actually suggest that in equilibrium tax rates in both regions must be the same.

The next proposition establishes that in any equilibrium not only are tax rates the same, but also income distributions must be such that the (per capita) supply of public goods is the same in both regions.

Proposition 6: Under perfect factor mobility any equilibrium under autonomy or independence is such that both regions set the same tax rate and both regions have income distributions such that per capita tax revenues in both regions are the same.

Proof: By contradiction, suppose that an equilibrium exists where, without loss of generality, $t_B > t_A$. In equilibrium all agents locating in region B must weakly prefer to live in

30

region B rather than region A. Thus, all agents in region B have incomes, w_B, such that,

$$w_B(t_B - t_A) \le \left(t_B - \frac{t_B^2}{2}\right)y_B - \left(t_A - \frac{t_A^2}{2}\right)y_A \; .$$

Similarly, all agents in region A must weakly prefer to be in that region rather than in A. Therefore, in equilibrium they must have incomes, w_A, such that,

$$w_A\left(t_B - t_A\right) \ge \left(t_B - \frac{t_B^2}{2}\right)y_B - \left(t_A - \frac{t_A^2}{2}\right)y_A.$$

But this, in turn implies that in equilibrium all agents in region A have higher incomes than the richest agent in region B. Now, the poorest agent in region A, with say income, w_p, receives more in public good consumption than what he is taxed:

$$t_A w_p < \left(t_A - \frac{t_A^2}{2}\right)y_A$$

Similarly, the richest agent in region B, with say income, w_r, receives less in public good than what he is taxed:

$$t_B w_r > \left(t_B - \frac{t_B^2}{2}\right)y_B$$

Thus, the richest agent in region B (who receives a negative net transfer from the government) must strictly prefer to switch to region A, where he becomes the poorest agent (and receives a positive net transfer). But this contradicts the fact that all agents weakly prefer to be in their region in equilibrium. Thus, there cannot exist an equilibrium with different tax rates.

Now, when both regions set the same taxes, there cannot be an equilibrium where their income distributions differ sufficiently that per capita tax revenues differ in the two regions. Indeed, with different (per capita) tax revenues, one region necessarily supplies more publicly provided private goods per capita. In that case, all agents in the region with lower supply of public goods would have an <u>individual</u> incentive to switch to the region with higher supply of public goods. QED

Corollary: The outcome where both regions are identical in all respects and where both regions set a tax of $t_F < t^*$ is an equilibrium under autonomy or independence.

31

proof: We know from proposition 4 that when both regions are identical there is a unique Nash equilibrium in taxes given by $t_{FA} = t_{FB} = t_F$. Given these tax rates, and given that both regions are identical they have the same per capita tax revenues. No individual, therefore, has a strict incentive to move his factor endowments. QED

There may exist other equilibria, under autonomy or independence, where the two regions are not identical in all respects. For example, the regions may have identical populations and identical per capita incomes, but their income distribution may differ; all that is required for an equilibrium to exist, in this case, is that per capita income and median income in each region is the same, so that total tax revenues and the median voters are the same.

However, note that in all equilibria the two regions must have identical per capita and median incomes; otherwise, either total per capita tax revenues are not the same or the two median voters are not the same (which is incompatible with the condition that the two tax rates must be identical).

Given that in all equilibria under autonomy or independence the median voters are the same, they necessarily have the same income and preferences over fiscal policy as the median voter in the nation as a whole. But, under autonomy or separation, they cannot implement their most prefered tax rate, t^*, because of fiscal competition. We know from the proof of proposition 4 that the equilibrium tax rate must then be strictly lower than t^*.

Therefore, if a new vote on unification was held following the move to independence or autonomy, both regions would have a majority in favour of unification. One may, thus, conclude that under perfect factor mobility, independence or autonomy of the regions is not a stable outcome. Eventually, migration and capital movements are such that a majority emerges in both regions in favour of unification. In other words, any move to autonomy or

32

independence in order to implement a different redistribution policy is self-defeating. Thus, factor mobility within a nation seems to be an important cementing force of national unity.

7. Conflicts over the composition of Public Goods.

An important dimension of conflict between regions, which we have left out of the analysis so far, relates to differences in regional preferences over the composition of nationally provided public goods. These different preferences often derive from differences in language, religion and culture. For example, an important source of conflict is the determination of what language should be used in public schools and what religion, if any, should be taught. In this section, we attempt to address some aspects of this dimension of regional conflict, by considering the question of choice of language in state schools and other public administrations.

It is generally believed that linguistic, religious or cultural differences between regions are important factors leading to the independence of regions. Thus, for example, linguistic and cultural considerations seem to be the main factors underlying the Parti Quebequois's drive towards the independence of Quebec, or ETA's drive towards the independence of the Basque region. Our analysis in this section suggests, however, that linguistic conflicts do not always exacerbate regional conflicts: indeed, in some cases, linguistic imperialism cements the union. The reason is that there is a benefit of linguistic imperialism to the region imposing its language on the union. However, in order to benefit from linguistic imperialism, the union must be maintained: to preserve the union (and, thus, benefit from imposing its own language on the whole nation) the region may be prepared to allow for sufficiently large transfers to the other region . Now, if there was no linguistic conflict at all, the region may not be prepared to make the same transfers to preserve the union and separation may therefore be more likely.

Our analysis of linguistic conflicts does not attempt to deal with all the important aspects of this issue. For example, we do not consider the situation where a minority in country A speaks the same language as in country B, and wants to break away from A to join B. Such situations are common in Eastern Europe; for instance, the Russian minority in Crimea might want to break away from the Ukraine to join Russia. This aspect of linguistic and cultural conflict is clearly outside the scope of this paper. Many other dimensions to this complex problem would require a much deeper analysis than the simple one briefly considered in this section.

We shall only consider here the question of how preferences for redistributive policies are affected by the language problem, and to what extent linguistic imperialism contributes to the movement towards separation.

To address this question we return to the framework of section 4, which we modify by introducing a stage 0 to the two-stage game, in which the unified nation decides on whether to have a single official language or whether to allow for both regional languages. Thus, the sequential game considered here has the median voter in the whole nation first make a decision on language, then make a decision on taxes in the union; finally, the median voters in each region decide whether they want to separate or not. If separation occurs, they get to choose their most preferred language and tax rate.

When different languages are spoken in different regions it is likely that labor mobility accross regions is reduced. It, thus, seems reasonable to suppose, as in section 4, that there is no mobility of labour accross regions. For simplicity and brevity, we shall also assume that the regions only face a choice between independence and union and that, as in section 4, there are no capital movements between the two independent countries.

Now, assume that populations in regions A and B speak a different language. There are then two possibilities concerning the supply of public goods: either the language of one

34

region is chosen as the unique language to be used in both regions or each region can use its most prefered language. If both languages are used, then, as before, preferences for redistribution depend only on income. If, however, only one official language is chosen, we assume that the people in the region speaking a different language derive a lower utility from the consumption of public goods. This would be the case, for example, if state schools were not using the local language. But, also, a myriad of small frustrations arise from the obligation to deal with the public administration in a different language from one's own. Conversely, we assume that the people whose language is chosen as the official language derive a greater utility from the consumption of public goods than if there were two official languages. This assumption reflects the idea that the obligation for the other ethnic group to speak one's own language improves communication possibilities at zero cost. Thus, assume that an individual agent's utility function over private and public consumption is given by:

$$U_i(c_v, g) = ((1-t)w + \left(\gamma_i - \frac{t^2}{2}\right)y$$

(27)

If each region can choose its most prefered language, then $\gamma_i = 1$. If the language of region A is chosen as the unique official language, then $\gamma_A \geq 1 > \gamma_B$ and if the language of region B is chosen, then $\gamma_B \geq 1 > \gamma_A$.

Admittedly, these modelling assumptions are somewhat simplistic, but for our purposes the advantage is that they require only minimal changes to our basic model. This facilitates comparisons with the earlier results.

The assumption that voting on the choice of language takes place before the vote on taxes is made partly to avoid any issues of cycling in majority voting decisions[4], but also, to reflect the observation that choices of language are harder to reverse than tax choices. Changes in language are much less frequent, in practice, than changes in taxes. It thus seems natural to assume that the choice of language is made before the tax rate is chosen.

35

Several new questions are relevant in this set-up: Under a single official language, how is the median voter in the unified country determined when the nation votes on fiscal policy? How does the choice of language affect the equilibrium tax rate and the incentives to separate? Finally, which groups favor the choice of one official language rather than two and which groups oppose this choice? We answer these questions in turn.

Note first that with only one official language, an individual's preferred tax rate will depend not only on his income level but also on his ethnic identity (that is, which language he speaks):

$$t^*(w, \gamma_i) = \frac{\gamma_i y - w}{y} \tag{28}$$

Assume that the language of region A is chosen, so that $\gamma_A \geq 1 > \gamma_B$. Then, compared to the situation with $\gamma_A = 1 = \gamma_B$, voters in region A prefer a higher tax rate, and vice-versa in region B. The preferred tax rate $t^*(w_v)$ of an individual with income w_v, under the single official language A, now becomes the preferred tax rate of an individual with income $w_v + y(\gamma_A - 1)$ in region A and with income $w_v - y(1 - \gamma_B)$ in region B, when both languages are allowed. We can, thus, define the identity of the median voter, under the single official language A, as an individual with income $\tilde{w}_m + y(\gamma_A - 1)$ in region A and income $\tilde{w}_m - y(1 - \gamma_B)$ in region B such that:

$$\int_0^{\tilde{w}_m + y(\gamma_A - 1)} h_A(w)dw + \int_0^{\tilde{w}_m - y(1-\gamma_B)} h_B(w)dw = \int_{\tilde{w}_m + y(\gamma_A - 1)}^{\overline{w}} h_A(w)dw + \int_{\tilde{w}_m - y(1-\gamma_B)}^{\overline{w}} h_B(w)dw \tag{29}$$

As in section 4, we shall be concerned with the case where $y_A > y_B$, and $w_{mA} > w_m > w_{mB}$. In this case, region A is richer and has less inequality than region B so that the conflict over

36

redistribution policy takes the form that region A would like to see lower taxes than in the union and region B higher taxes (assuming that each region's language is an official language). The imposition of a single language may change the conflict over redistribution policies. Suppose that region A's language is imposed, then all voters in region A favour redistribution more and all voters in region B favour it less. Assuming that there are no non-separation constraints and that a majority of the population lives in region A (so that a majority is indeed in favour of language A), the effect of imposing language A is to unambiguously raise the equilibrium tax rate. If, however, the non-separation constraint is taken into account the overall effect is ambiguous.

If a single language is imposed on the unified nation the non-separation constraints are:

$$
\begin{aligned}
(1-t)w_{mA} + \left(t\gamma_A - \frac{t^2}{2}\right)y &\geq \alpha\left[w_{mA} + \frac{1}{2}\frac{(y_A - w_{mA})^2}{y_A}\right] \\
(1-t)w_{mB} + \left(t\gamma_B - \frac{t^2}{2}\right)y &\geq \alpha\left[w_{mB} + \frac{1}{2}\frac{(y_B - w_{mB})^2}{y_B}\right]
\end{aligned}
\tag{30}
$$

The RHS of these inequalities represents the payoff of the median voter in each region under separation, when each region uses its most preferred language and sets its preferred redistribution policy. Compared with the non-separation constraints of section 4 (equation (17)), the constraints here differ only to the extent that $\gamma_i \neq 1, i = A, B$.

Suppose that there is a majority of voters in region A and that language A is the unique language of the union, then for any $\alpha \leq 1$ it is easy to see that both constraints will be satisfied for some tax rate, $0 < t < 1$, provided γ_A is large enough and γ_B is sufficiently close to one. In section 4, however, we have shown that in the absence of any linguistic conflict it is not possible to satisfy both constraints when α is close to one. This observation suggests that linguistic imperialism may reduce the likelihood of separation. However, there are also situations where linguistic imperialism may have the opposite effect. The main result of this

section, Proposition 6, characterizes the situations in which linguistic imperialism cements the union and those where it exacerbates the regional conflict.

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Proposition 7: Assume that $y_A > y_B$, and $w_{mA} > w_m > w_{mB}$. If the richer region imposes its language (region A), then linguistic imperialism cements the union. If instead the poorer region imposes its language (region B), then linguistic imperialism divides the union.

Proof: It is easiest to see the argument by considering figures 4a and 4b below:

INSERT FIGURES 4A AND 4B

Consider first the case where language A is imposed on the nation. Comparing the situation of linguistic imperialism, with non-separation constraints (NSC) given by equations (30) with the situation where both languages can be used, with NSC's given by equations (17), we see that the admissible range $\left[t_A^{min}, t_A^{max} \right]$ defined by region A's NSC expands under lingustic imperialism and the admissible range $\left[t_B^{min}, t_B^{max} \right]$ shrinks under linguistic imperialism, with t_B^{min} increasing unambiguously. As a consequence, $\left[t_A^{min}, t_A^{max} \right] \cap \left[t_B^{min}, t_B^{max} \right] = \left[t_B^{min}, t_A^{max} \right]$ shifts to the right.

This results in a lower likelihood of separation for two reasons. First, as $y_A > y_B$ region A's NSC , which is more likely to be binding when both languages are allowed, is relaxed when language A is the unique official language . Second, even when $y_A = y_B$, the choice of A's language increases t_A^* (the most preferred tax rate of region A's median voter under unification) and reduces t_B^* (the most preferred tax rate of region B's median voter, under unification), thereby reducing the regional conflict over fiscal policy.

If now region B's language is chosen as the unique official language, $\left[t_A^{min}, t_A^{max} \right]$ shrinks and $\left[t_B^{min}, t_B^{max} \right]$ expands, as a result of linguistic imperialism. Therefore,

38

$\left[t_A^{min}, t_A^{max}\right] \cap \left[t_B^{min}, t_B^{max}\right] = \left[t_B^{min}, t_A^{max}\right]$ shifts to the left into a region with lower tax rates. This policy is likely to induce more separation for two reasons. First, region A's NSC is tighter as a result, and may no longer hold. Second, t_A^* shifts to the left and t_B^* shifts to the right. The regional conflict over fiscal policy is thus exacerbated. QED

One implication of proposition 7 is that linguistic imperialism goes hand in hand with economic prosperity of the imperialistic region. When the richer region imposes its language (and culture) on the poorer region the median voter in the richer region favours more expenditure on public goods and more redistribution. This implies that the poorer region gets a larger transfer from the richer region. The increased transfer may more than compensate the median voter in the poorer region for the loss in utility incurred from having to speak another language. Another implication of proposition 7 is that when a rich region, imposing its language on a poorer region, loses its economic advantage it either has to give up its linguistic hegemony and/or it has to let the other region break away. These predictions are not inconsistent with the history of linguistic conflict in some parts of Europe.

When the imposition of a single language leads to the break up of the nation, the median voter in the whole nation may decide to opt for multilinguism provided that the break up can be avoided when two official languages are allowed. More intriguingly, in situations where the majority of the population lives in region B, the median voter may decide to impose language A as a single language, even though it is not his most preferred language. The reason is simply that by imposing language A the median voter cements the union, and he is better off when the two regions remain united.

Finally, to obtain a better understanding of proposition 7 it helps to identify which constituencies in each region are in favour or against unification when, language A is imposed as a single official language. The voters who benefit most from its imposition are those who would like to see higher taxes in region A, and those who would like to increase

39

the transfers from region A to region B. Note also that the rich in region B might favour the imposition of language A since this could imply lower taxes in region B.

8. Conclusion.

This paper provides a positive analysis of the break up of nations. The analysis is confined to a simple and narrow framework in which the main conflict of interest between regions is over fiscal and redistribution policies. There are no doubt other important factors bearing on this issue which we have ignored. Nevertheless, some useful lessons can be drawn from our analysis. For example, our analysis provides some insights on the process of European unification. First, the process of European unification may be facilitated not only by inducing greater convergence in income per capita in the different countries, but also by reducing differences in income distribution accross countries. The European Commission's fund for regional development may play an important role in this respect. Second, our analysis suggests that labour mobility within the European union should be encouraged to cement the union. Third, barriers to trade and factor movements between union members and other European countries serve the important function of cementing the union. If a country has to give up some freedom in policy making by joining the union, it will only be induced to join if there is a benefit to be gained by joining. Fourth, giving member countries the option of leaving the union at any time can facilitate the unification process. Fifth, linguistic differences are not necessarily a source of division. Also, our model provides some new explanations for the disintegration of the Soviet Empire. For example, the increase in income inequalities may have facilitated the break up, by exacerbating differences in regional preferences over redistribution policies. These distributional conflicts have also been exacerbated by the process of privatization, which inevitably has involved a huge redistribution of resources. Also, the collapse of the central planning system in Russia has considerably reduced the benefits of remaining in the union.

Proof of lemma 1: A Nash equilibrium in fiscal competition must be a solution of (21) with $t_{FA} = t_{FB}$ since both regions are identical. We omit indexes of regions in what follows. The first order condition becomes :

$$w_m - (1-t)y = (1-t)\frac{dw_m}{dt} + \left(t - \frac{t^2}{2}\right)\frac{dy}{dt} \tag{A1}$$

Using the non arbitrage equation (20) and using the fact that both regions are identical, we get :

$$\frac{dK}{dt} = \frac{-kL}{2(1-t)(1-\beta)} \tag{A2}$$

Using this, (23) and (24) become

$$\frac{dw_m}{dt} = \frac{-\beta}{2(1-t)}k^\beta\left[L_m - \frac{K_m}{k}\right] \tag{A3}$$

$$\frac{dy}{dt} = \frac{-\beta k^\beta}{2(1-t)(1-\beta)} \tag{A4}$$

After making the adequate replacements and rearrangements, equation (A1) becomes

$$(1-t)\left[L_m - \frac{\beta}{2}\left(L_m - k^{-1}K_m\right)\right] = (1-t)^2 - \frac{\beta}{2}\frac{\left(t - \frac{t^2}{2}\right)}{(1-\beta)} \tag{A5}$$

The left-hand side is a negatively sloped linear function of t and the right hand side is a quadratic function of t having 2 positive roots, one smaller and one larger than one. Figure 5 shows the solution.

There is thus a unique root $0 \le t_F < 1$. As the right hand side of (A1) is always negative, we must have $t_F < t^*$.

We now show, that, holding $\frac{w_m}{y}$ constant, $\frac{dt_F}{dk} < 0$.

We know from the definition of individual pre-tax income (equation (3)) and from factor prices (equation (18)) that

$$\frac{w_m}{y} = L_m - \beta\left(L_m - \frac{K_m}{k}\right)$$

Assuming $dK_m = 0$, for $\frac{w_m}{y}$ to remain constant, we must have

$$dL_{mA} = \frac{\beta}{1-\beta} K_m \frac{dk}{k^2} \qquad (A6)$$

Under that condition, an increase in k will increase the intercept of the left-hand side of (A5). The expression for the shift in the intercept, for a varying k and L_m is

$$\left(1 - \frac{\beta}{2}\right)dL_m - \frac{\beta}{2}\frac{dk}{k^2}K_m \qquad (A7)$$

Replacing dL_m by A6, one sees that A7 is always >0, $\forall \beta$ for dk>0. This shift in the left-hand side of (A5) will decrease t_F. It is then immediate to see that for L constant $\frac{dt_F}{dk} < 0$ implies $\frac{dt_F}{dk} < 0$. QED

Proof of lemma 2:

Start from a situation where $w_{mA} = w_{mB}$ and where both regions set the Nash equilibrium tax level t_F; assume an exogenous increase in w_{mA}, and keep the tax rate in region B fixed at t_F. This induces a best response in region A of $t_{FA} < t_F$. Indeed, looking at A5, an exogenous increase in w_{mA} above w_m produces an upward shift in the intercept $L_m - \dfrac{\beta}{2}\left(L_m - \dfrac{K_m}{k}\right)$ and thus a reduction in t_{FA} below t_F. This direct effect is not offset by the ensuing increase in income per capita caused by the capital inflow. Indeed even though this increase in income per capita tends to increase t_{FA}, the non arbitrage equation tells us that a net capital inflow in region A (producing this indirect effect) necessitates in equilibrium a net reduction in the tax rate of region A. The best response of A to any tax rate in region B will thus, because of the exogenous increase in w_{mA}, result in a lower tax rate in region A (including a lower t_A^*). The shift in A's best response function will thus lower t_{FA} and t_{FB}, but t_{FA} will be lower than t_{FB} as the equilibrium will be below the 45° line, as can be seen in figure 2b. Obviously, t_{FB} remains below t_B^*. From the no arbitrage equation, it then follows that in equilibrium the capital stock per capita in region A is greater than in region B

The last part of lemma 2 is easily proved by starting from $w_{mA} = w_{mB}$. We know from lemma 1 that $\dfrac{dt_F}{dK} < 0$. An exogenous incraese in w_{mA} will then, as we just showed, only further decrease t_{FA} and t_{FB} below t_F QED

Proof of Proposition 5:

i) This part of proposition 5 is an immediate consequence of proposition 2.

ii) From lemma 2 we know that $\dfrac{dt_{FL}}{dK} < 0$. Thus, for K sufficiently large the benefits of no tax competition under independence outweigh the efficiency loss of independence. The schedule $K(\alpha)$ is given by the solution to the equation $U_{mB}\big(t_{FB}(K)\big) = U_{mB}\big(t_B^*, \alpha\big)$ where the former is the utility of region B's median voter under autonomy and the latter her utility under independence. Keeping t_B^* fixed, we have:

43

$$\frac{\partial U_{AB}}{\partial t_{FB}} \frac{\partial t_{FB}}{\partial K} dK = \frac{\partial U_{mB}\left(t_B^*, \alpha\right)}{\partial \alpha} d\alpha \Rightarrow \frac{dK}{d\alpha} = \frac{\dfrac{\partial U_{mB}}{\partial \alpha}}{\dfrac{\partial U_{mB}}{\partial t_{FB}} \dfrac{\partial t_{FB}}{\partial K}}$$

We know from propositions 1 and 2 that an increase in α increases U_{mB} under separation. Therefore, $\frac{\partial U_{mB}}{\partial \alpha} > 0$. Moreover, from lemma 2, we know that an increase in K leaving $\frac{w_{mi}}{y_i}$ constant will decrease t_{FB}, thereby decreasing U_{mB}; $\frac{\partial U}{\partial t_{FB}} \frac{\partial t_{FB}}{\partial K}$ is thus negative. Therefore $\frac{dK}{d\alpha} < 0$. Defining $K(\alpha)$ as the locus making the median voter in region B indifferent between separation and autonomy, it follows that $\forall K \geq K(\alpha)$, separation is preferred.

iii) The proof here follows the same logic as in proposition 2. Fiscal competition imposes on both regions a lower tax rate than their prefered rate. Region B is hurt even more since it suffers capital flight whereas region A gains from capital inflows which increase income per capita. Fiscal competition thus represents an inefficiency and, as in proposition 2, tax accomodation in the unified country could prevent this inefficiency. In particular, inhabitants of region B are ready to accept a lower tax rate conceded to inhabitants in region A in order to avoid the inefficiency of fiscal competition. Contray to proposition 2 however, a referendum on autonomy requires a majority in the country as a whole.

We show first that when the inefficiencies of fiscal competition are high, it is possible to find a tax rate in the unified country such that a majority in each region defeats a referendum on autonomy. Call $\tilde{t}_{1B}\left(\tilde{t}_{1A}\right)$ the accomodating tax rate at which the median voter in region B (region A) is indifferent between autonomy and a unified fiscal policy. Because under autonomy, region B suffers both from fiscal competition and capital flight, $\tilde{t}_{1B}$ will be lower than t_{FB}. Under any tax rate greater than $\tilde{t}_{1B}$, more than 50% in region B will reject autonomy.

In region A, there is a trade-off between the advantages of capital inflows and the inefficiently low tax rate due to fiscal competition. It is easy to see that $\tilde{t}_{1A} > t_{FA}$. For $t \leq t_{FA}$,

a referendum on autonomy would yield 100% votes since income per capita would increase and the tax rate in the unified country would not be closer to the preferences of a majority. In order to determine $\tilde{t}_{1A}$, it is useful to look at the net gains an individual with income w_v gets from autonomy, when the tax rate in the unified country is t. This is given by the following equation :

$$w_v(t-t_{FA}) - y\left[\left(t-\frac{t^2}{2}\right)-\left(t_{FA}-\frac{t_{FA}^2}{2}\right)\right]+\left(t_{FA}-\frac{t_{FA}^2}{2}\right)Dy_A \tag{A8}$$

The first expression, which is positive for $t > t_{FA}$, gives the economy on tax payments under autonomy. The second expression is negative and gives the loss in transfers from a lower tax rate. The third expression is positive and gives the gain in transfers from the increase in income per capita Dy_A due to capital inflows. It is useful to rearrange this equation in the following way :

$$a\left(w_v, t_{FA}, Dy_A\right) + \left(w_v - y\right) + y\frac{t^2}{2} \tag{A9}$$

where $a\left(w_v, t_{FA}, dy_A\right) = -w_v t_{FA} + y\left(t_{FA}-\frac{t_{FA}^2}{2}\right)+\left(t_{FA}-\frac{t_{FA}^2}{2}\right)dy_A$ with $\frac{\partial a}{\partial w_v}<0, \frac{\partial a}{\partial t_{FA}}$ for $w_v < y(1-t_{FA})$ and < 0 otherwise, and $\frac{\partial a}{\partial Dy_A}>0$.

For $w_v < y$, the income levels we are interested in, the gains from autonomy are a quadratic function with interceipt a, a negative slope for small values of t and a positive slope for higher values of t, and with slope w_v at t=1. There are 2 positive roots given by :

$$t = 1 - \frac{w_v}{y} \pm \sqrt{\frac{\left(y-w_v\right)^2 - 2ya}{y}} \tag{A10}$$

$\tilde{t}_{1A}$ is the biggest of those two roots for $w_v = w_{mA}$. Note that this tax rate is higher than t_A^*, w_{mA}'s preferred tax rate under unification. Below $\tilde{t}_{1A}$, unification is strictly preferred to autonomy by w_{mA}.

Tax rates below $\tilde{t}_{1A}$ are also thresholds at which agents with income higher than w_{mA} are indifferent between autonomy and unification. At those tax rates, more than 50% of voters in region A prefer unification to autonomy.

As long as $\tilde{t}_{1B} < \tilde{t}_{1A}$, there is room for finding a tax rate t making a majority in each region beter off than under autonomy. Unification will thus always be the outcome.

When however the inefficencies from fiscal competition are smaller because K is smaller, t_{FA} and t_{FB} increase and the room for manoeuver becoms smaller. Voters in region B will be less ready to make concessions and $\tilde{t}_{1B}$ will increase.

Similarly, in region A, t_{FA} will be closer to a majority's preferences and $\tilde{t}_{1A}$ will decrease, as can be seen looking at A9, taking into account an increase in a. $\overline{K}$ is then the level of capital stock at which $\tilde{t}_{1A} = \tilde{t}_{1B}$. That tax rate is the only accomodating tax rate making a majority in each region indifferent between autonomy and unification. Below $\overline{K}$ there is no such accomodation tax rate any more.

Proof of the corollary to proposition 5:

1) An increase in $w_{mA} - w_{mB}$ will increase capital flight in region B which loses more, everything else equal, from fiscal competition. For the median voter in region B to remain indifferent, for a given α, there must be less fiscal competition which means a lower K. $K(\alpha)$ therefore shifts downwards.

2) An increase in capital flight will reduce $\tilde{t}_{IB}$ and increase $\tilde{t}_{IA}$. We will thus have $\tilde{t}_{IB} < \tilde{t}_{IA}$ which means that unification will be preferred. Therefore, $\overline{K}$ must be lowered.

Q.E.D.

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ENDNOTES

[1] In the second stage of our sequential game there are always two pure strategy Nash equilibria. In one of these equilibria each player plays a weakly dominated strategy. We take it that the relevant equilibrium is the one where players choose undominated strategies.

[2] One verifies easily that this will be the case in region B if $t_A < t_B$, and in region A if $t > \alpha t_A + (1-\alpha)$, where $t_A(t_B)$ denotes the equilibrium tax rate in region A (region B) after separation, and t the tax rate under unification. For $t < \alpha t_A + (1-\alpha)$, one verifies that the poor in region A are the most in favor of separation. If the country's median voter lives in region A, he will belong to the poor of that region and will not be ready to make tax concessions to prevent separation.

[3] A straightforward calculation using the no arbitrage equation (20) reveals that

$$\frac{dK_i}{dt_i} = \frac{-\left(\dfrac{K-K_A}{L_B}\right)^{1-\beta}}{\left[(1-t_B)(1-\beta)\left(\dfrac{K_A}{L_A}\right)^{-\beta}\dfrac{1}{L_A} + (1-t_A)(1-\beta)\left(\dfrac{K-K_A}{L_B}\right)^{-\beta}\dfrac{1}{L_B}\right]} < 0.$$

[4] Indeed, by introducing conflicting preferences over the composition of public goods we increase the dimension of a voter's choice set and thereby introduce the possibility of Condorcet cycles.
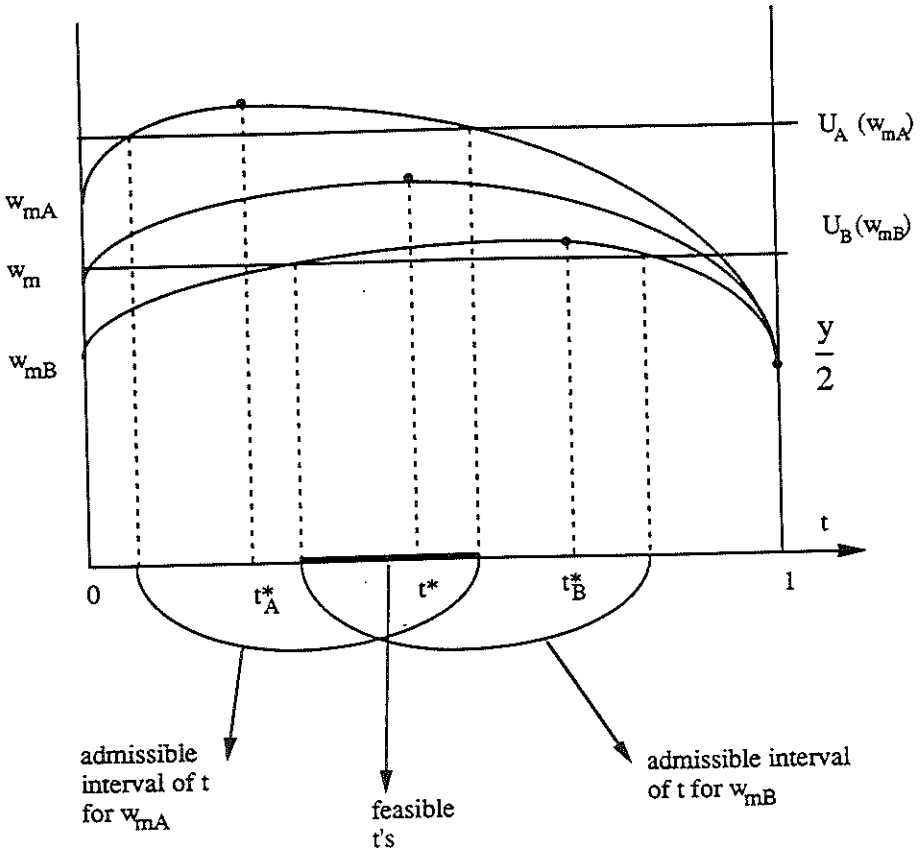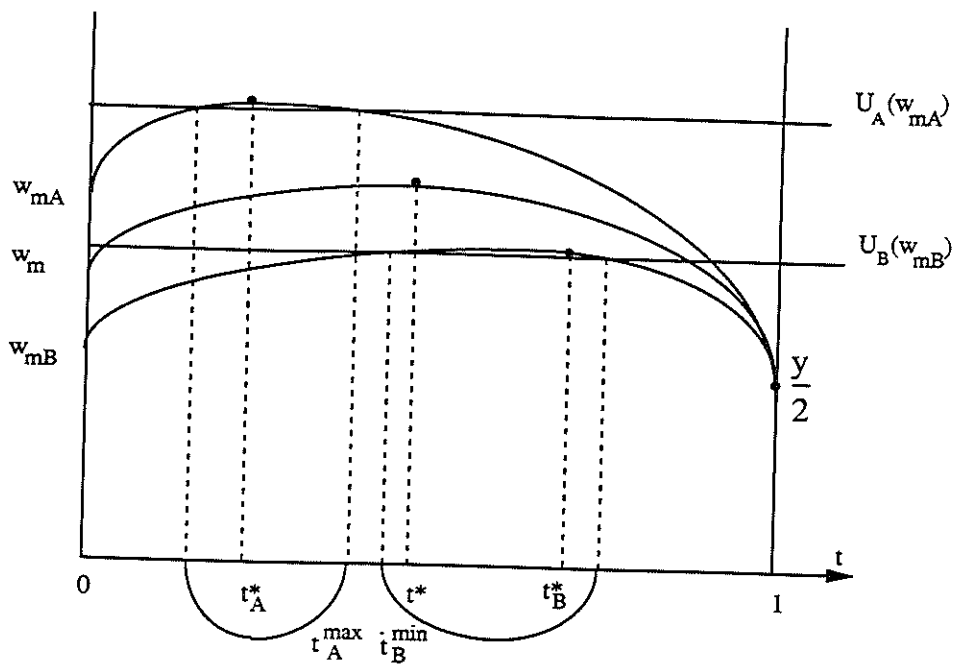
t* is optimal

Figure 1.a.

Separation is inevitable

$U_A(w_{mA})$

w_{mA}

w_m

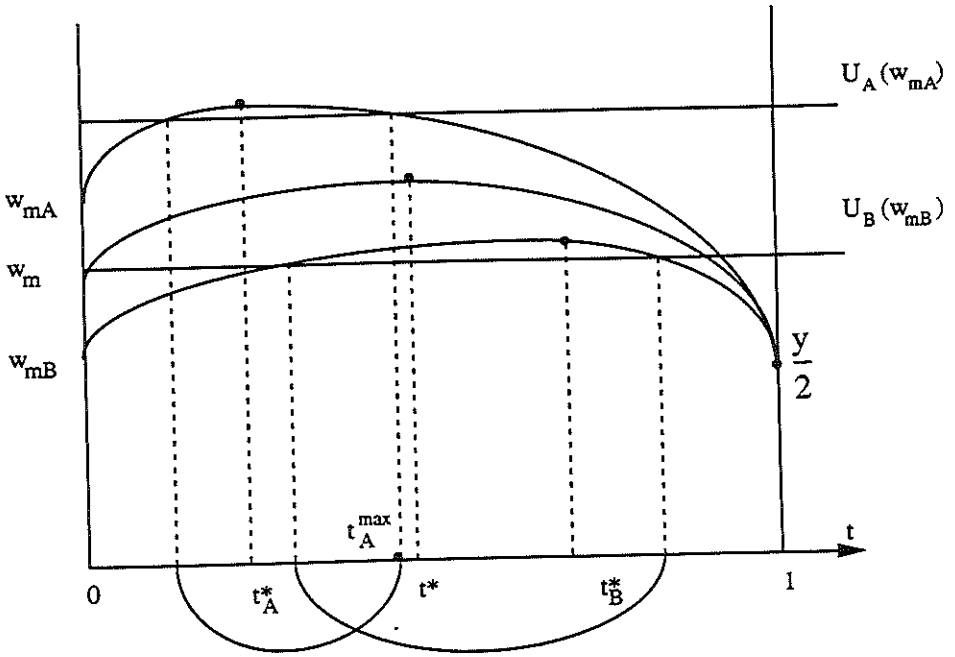$U_B(w_{mB})$

w_{mB}

$\dfrac{y}{2}$

0

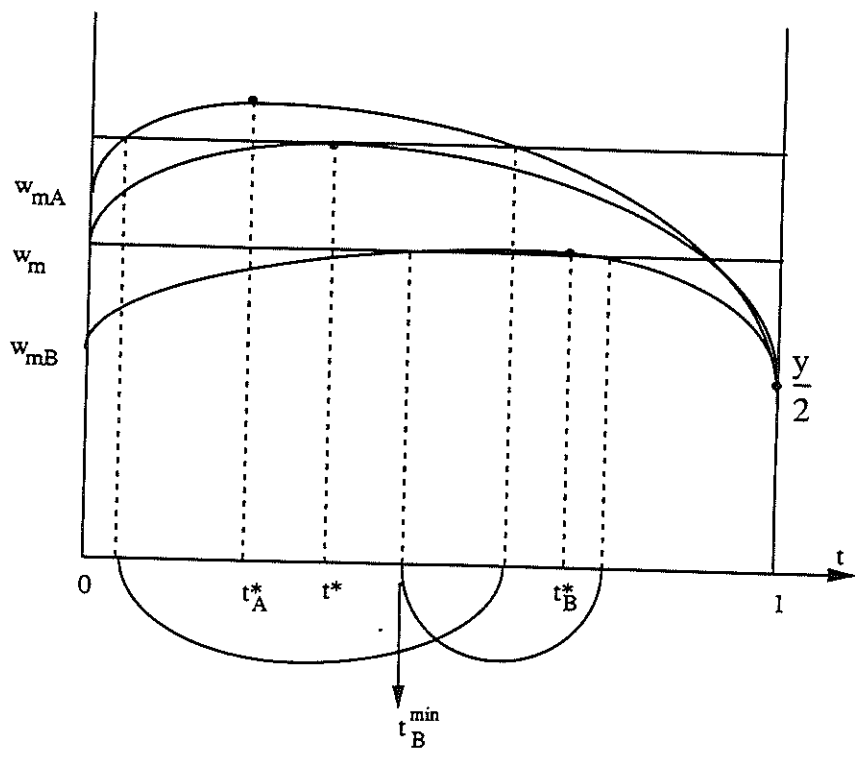t_A^* t^* t_B^* 1

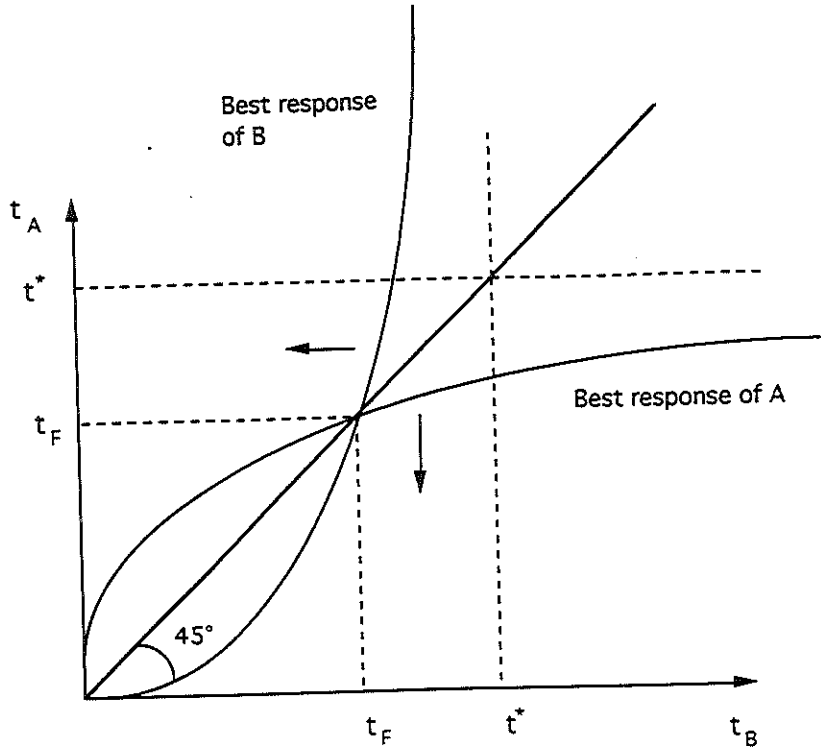t_A^{max} t_B^{min}

t

Figure 1.b.
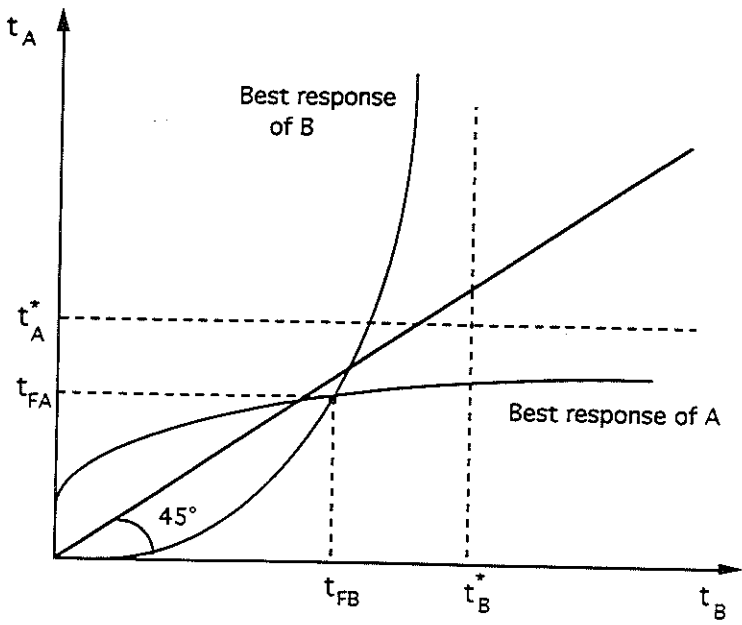
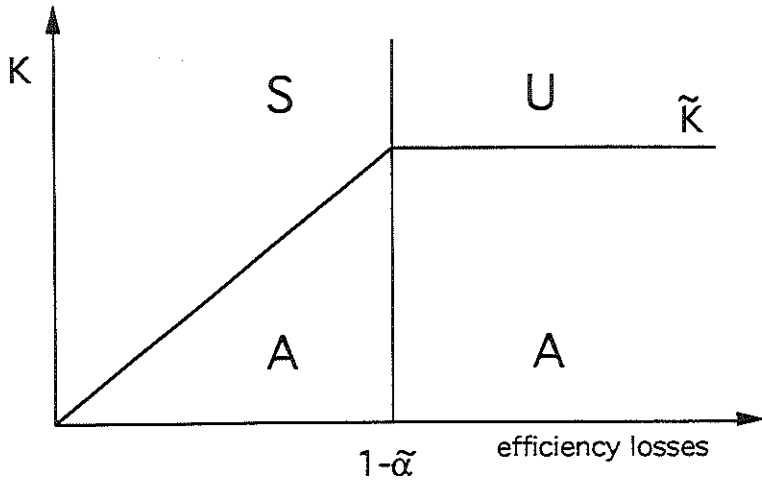Figure 1.c.

Figure 1.d.

FIGURE 2.a.

FIGURE 2.b.

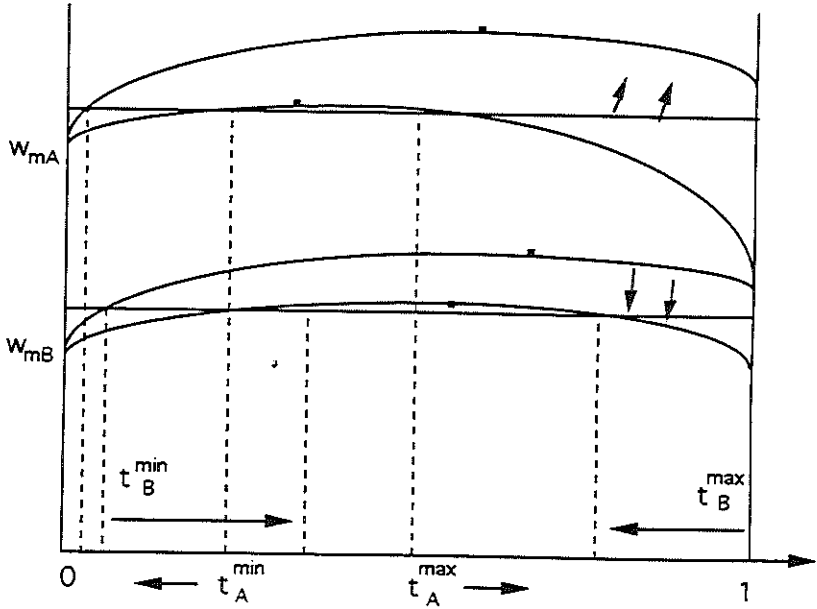FIGURE 3

Region A's language as official language.

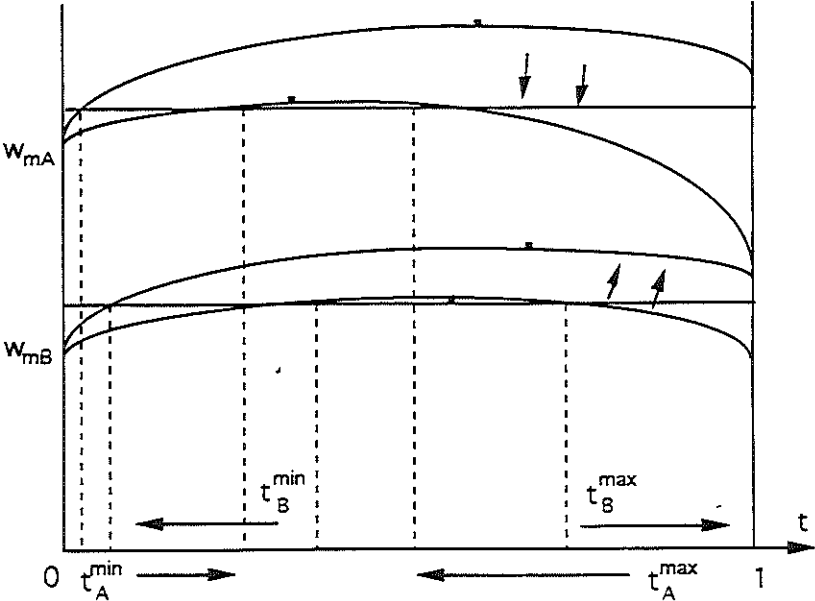
FIGURE 4.a.

Region B's language as official language

FIGURE 4.b.

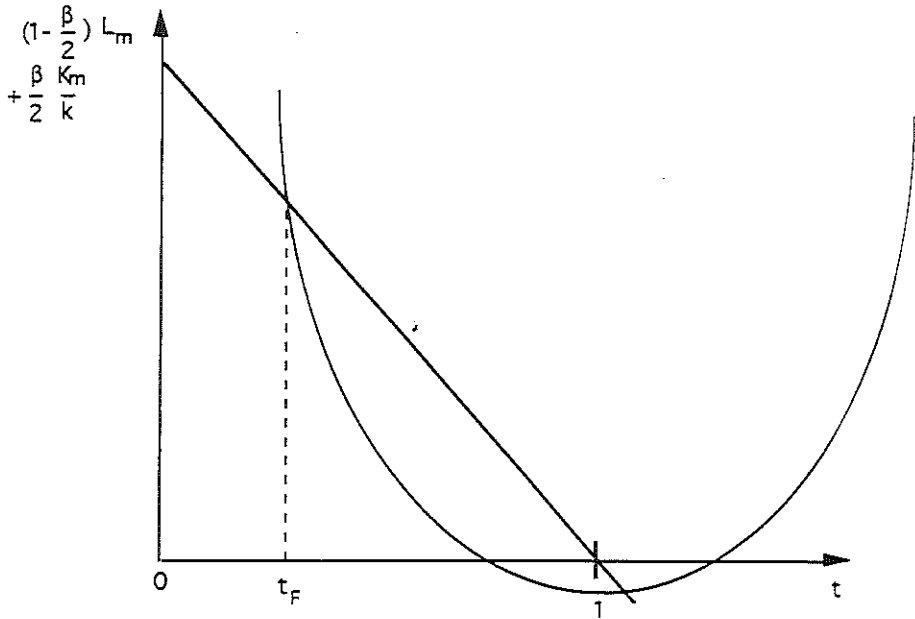The equilibrium tax rate (t_F)

competition with $w_{mA} = w_{mB}$

FIGURE 5

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