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Delayed Integration of Mobile Labor: A Principle for Coordinating Taxation, Social Security, and Social Assistance

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Wolfram F. Richter

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DELAYED INTEGRATION OF MOBILE LABOR: A PRINCIPLE FOR COORDINATING TAXATION, SOCIAL SECURITY, AND SOCIAL ASSISTANCE

Abstract

Delayed Integration is a rule for assigning mobile individuals to jurisdictions for the purpose of taxation, social security, and social assistance. It is a compromise between the Origin Principle and the Employment Principle. Individuals are assigned to the jurisdiction to which they move only after a coordinated period of transition. The paper discusses the merits and shortcomings of such an assignment rule.

JEL Classification:H21, R13.

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1. Introduction

In a world in which constrained labor mobility is the sole impediment to allocational efficiency, integrating labor markets is clearly efficiency enhancing. However, there are losers and winners of market integration. Losers are among those factors whose marginal product comes under competitive pressure. In this paper, the focus is exclusively on the factor of labor, which divides into a mobile and an immobile part. The differentiation is exogenous and non-labor factors of production are assumed away.

From an ex ante point of view labor migration is driven by regional productivity shocks. Such shocks may be favorable or adverse. As a result market integration affects mobile and immobile labor differently. Whereas market integration helps to insure mobile labor against regional shocks immobile labor suffers from increased income volatility. The latter may evoke a demand for market provided insurance. Market insurance, however, suffers from adverse selection. Governments may therefore see reason to intervene with taxation and social insurance. The reason to intervene is strengthened if mobility is skill driven. In this case skill and volatility of income will be negatively correlated. This makes non-skilled immobile labor the natural target of distributive policy.

In this paper three critical assumptions are made. First, distributive policy is pursued at the regional level. Second, there is no fiscal equalization across regions, and third, discriminatory policies and institutional restrictions on labor mobility are not admissible. This specific set of assumptions is characteristic of the state of integration achieved by the European Union. The Union does not really assign the power to redistribute income to the regions. Rather distributive competence is with the Member States. Still, the Treaty of the European Community prohibits any discriminatory policy directed by the Member States against migrant labor. Such an institutional setting is more characteristic of an interregional context than of an international one. It is the reason why the following theoretical analysis does not refer to countries and nations but to regions and jurisdictions.

If distributive policy is pursued by autonomous jurisdictions there is a need to assign mobile individuals to these jurisdictions in an unambiguous way. There are competing

rules of assignment, however, and their comparative advantages are the subject of this paper.

The literature tends to restrict consideration to two extreme rules of assignment, the Origin Principle and the Employment Principle. The latter means that individuals are assigned to the competent jurisdiction in the region of employment. The Origin Principle requires instead to assign individuals to the competent jurisdiction in the region from which they originate. This may be, though need not be, the region in which an individual was born. A less rigid application of the Origin Principle would allow individuals to opt for a specific jurisdiction once at the beginning of their working life (Sinn, 1994, p. 100). Alternatively, one can consider to assign individuals to the country of citizenship. This possibility is however not considered in this paper. The reason is that the Treaty of the European Community explicitly rules out any discrimination on the grounds of nationality.[1]

The Principles of Employment and Origin have their direct counterparts in capital-income taxation. To see this interpret labor income as the return to human capital. It is then obvious that the Employment Principle amounts to taxing capital at source. It may be less obvious that the Origin Principle amounts to taxing capital in the country of residence. Note however that the country of (labor's) origin shares two specific features of the country of (capital's) residence. In both cases reference is made to the region in which wealth has been accumulated and which cannot be substituted ex post by taxpayers seeking to avoid local taxation.

It is common practice to assign mobile labor according to the Employment Principle. The OECD Model Tax Convention is based on the Employment Principle just as the coordination of social security among the Member States of the European Union.[2] The disadvantages of source taxes are well documented in the literature. If non-harmonized, they induce production inefficiency and they harm immobile factors of production. Source taxes on mobile factors are shifted backward. In fact, mobile factors can be taxed

[1] One may argue that the prohibition of the Nationality Principle extends to the Origin Principle and that the Origin Principle is therefore no viable policy option for the European Union. On the other hand, the Origin Principle has some attractive features which deserve to be analyzed theoretically.

[2] See Regulation (EEC) No. 1408/71.

on a benefit basis only (Musgrave, 1999, p. 170). There is, however, an additional problem if labor is taxed at source. The Employment Principle is inherently discriminatory. It is not easily extended to cover non-working individuals. This may not be considered a pressing political problem of Europe. It may still become an impediment for the further political integration. The right of free movement ranks high among the agreed values of the European Union. According to the Treaty of Maastricht every citizen of the Union has the right to reside wherever (s)he wishes to. This ruling contrasts with the legal practice which ties the freedom to move to employment. In particular, welfare recipients lose their claim to support if they choose to migrate. This hardly complies with the notion of a European citizenship and it might not be wise to leave it to the courts to close the gap between European visions and common practice.

The tension between the restricted granting of social assistance and the declared right of free movement of all citizens could easily be resolved by requiring the country of origin to export social assistance. Countries are, however, reluctant to adopt this straightforward solution. One can only speculate about the reasons. An obvious reason will be monitoring. Social assistance is designed as support to persons in need. Such need has to be monitored. Countries are reluctant to delegate monitoring functions to foreign administrations. Although social assistance is not the primary focus of the present paper, it will be given due consideration when weighing competing rules of assignment.

The Origin Principle has been proposed as a rule for assigning working individuals to jurisdictions. The reason has been an allocational one. In contrast to the Employment Principle, the Origin Principle sustains production efficiency. Some authors plead for the Origin Principle not only with a view to production efficiency. For Sinn (1994) it safeguards the Welfare State. In Sinn’s conception, the Welfare State provides insurance against income risk and uncertain life careers. It works best if it is not left to the individual’s discretion whether and when to opt out of the system. The freedom to opt out would only result in adverse selection. At most, individuals should be allowed to choose between competing redistributive systems ex ante when young and ignorant about career perspectives. The Origin Principle is the one that allows the realization of such a conception.

However, the underlying view of redistribution can be criticized as it relies on coercion. The implicit assumption is that people have to be forced if they are to bear a fair share of the cost of distributive policy. The competing conception suggests that distributive policy needs to be approved by the population. Such approval is ensured best if there is a strong feeling of solidarity between the winners and losers of redistribution. Such a feeling of solidarity must, however, grow. It grows in neighborhoods and fellowships. The Origin Principle ignores this as it is oriented towards the past. The Employment Principle is more integrative. It is responsive to changes in neighborhoods.

The Origin Principle can also be criticized for the weak incentives it gives jurisdictions to respond to citizens' preferences. After individuals have been assigned to a particular jurisdiction, they cannot threaten to exit. That makes them exploitable. The Origin Principle imposes little discipline on Leviathan governments. The Employment Principle is more supportive of efficiency enhancing competition among jurisdictions.

If neither the Origin nor the Employment Principle are fully convincing rules of assignment, a mix of the two might promise better results. And in fact, one particular mix has been recently suggested by the Council of Economic Advisors to the Ministry of Finance in Germany (Wissenschaftlicher Beirat, 2001) as a rule for assigning citizens of the European Union. The idea is to leave migrants – working and non-working individuals alike – assigned to their country of origin for a coordinated period of transition and to reassign them to the country of immigration thereafter. Hence jurisdictional reassignment follows migration only with delay. The Council calls this assignment rule ”Delayed Integration”.[3] It is integrative in so far as migrants are eventually assigned to the country to which they move. Integration is delayed as reassignment becomes effective only after a period of transition. For the sake of illustration the Council assumes a transition period of five years.

It is not that the idea of Delayed Integration is totally novel. In fact, there are rules in foreign tax codes that catch the very spirit of Delayed Integration. An example is the

[3] Sakslin (1997) has made a proposal that comes close to Delayed Integration. However, the proposal refers to residence-based benefits only. Michel et al. (1998) study the effect that some delayed granting of citizenship has on distributive policy. In contrast to the model of the present paper they assume low-skilled labor to be mobile.

foreign tax code of Germany (Weichenrieder, 2000). When a German taxpayer emigrates and moves to a low income tax jurisdiction (s)he continues to be subjected to German taxation on that part of her/his income that originates in Germany. There are other rules that resemble Delayed Integration but are dissimilar to it in an important respect. An example is the granting of social assistance within Germany or Switzerland. By citing Feld (2000), Weichenrieder reports that Swiss *Kantons* provide welfare support to immigrants from other *Kantons* as if they were residents and that the *Kanton* of origin reimburses the *Kanton* of residence for its full expenses during the first two years after migration and for half its expenses during the following six years. A similar rule applies to migration within Germany (Wissenschaftlicher Beirat, 2001). The obligation to refund costs for an initial time period is reminiscent of Delayed Integration. However, the rule differs with respect to the incentives given to migrants. It is as if a residence principle were in place. Migrants are entitled to the welfare support granted at the place where they choose to reside. This differs from Delayed Integration. During the period of transition this principle entitles immigrants only to the welfare support granted in their home jurisdiction.

Weichenrieder takes a critical view of Delayed Integration. He argues that Delayed Integration weakens tax competition. Regions' incentive to undercut other regions' tax rates is undermined. The promise of low tax rates after a period of transition lacks credibility. There is always the risk that jurisdictions resort to policy surprises.

The present paper tries to work out the merits of Delayed Integration. This is done in a model that ignores strategic aspects of tax competition. The model is an adaptation of Wildasin (2000). It is introduced in Section 2. Section 3 analyzes the equilibrium that migration brings about in a world of *laissez faire*. In the remaining sections, it is assumed that regional governments pursue autonomous policies of redistribution. That raises the question of which rule of assignment between individuals and jurisdictions should apply. Section 4 looks at the Employment Principle, Section 5 at the Origin Principle, and Section 6 at the Principle of Delayed Integration. Section 7 summarizes and draws conclusions.

2. A simple model of skilled labor mobility

The model is largely a simplified version of Wildasin (2000). The focus is on a representative jurisdiction endowed with $\overline{L}$ immobile and $\overline{H}$ mobile native workers. The division into immobile and mobile workers is exogenous. In contrast to Wildasin (2000), we regard mobility to be an innate ability. It is out of personal control. Without loss of generality, one may therefore normalize the immobile workforce to be one, $\overline{L} = 1$. Wildasin (2000) assumes instead that mobility is the result of skill acquisition, which is endogenously determined by human capital investment.

Production is assumed to require labor only. The output of the jurisdiction under consideration is a function $\Theta F(H)$ of the number, *H*, of mobile workers employed. $\overline{H} < H$ stands for immigration and $\overline{H} > H$ for emigration. We assume positive but decreasing marginal productivity, $F' > 0 > F''$. The factor Θ reflects a stochastic regional shock. This means that its value may well deviate from Θ^*, which holds outside the jurisdiction. In contrast, technology is the same throughout the economy, $F = F^*$. In what follows, an asterisk refers to parameters of foreign jurisdictions. They are exogenous, reflecting the fact that our region is small vis á vis the rest of the economy.

Linear homogeneity implies that the full product, ΘF, is distributed as income to the workforce employed in the jurisdiction. Income per capita is $\Theta F/(1+H)$. A key assumption for the following analysis requires

$$\theta F' > \theta F/(1+H) \ . \tag{1}$$

Hence the marginal product of mobile labor exceeds the average product of the locally employed workforce. (1) is far from being self-evident. Major results derived in this paper turn into their opposite if (1) holds with a reversed inequality sign. Still, it is suggestive to interpret (1) as a condition of *skill-driven mobility*. Note that (1) is equivalent to $r = \Theta F' > \Theta[F - HF'] = w$ which says that the return to mobile labor exceeds the return to immobile labor. This is plausible only if mobile labor can be equated with skilled labor.

3. Laissez faire

When jurisdictions refrain from intervening in labor markets, the wage income of mobile labor, *r*, is determined by the foreign rate of return, $r^* = \Theta^* F'^*$.[4] This has some immediate though important implications. First, the resulting allocation of mobile labor is production efficient, $\Theta F' = r = r^* = \Theta^* F'^*$. Second, mobile labor is perfectly insured against the income risk of regional shocks. r does not vary with Θ but only with Θ^*. As the given jurisdiction is small and as there are many small jurisdictions, it is reasonable to assume that Θ^* is non-stochastic and independent of Θ. Regional shocks are completely absorbed by variations in employment, $H^{LF} = H^{LF}(\Theta)$. In a regime of *laissez faire*, employment is positively correlated with regional shocks, $dH^{LF}/d\Theta = -F'/\Theta F'' > 0$. This makes the return to immobile labor, $w = \Theta\left[F - H^{LF}F'\right]$, more volatile. Without adjustment in H^{LF}, we have $\partial w/\partial\Theta = F - H^{LF}F'$, which falls short of

$$F = \frac{\partial w}{\partial \Theta} + \frac{\partial w}{\partial H}\frac{dH^{LF}}{d\Theta} = \frac{dw}{d\Theta}.$$

The effects that the integration of labor markets have for immobile labor are therefore ambiguous. The exposure of immobile labor to regional shocks increases. It is not clear whether such increased risk is compensated for by an increase in the expected return.[5] It

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[4] *F'** is a short-form for *F'(H*)*. One referee does not like the use of *r* for denoting the wage income of mobile labor. On the other hand, there is a straightforward analogy between mobile labor and mobile capital which makes this notation particularly suggestive.

[5] The gains from labor market integration is not our theme. Still one would like to know how the expected return to immobile labor in the closed economy, $E\Theta\left[F(\overline{H}) - \overline{H}F'(\overline{H})\right]$, compares with the expected return in the open economy, $E\Theta\left[F(H^{LF}) - H^{LF}F'(H^{LF})\right]$. *E* denotes expectation. The question is easily answered if production is Cobb-Douglas, $F = H^{1-\alpha}$, if regional shocks are completely absorbed by unbiased variations of employment, $\overline{H} = EH^{LF}(\Theta)$, and if the return to mobile labor, $r = \Theta F'$, is non-stochastic. It is then straightforward to show that $H^{LF}(\Theta) = \overline{H}(E\Theta^{1/\alpha})^{-1}\Theta^{1/\alpha}$ and that $E\Theta\left[F(\overline{H}) - \overline{H}F'(\overline{H})\right] < E\Theta\left[F(H^{LF}) - H^{LF}F'(H^{LF})\right] \Leftrightarrow E\Theta < (E\Theta^{1/\alpha})^{\alpha}$, which holds true by Jensen's inequality. The expected return to immobile labor then increases as a result of market integration.

depends not least on risk preferences. The results derived by Wildasin (2000, Prop. 1) are less ambiguous and more positive. Since mobility is not fate in Wildasin's setting but the result of investment decisions taken ex ante, expected utilities are equalized in equilibrium across skill levels. As a consequence, labor market integration raises the equilibrium return to all kinds of labor and eliminates all income risk. Hence there is little reason for government intervention. Welfare is maximized by *laissez faire*. This is not necessarily the case in the present framework, in which characteristics of mobility and skill are exogenous.

4. The Employment Principle

If governments wish to redistribute labor income in a world of free labor mobility, the rule assigning individuals to jurisdictions becomes focal. In this section, it is assumed that workers pay taxes to and receive public transfers from the jurisdiction in which they are employed. This is the Employment Principle. It is the principle recommended in Article 15 of the OECD Model Convention for the taxation of labor income. It is also the principle governing social security in the European Union as laid down in Regulation (EEC) No. 1408/71. In what follows, we do not explicitly differentiate between taxation and social security. We simply assume that an individual has to pay taxes, *T*, to the jurisdiction to which (s)he is assigned and that (s)he receives some transfer, *S*, from the same jurisdiction. A crucial assumption is that such taxes and transfers do not discriminate between mobile and immobile workers. For the sake of further simplification, we assume linear taxation at the rate $t \in [0,1]$. Hence tax revenue is $T^E = t\Theta F(H^E)$. The index, *E*, is to indicate that taxation accords with the Employment Principle. If the government budget is to be balanced, we must have $S^E = t\Theta F(H^E)/(1+H^E)$. Note that non-discrimination means that each worker pays the same wage-tax rate, *t*, and that (s)he receives the same transfer, S^E.

Net wage income of mobile labor is $r^E \equiv (1-t)\Theta F' + S^E$, which by wage arbitrage equals the net wage income paid abroad, $(1-t^*)\Theta^* F'^* + S^*$. The Employment

Principle is known to threaten production efficiency. See, among others, Frenkel, Razin and Sadka (1991, Chapt. 2.1). In the present model, production inefficiency, $\Theta F' \neq \Theta^* F'^*$, follows from wage arbitrage if transfers are harmonized, $S^E = S'^*$, but tax rates are not, $t \neq t^*$.

Given the Employment Principle, the level of employment, $H^E = H^E(\Theta, t)$, of a small jurisdiction follows from solving r^E=constant. Let H^E_Θ, H^E_t, S^E_H etc. denote partial derivatives. Implicit differentiation gives us

$$H^E_\Theta = -\frac{(1-t)F' + tF/(1+H^E)}{(1-t)\Theta F'' + S^E_H} \qquad \text{and} \tag{2.a}$$

$$H^E_t = \frac{F' - F/(1+H^E)}{(1-t)F'' + S^E_H/\Theta}. \tag{2.b}$$

It what follows, it is assumed that employment is positively correlated with regional shocks,

$$H^E_\Theta > 0 \quad \Leftrightarrow \quad (1-t)\Theta F'' + S^E_H < 0 \ . \tag{3.a}$$

The first term in the sum of (3.a) is clearly negative. The second term may be non-negative, however, because transfer payments may react positively to immigration. This is just the case when mobility is skill-driven in the sense of (1),

$$S^E_H = \frac{t\Theta}{1+H}\left[F' - \frac{F}{1+H}\right] \geq 0 \ , \tag{3.b}$$

where equality holds if $t = 0$. If (3.a) and (1) hold jointly, taxation drives mobile labor out of the country, $H^E_t < 0$.

The only income on which local policy has an impact is the income of immobile labor, $w^E = w^E(t, \Theta) \equiv (1-t)\Theta\left[F - H^E F'\right] + S^E$. The income of mobile labor, r^E, is fixed by wage arbitrage. However, redistributive policy in favor of immobile labor fails to be effective if the Employment Principle applies. This follows from the well-known result that taxing perfectly mobile production factors at source is harmful for the

immobile factors. The burden of taxation is shifted backwards and local production decisions are distorted.

Proposition 1: Given the Employment Principle, $t = 0$ maximizes the net income of immobile labor, $w^E(t,\Theta)$.

The proof is skipped as the result is considered to be known. The proof follows from demonstrating

(i) $\partial w^E / \partial t = 0$ at $t = 0$ and

(ii) $\partial^2 w^E / \partial t^2 = \Theta\left[F' - F/(1+H^E)\right]^2 / F'' \leq 0$ at $t = 0$.

Although the income of immobile labor is maximized by setting $t = 0$, it is interesting to study the effects of some positive choice of *t*. Of major interest is the effect that $t > 0$ has on the volatility of immobile labor income. One might be inclined to conjecture that reducing w^E is just the price one has to pay for smaller volatility with respect to regional shocks. However, the contrary is true. To see this, we compare $\partial w^E / \partial\Theta$ with $dw/d\Theta = F$ at $H = H^E$ and at small values of $t > 0$. $t = 0$ is excluded as any difference vanishes in absence of taxation. If $w^E_\Theta > F$, this is interpreted as a volatility increasing effect of taxation.

Proposition 2: If the Employment Principle applies, if (1) holds, and if $t > 0$ is sufficiently small, then the volatility of immobile labor income exceeds the *laissez-faire* level of volatility at $H = H^E$.

The proof is straightforward. It relies on showing

$$F(H^E) = \left.\frac{dw}{d\Theta}\right|_{H=H^E} < \frac{\partial w^E}{\partial\Theta}$$

$$= \left[(1-t) + \frac{t}{1+H^E}\right]F - (1-t)H^E F' + \left[-(1-t)\Theta H^E F'' + S^E_H\right]H^E_\Theta \qquad (4)$$

$$\Leftrightarrow \quad 0 < -\frac{S_H^E}{(1-t)\Theta F'' + S_H^E}.$$

The latter inequality follows from (3.a-b).

(4) helps to understand Proposition 2. If mobile labor did not respond to shocks, $H_\Theta^E = 0$, then taxation would be volatility reducing. For $H_\Theta^E = 0$, we obtain $w_\Theta^E < F$. However, by (3.a) employment is positively correlated with regional shocks. This reverses the volatility reducing effect.

From the perspective of immobile labor, the Employment Principle has unfavorable effects only. When assessing such a result, one should note, however, that the present analysis disregards non-labor income. This is clearly restrictive. One could assume instead that immobile non-labor factors of production exist. In this case much would depend on whether the returns to such non-labor factors are included in the tax base and on how tax proceeds are distributed. Immobile labor can well benefit from the taxation of mobile factors if the tax burden and the efficiency loss are shifted to the immobile non-labor factors of production.

5. The Origin Principle

Taxing labor in the country of employment is not the only option. Taxing labor in the country of origin is a prominent alternative. Much of the literature, however, focuses on capital income taxation. In this context, taxation in the country of employment amounts to taxation at source whereas taxation in the country of origin amounts to taxation in the country of residence. See, among others, Frenkel et al. (1991). A more or less implicit assumption is that households do not change their place of residence. At most they commute and supply labor abroad. However, this is not the relevant case in practice. In the European Union less than 400,000 people work in a country which is not their country of residence. In the terminology of Regulation (EEC) No. 1408/71, they are frontier workers. More people migrate, which means that they change their place of

residence along with the place of work. In this context, it is better not to speak of the residence principle but to speak of the Origin Principle instead.

Origin taxation is theoretically appealing as it preserves *production efficiency*. This is easily demonstrated. Origin taxation implies that neither tax rates nor transfer payments change when labor is supplied abroad. By wage arbitrage, we obtain $(1-t)\Theta F'+S^O = r^O = (1-t)\Theta^* F'^* + S^O$, or $\Theta F' = \Theta^* F'^*$. As a result, employment is not affected by taxation and it equals the level of employment in a regime of *laissez-faire*, $H^O = H^O(\Theta) = H^{LF}(\Theta)$. H^O is implicitly defined by $\Theta F' =$ constant. Hence $H^O_\Theta = H^{LF}_\Theta = -F'/\Theta F'' > 0$.

In a regime of origin taxation, revenue amounts to $T^O = t\Theta F + t(\overline{H} - H^O)\Theta^* F'^*$. This covers both the case of emigration, $\overline{H} > H^O$, and the case of immigration, $\overline{H} < H^O$. With a balanced budget, transfer payments are $S^O = S^O(t, \Theta, H^O) = \frac{t}{1+\overline{H}}\left[\Theta F + (\overline{H} - H^O)\Theta^* F'^*\right]$. Again, the focus is on net wage income of immobile labor, $w^O = w^O(t,\Theta) = (1-t)\Theta\left[F - H^O F'\right] + S^O$. As H^O is constant in t and as $\Theta F' = \Theta^* F'^*$, we obtain

$$\frac{\partial w^O}{\partial t} = -\Theta\left[F - H^O F'\right] + \frac{\Theta F + (\overline{H} - H^O)\Theta^* F'^*}{1+\overline{H}} \tag{5}$$

$$= \frac{\overline{H}\Theta}{1+\overline{H}}\left[F'(1+H^O) - F\right] > 0 \quad \Leftrightarrow \quad (1)$$

Proposition 3: Assuming origin taxation, net wage income of immobile labor increases in t if, and only if, mobility is skill driven in the sense of (1).

The benefits accruing to immobile labor do not result from efficiency gains. Their only source is intra-jurisdictional redistribution. The losers are mobile workers. To see this more clearly compute the income accruing to natives. This income turns out to be constant in *t*:

$$\omega^O + \overline{H}\rho^O = (1-t)\Theta\left[F - H^O F' + \overline{H}F'\right] + (1+\overline{H})S^O$$

$$= \Theta\left[F + (\overline{H} - H^O)F'\right] = w + \overline{H}r\,.$$

Much in contrast to what has been shown for the Employment Principle, origin taxation helps to decrease the volatility of immobile labor income. The decreasing effect is stronger, the larger $t > 0$. This follows from noting

$$\frac{\partial\omega^O}{\partial\Theta} = \frac{d}{d\Theta}\left\{\left[(1-t) + \frac{t}{1+\overline{H}}\right]\Theta F + \left[t\frac{\overline{H} - H}{1+H} - (1-t)H^O\right]\Theta * F'^*\right\}$$

$$= \left[(1-t) + \frac{t}{1+\overline{H}}\right]F < F = \frac{dw}{d\Theta},$$

making use of $\Theta F' = \Theta * F'^*$.

Proposition 4: Assuming origin taxation, the volatility of immobile labor income decreases in $t > 0$.

The Origin Principle thus has a volatility decreasing effect. It provides insurance against regional shocks. However note, that regional income rather than income accruing to natives is insured. Whereas the income accruing to natives depends on $\overline{H}$ regional income depends on H^O. It amounts to:

$$\omega^O + H^O\rho^O = (1-t)\Theta F + (1+H^O)S^O > \Theta F = w + H^{LF} r$$

$$\Leftrightarrow \quad (\overline{H} - H)\left[(1+H^O)F' - F\right] > 0.$$

Given (1), this means that the Origin Principle implies income redistribution from jurisdictions of immigration, $H > \overline{H}$, to jurisdictions of emigration, $\overline{H} > H$. Hence the Origin Principle insures regional income against regional shocks. Summarizing, we obtain

Proposition 5: Origin taxation has no effect on the level of aggregate income accruing to natives. Given (1), it damps, however, the volatility of regional income.

It may look as if the Origin Principle has a clear advantage compared to the Employment Principle. The latter impedes production efficiency and works against the interests of immobile factors, as shown above. The Origin Principle does not share these deficiencies. Still, it has its shortcomings which can, however, only be addressed by stepping out of the model. For instance, the Origin Principle is known to impede consumption efficiency if combined with income taxation. The marginal rates of substituting leisure for consumption fail to be equalized across jurisdictions. See, among others, Frenkel et al. (1991). Furthermore, the Origin Principle is at variance with the political objective of integrating immigrants. Integration suggests treating immigrants like inhabitants. The Origin Principle makes this impossible. Individuals stay assigned to their country of origin even if they decide to leave it for ever. This has very much the flavor of slavery in the name of states. Although individuals are free to migrate, the country of origin continues to claim its share of all the returns earned, wherever this may be. This is against the interests of immigration countries especially if various benefits are made available to immigrants. Above all it weakens competition among jurisdictions, even when such competition can be considered to be desirable and efficiency enhancing.

6. Delayed Integration

If both the Employment and the Origin Principle have their deficiencies, it is inviting to look for a compromise. Such a compromise may provide that migrants are reassigned for purposes of taxation and social security to the country of immigration only after an agreed period of transition has elapsed since migration. Just for the sake of illustration, let us assume a transition period of five years. The ruling would then be that migrants are treated according to the Origin Principle for the first five years and thereafter according to the Employment Principle. Let us call this practice *Delayed Integration*. Conflicts between tax authorities are ruled out if all adhere to the same span of delay. This kind of coordination is assumed throughout in what follows. The difference from current European practice is not so much the institution of some delay. In fact, workers posted

abroad temporarily remain assigned to their jurisdiction of origin under current law.[6] Hence the novel element of Delayed Integration is the use of the length of delay as an explicit policy instrument. Furthermore, part of the proposal is the suggestion that Delayed Integration should be applied to all citizens alike and that there should be no differentiation between (i) recipients of welfare payments and (ii) individuals that are employed or treated as if they were employed like family members and students.

This section takes a closer look at the properties of Delayed Integration. Some basic results are derived within the given static model. As Delayed Integration is an inherently dynamic concept, it has to be adapted to the static framework. The adaptation is straightforward, however. It requires labor income earned abroad to be taxed at the rate $d\ t + (1-d)t^*$. $\boldsymbol{d} = \boldsymbol{d}^* \in (0,1)$ measures the coordinated rate of delay. Hence Delayed Integration can be interpreted as a convex combination between the Origin and the Employment Principle. This property helps to explain the following results. With $\boldsymbol{d}$ approaching zero (one) Delayed Integration turns into employment (origin) taxation. The concept of Delayed Integration is equally applied to transfer payments. This means that $d\ S + (1-d)S^*$ is paid to those working abroad whereas inhabitants of the home jurisdiction receive S and pay taxes at the rate t. By wage arbitrage of emigrants, we have

$$(1-t)\Theta F' + S \ = \ [d(1-t) + (1-d)(1-t^*)]\Theta^* F'^* + d\ S + (1-d)S^*. \qquad (6)$$

Obviously, the Origin Principle is recovered for $\boldsymbol{d} = 1$ and the Employment Principle is obtained for $\boldsymbol{d} = 0$. For what follows, much depends on whether wage arbitrage is bilateral or unilateral. *Wage arbitrage* is said to be *bilateral* if both (6) and its counterpart,

$$(1-t^*)\Theta^* F'^* + S^* \ = \ [d(1-t^*) + (1-d)(1-t)]\Theta F' + d\ S^* + (1-d)S\ , \qquad (6^*)$$

hold jointly. Wage arbitrage is called *unilateral* if only one of (6) and (6*) holds with equality and the other with inequality. Unilateral wage arbitrage results if emigration from one jurisdiction excludes emigration from the other. Such a pattern of migration is

[6] For the purpose of social security, the rule is that the duration of the posting does not exceed twelve months (Article 14 Reg. 1408/71; Watson, 1980, p. 127). For the purpose of taxation, the duration may not exceed six months (Article 15 OECD Model Convention).

sustained in equilibrium if we have equality in either (6) or (6*) and if the left-hand side exceeds the right-hand side otherwise. Let us call this a corner equilibrium. It is informative, however, also to analyze interior equilibria characterized by bilateral wage arbitrage. We do one after the other and start with the latter.

6.1 Bilateral Wage Arbitrage

Consider Delayed Integration with $\boldsymbol{d} \in (0,1)$. Bilateral wage arbitrage is feasible only if fiscal policies are sufficiently harmonized. This does not necessarily require the equalization of policy instruments, $t = t^*$ and $S = S^*$. However, differences in tax rates, $t \neq t^*$, are compatible with bilateral wage arbitrage only if the marginal products of mobile labor as well as net tax payments are equalized among jurisdictions. The former is the requirement for production efficiency. The latter means

$$t\Theta F' - S \;=\; t^*\Theta^* F'^* - S^*, \tag{7}$$

which is best interpreted as *harmonization of distributive policy*. Hence whenever there are good reasons not to harmonize distributive policy across jurisdictions, bilateral wage arbitrage will not be viable. This is different from the regimes in which either the Employment or the Origin Principle applies and it may be considered a disadvantage of Delayed Integration.

Proposition 6: Assume Delayed Integration with $\boldsymbol{d} \in (0,1)$, bilateral wage arbitrage, and $t \neq t^*$. The implications are (i) production efficiency and (ii) harmonization of distributive policy.

For a proof, solve (6*) for S^* and eliminate S^* from (6). After canceling various expressions, we end up with $d(t - t^*)\Theta^* F'^* \;=\; d(t - t^*)\Theta F'$, which implies production efficiency. Inserting $\Theta F' = \Theta^* F'^*$ into (6) and dividing through by $1 - \boldsymbol{d}$ gives us (7).

From now on assume $\Theta F' = \Theta^* F'^*$. Hence $H^{DI} = H^{DI}(\Theta) = H^{LF}(\Theta)$ and $H_{\Theta}^{DI} \;=\; -F'/\Theta F'' \;>\; 0$. Tax revenue is

$$T^{DI} = t\Theta F + td(\overline{H} - H^{DI})\Theta * F'*.$$

The first term on the right-hand side is tax revenue collected from home income. The second term is tax revenue collected from income earned abroad. If there is immigration, the second term is negative. It is then tax revenue accruing to foreign jurisdictions. By budget balance we obtain

$$S^{DI} = S^{DI}(t, \Theta, H^{DI}) = t\frac{\Theta F * d(\overline{H} - H)\Theta * F'*}{1 + H + d(\overline{H} - H)}.$$

Our focus is again on net wage income of immobile labor,

$$w^{DI} = w^{DI}(t, \Theta) = (1-t)\Theta\left[F - H^{DI}F'\right] + S^{DI}.$$

As H^{DI} is constant in t and as $\Theta F' = \Theta * F'*$, we obtain

$$\frac{\partial w^{DI}}{\partial t} = -\Theta\left[F - H^{DI}F'\right] + \frac{\Theta F + d(\overline{H} - H)\Theta * F'*}{1 + H + d(\overline{H} - H)}$$

$$= \frac{\left[H + \delta(\overline{H} - H)\right]\Theta}{1 + H + \delta(\overline{H} - H)}\left[F'(1 + H^{DI}) - F\right]$$

which is a straightforward generalization of (5).

Proposition 7: Assuming Delayed Integration and production efficiency, net wage income of immobile labor increases in t if, and only if, mobility is skill driven in the sense of (1).

For proposition 7 to hold, nothing has to be said about the exact degree of delay. d only needs to be positive. The degree of delay is more critical for the effect that Delayed Integration and production efficiency have on the volatility of immobile labor income. As we show next, the volatility is reduced only if $d \in (0,1]$ is sufficiently large. This follows from verifying

$$F = \frac{dw}{d\Theta} > \frac{\partial w^{DI}}{\partial \Theta} = \left[(1-t) + \frac{t}{1 + H + d(\overline{H} - H)}\right]F$$

$$-(1-t)HF' - \left[(1-t)\Theta HF'' - S_H^{DI}\right]\frac{\partial H^{DI}}{\partial \Theta}$$

$$\Leftrightarrow \quad \left[H + d(\overline{H} - H)\right]F > -\frac{(1-d)F'}{F''}\frac{(1+H)F' - F}{1 + H + d(\overline{H} - H)}. \tag{8}$$

The derivation of the equivalence is straightforward. Use is made of $\Theta F' = \Theta * F'*$, $t > 0$, and of $H^{DI} = H^{LF} = H$.

Let us have a closer look at (8). Obviously it does not depend on the value of $t > 0$ whether the volatility of immobile labor income is reduced or not. The tax rate, *t*, enters (8) neither directly nor indirectly via *H*. More critical is the choice of d and the question of whether mobility is skill driven or not. If mobility is skill driven in the sense of (1) and if d is fixed below one, the right-hand side of (8) is positive, just as the left-hand side is. Under such circumstances, unconditional statements about the effect on volatility are not feasible. This would be different if mobility were restricted to unskilled labor, a constellation which is ruled by (1). The impact that the kind of labor mobility has on (8) disappears for d =1. In this case, the right-hand side vanishes and the volatility of immobile labor income is unambiguously reduced, as already stated by Proposition 4. We need not set d =1, however, if (8) is to hold true. It suffices that d is chosen sufficiently close to one so that the right-hand side becomes small relative to the left-hand side. Note that H does not depend on d >0.

Proposition 8: Assuming production efficiency, Delayed Integration has a reducing effect on the volatility of immobile labor income for all $t > 0$ if d is chosen sufficiently close to one.

It is not surprising that Proposition 8 only holds for large values of d. The smaller d is, the smaller the difference between Delayed Integration and the Employment Principle is. Proposition 2, however, taught us that the volatility reducing effect may well be reversed if the Employment Principle applies.

It has to be stressed that Propositions 7 and 8 rely on production efficiency, which, according to Proposition 6, is guaranteed only if Delayed Integration with $d \in (0,1)$

sustains bilateral wage arbitrage. If Delayed Integration sustains unilateral wage arbitrage only, the implications become less clear-cut.

6.2 Unilateral Wage Arbitrage

If wage arbitrage is unilateral, either (6) or (6*) holds with equality. Equality of (6) captures the case in which workers emigrate from the home jurisdiction. Vice versa, equality of (6*) stands for a situation in which workers emigrate from the foreign jurisdiction. The two cases have to be analyzed separately. Since the analysis becomes a bit messy, we focus on a single question. The question is whether the net income of immobile labor can be increased via taxation. The question has to be seen in connection with Proposition 1. This proposition states that the net income of immobile labor cannot be increased by taxation if the Employment Principle holds. This result applies equally to jurisdictions of emigration and immigration. One may easily conjecture that things are different if Delayed Integration is adopted. In fact, we are going to show that the prospects for redistributing income towards immobile labor are better if Delayed Integration applies. More detailed statements have to differentiate between jurisdictions of emigration and those of immigration. We start by looking at jurisdictions of emigration.

Respecting budget balance, a jurisdiction of emigration pays transfers to the amount of

$$S^e = t\,\frac{\Theta F + \delta(\overline{H} - H^e)\Theta^* F'^*}{1 + H^e + \delta(\overline{H} - H^e)}.$$

The index, *e*, indicates emigration, $\overline{H} > H^e$. H^e denotes equilibrium employment in the home jurisdiction. Its level is determined by (6) or $(1-t)\Theta F' + (1-\boldsymbol{d})S^e + \boldsymbol{d}\,t\Theta^* F'^*$ = constant. Implicit differentiation gives us

$$\frac{\partial H^e}{\partial t}\Big|_{t=0} = \left[\Theta F' - d\Theta^* F'^* - (1-d)S_t^e\right] / \Theta F''$$

Net income of immobile labor is $w^e = (1-t)\Theta\left[F - H^e F'\right] + S^e$. It is straightforward to derive

$$\frac{\partial w^e}{\partial t}\Big|_{t=0} = \frac{d\overline{H}}{1 + H^e + d(\overline{H} - H^e)} \left[(1 + H^e)\Theta * F'^* - \Theta F\right]. \tag{9}$$

We can see that two things must come together if w_t^e is to be positive at $t = 0$. First integration must be delayed, $d > 0$. Second, the marginal product that mobile labor can earn abroad must exceed the average product earned at home,

$$\Theta * F'^* > \Theta F/(1+H) \ . \tag{1*}$$

At first sight, (1*) looks very much like (1). In fact, (1*) equals (1) if production efficiency holds. However, unlike (1), (1*) cannot be interpreted as skill-driven mobility. (1*) is obtained, for instance, if the foreign jurisdiction experiences a strongly positive shock.

Proposition 9: If (1*) holds and if integration is delayed $d > 0$, then the net income of immobile labor residing in the jurisdiction of emigration is increased by marginal taxation.

Let us compare this result with the case in which the home jurisdiction is characterized by inflowing labor. Transfer payments amount to

$$S^i = t\,\frac{\Theta F + d(\overline{H} - H^i)\Theta F'}{1 + H^i + d(\overline{H} - H^i)}.$$

This is obtained from dividing up tax revenues $T^i = t\Theta\left[F - H^i F'\right] + t\Theta\overline{H}F' + (1-\delta)t(H^i - \overline{H})\Theta F' = t\Theta F + t\delta(\overline{H} - H^i)\Theta F'$ among $1 + \overline{H} + (1-d)(H^i - \overline{H})$ equal shares. H_t^i is obtained by implicit differentiation of (6*) or $(1-d)\left[(1-t)\Theta F' + S^i\right] + d(1-t^*)\Theta F'$ = constant. Net income of immobile labor is $w^i = (1-t)\Theta\left[F - H^i F'\right] + S^i$. It responds to marginal taxation according to

$$\frac{\partial w^i}{\partial t}\Big|_{t=0} = d\,\Theta \frac{(1+H^i)F' - F}{1+H^i + d(\overline{H} - H^i)}\left[\overline{H} - \frac{(1-d)t^*}{1-dt^*}H^i\right]. \tag{10}$$

For $t^* = 0$, (10) looks very much like (9). Hence skill-driven mobility and Delayed Integration with $d > 0$ jointly ensure positivity of (10). The sign of (10) is more ambiguous if $t^* > 0$. The reason is that the tax elasticity of home employment increases in the foreign tax rate. More precisely, the absolute value of $H_t^i\big|_{t=0}$ increases in t^* when $d > 0$. On the other hand, positivity of (10) can be ensured even for $t^* > 0$ if d is sufficiently close to one.

Proposition 10: If mobility is skill driven in the sense of (1) and if integration is delayed, $d > 0$, then the net income of immobile labor residing in the jurisdiction of immigration is increased by marginal taxation either if $t^* = 0$ or if $t^* > 0$ and if d is sufficiently large.

7. Conclusions

The major conclusion to be drawn from the preceding analysis is that every rule of assignment has its specific shortcomings. There is no rule which can be said to outmatch the competing ones, both on allocational and distributional grounds. The rules which have been discussed in detail are the Employment Principle, the Origin Principle and the Principle of Delayed Integration. It remains to summarize their major characteristics. In doing so, we focus on the following objectives: (i) allocational efficiency, (ii) compatibility with a policy of integration, (iii) applicability to social assistance, (iv) the power to redistribute in favor of immobile non-skilled labor, and (v) the power to insure immobile labor income against regional shocks.

Allocational efficiency relates to production and to consumption. Only production efficiency has been the explicit subject of the preceding analysis. This can be justified in view of the production efficiency theorem of Diamond and Mirrlees (1971) giving

priority to production efficiency in cases where policy has to choose.[7] Still, a broader view of efficiency should not leave consumption unconsidered.

We have seen that the only rule of assignment which sustains production efficiency is the Origin Principle. Delayed Integration with positive delay sustains production efficiency only if wage arbitrage is bilateral, a situation requiring harmonization of distributive policy. The specific appeal of assigning individuals to their country of employment rests on the consumption efficiency which the assignment brings about. Delayed Integration with unilateral wage arbitrage tends to violate both efficiency conditions. The mere fact that Delayed Integration violates two efficiency conditions whereas the Employment Principle only one does not allow us to make strong inferences. After all, it is not the number of distortions that count, but the total efficiency loss. Still, given the framework adopted in this paper, one may well conjecture that efficiency losses are minimized by the Origin Principle and that they tend to decrease in the length of delay which is applied under Delayed Integration.

The model employed in this paper assumes that the public sector performs efficiently. Hence competition among jurisdictions has no efficiency enhancing function as it would have in a Tiebout-like setting. This obviously biases the results against the Employment Principle and against the choice of some small value d under Delayed Integration. This has to be kept in mind when drawing policy conclusions.

The criterion to which we turn next is compatibility with a policy of integration. We have mentioned that it is not fully clear why we should pursue such an objective. Two tentative reasons have been suggested. One refers to the efficiency of administration. Incentives to monitor are stronger if monitoring is the responsibility of institutions which collect tax payments and which fund transfer payments. The other reason refers to distributive policy. Distributive policy is most effective if it is grounded in ethical values approved by those bearing the burden of redistribution. This is widely acknowledged (Pauly, 1973) and implies that distributive policy should aim at exploiting the feeling of solidarity. Solidarity, however, develops best in neighborhoods and similar structures. All this

[7] Soren Bo Nielsen rightly pointed out that the production efficiency theorem is only applicable in absence of pure profits. Hence reference to this theorem is questionable in the present model which assumes limits to the taxation of immobile factor incomes.

provides strong arguments for integrative rules of assignment such as the Employment Principle. As a corollary, it indicates limits of the Origin Principle. A shortcoming of the Employment Principle is its restricted coverage. It is not easily extended to social assistance. Social assistance, however, deserves special consideration.

It would not be prudent policy to put the burden of social assistance on the jurisdiction of immigration. It would only bring the Welfare State under competitive pressure. Jurisdictions would have strong incentives to cut welfare payments in order to deter the immigration of entitled persons. The widely practiced solution to the problem rests on discrimination. The rule is that welfare recipients are withdrawn support if they choose to migrate. It is not totally clear whether such practice complies with the spirit of the European Treaty in the post-Maastricht era. After all, one must admit that territorially restricted social assistance severely curtails the freedom to move. This freedom, however, ranks high among the agreed values of the European Union. It is therefore doubtful that territorially restricted social assistance is a politically and legally viable long-run solution for the European Union.

The solution which appears appealing at first sight puts the burden of social assistance unilaterally on the jurisdiction of origin. Extraterritorial welfare support would then have to be funded exclusively by the jurisdiction of origin and monitoring would be delegated to the jurisdiction of residence. Such a solution is not really convincing, however. This is not only for the reasons raised before against the Origin Principle. Particular problems would appear if one were to combine the Origin Principle for welfare recipients with the Employment Principle for the working population. The two groups are not easily separated in practice. According to a ruling of the European Court of Justice, 10-12 hours of work per week suffice for a person to be qualified as working. The point is that the working status has far-reaching implications. Under the current law, it implies unrestricted assignment to the jurisdiction of employment. This assignment is not even revised in practice if the worker loses her job and becomes eligible to social assistance. Hence the separation between working individuals and welfare recipients is difficult to enforce in practice. For the same reason, any hybrid regime of assignment rules fails to be a convincing solution.

It is the specific appeal of Delayed Integration that it is equally applicable to employed individuals and to welfare recipients and that it allows one to balance the legitimate interests of both the jurisdiction of immigration and the jurisdiction of emigration. There is only the problem that Delayed Integration requires delegated administration for a period of transition. But that should be manageable if it is handled on a mutual basis and if the period of transition is not excessive.

The final criterion we have chosen to discuss refers to the welfare of immobile labor. It is not totally clear whether this criterion deserves special notice. For one, immobile labor constitutes only one segment of the workforce, and for the other, one must be aware that any policy designed to alleviate the fate of immobile labor may produce severe distortions. Mobility generates efficiency gains so that any policy targeted at immobility tends to be costly in terms of efficiency.

In the preceding analysis, such efficiency costs are ruled out by assuming an exogenous division in mobile and immobile labor. Given this arguable assumption, there is good reason to target distributive policy to immobile labor. For one, it makes sense to assume immobile labor to be non-skilled and, hence, the deserved object of welfare support. For the other, the effectiveness of redistribution decreases with the degree of mobility. If the Employment Principle applies, the welfare of mobile labor is out of the control of regional policy. It is then natural to ask what effect competing rules of assignment have on the welfare of immobile labor.

The results derived in this paper suggest that immobile labor benefits most from the Origin Principle. If Delayed Integration applies, a long period of transition is beneficial. The reason is fairly obvious. It does not pay for immobile labor to tax mobile labor at source (Proposition 1). It even makes the variance of immobile labor income increase if there are regional shocks (Proposition 2). Insurance against regional shocks is provided only if Delayed Integration is applied and if the period of transition is sufficiently long (Proposition 8). An extended period of transition is also preferable if immobile labor is to be the clear winner of distributive policy (Proposition 10).

In summary, one can say that Delayed Integration deserves to be considered an appealing compromise between the extreme Principles of Origin and Employment. The preceding analysis does not lend itself to a forceful plead. Clearly one would like to see results that prove optimality of Delayed Integration in some relevant sense. This paper does not provide this kind of results. However, some attractive features of Delayed Integration could be identified. Hence it is a rule of assignment that policy should seriously consider as an optional basis for coordinating the policies of autonomous jurisdictions committed to free movement of all their citizens.

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