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TAX INCENTIVES ON INTER-MUNICIPAL
MIGRATION AND WELFARE

Hannu Laurila

DEPARTMENT OF ECONOMICS AND ACCOUNTING

FI-33014 UNIVERSITY OF TAMPERE, FINLAND

# Tax Incentives on Inter-Municipal Migration and Welfare

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Hannu Laurila

Department of Economics and Accounting
FI-33014 University of Tampere

**Abstract:** *Short-run effects of taxation on inter-municipal migration and welfare are examined in a model constructed as a synthesis of the classic model of inter-regional labour migration and the model of international trade policy. It is found that there is an asymmetry in the effects of a given tax change. Labour income taxation in an out-migration municipality induces emigration and causes welfare losses if the tax is high enough to surpass the migration threshold However, if the municipality is small and capital intensive in its industrial structure, the effects are still slight. Taxation in an in-migration municipality reverses the migration pattern and causes welfare losses even with a small tax, but the effects are modest if the municipality is large and capital intensive. Thus, the effects may remain fairly insignificant in practice, at least in Finland.*

# 1 Introduction

In Finland, the role of the market mechanism in steering regional development has grown during the last years. Economic integration has changed the tenets of regional policy, and the financial focus of municipalities has shifted from state grants towards their own, locally determined tax bases. Inter-municipal migration has increased and a clear division to out-migration and in-migration municipalities has emerged.

The development has provoked discussion on the incentive effects of taxation. A common view has been that taxes induce people to vote with their feet thus making inter-municipal differences unsustainable. According to this insight, out-migration municipalities are doomed to a vicious circle in which emigration causes tax increases, which in turn speed up the emigration, which causes further pressure for tax increases, and so on. Migration is seen as a zero-sum game and concentration in the biggest growth centres is regarded not only inevitable but also tax-driven.

This paper reviews the basic message of economic theory concening taxation and migration. In section 2, a model of inter-municipal migration is constructed as a synthesis of the classic labour market model and the model of international trade policy. The comparative static effects of labour income taxes around the short-term migration equilibrium are analysed in section 3 from the viewpoints of out- and in-migration municipalities. Section 4 concludes.

# 2 The model

Individual welfare depends on a wide variety of more or less place-dependent factors. Therefore, the choice of residential location is a key issue in people's rational behaviour. The classic theory of migration describes the issue as a response to differences in real wages between local labour markets (Armstrong & Taylor, 2002, pp. 141-143; McCann, 2001, pp. 175-207). This is suitable because labour income is the most important base of consumption expenditure for average people, and

because the real wage is a simple and commonly used measure of individual welfare. The local nature of the labour market also constitutes a spatially relevant scene for migration analysis.

In the classic theory, local variation is treated in terms of the exogenous market parameters that enter in the budget constraint. To formalize, ignore non-labour income, normalise total available time to unity, compress private and public goods and services into one consumption bundle, and write

(1) *Max U(q,l) s.t. (1-l)w = pq,*

where $q$ is consumption, $l$ is leisure time, $w$ is nominal wage, and $p$ is price level. Assuming that the qualitative aspects of leisure, work and consumption include in the market information, the parameters $w$ and $p$ determine the attainable welfare. Solving for consumption from the budget constraint yields $q = (1-l)\omega$, where $\omega = w/p$, and substituting in the utility function shows that the problem reduces to a question of optimal time use with respect to the real wage.

The real wages are determined locally on competitive labour markets. Local supply of labour derives from the individual time use decisions. On the market level, (1) implicitly yields $\omega = w/p = g(L)$, where $g(L)$ describes the value of time in the market. Assuming that $g' > 0$ the labour supply schedule is upward sloping in L-$\omega$ space. Local market demand derives from the capability of the local production sector to hire labour. The firms aim at

(2) *Max pq - wL,*

where $q = f(K,L)$. The usual assumptions on the production function are made. The aggregate production technology may differ between municipalities for e.g. structural reasons. The capital stock K being constant in the short term the optimisation yields $\omega = w/p = f_L$ for the market demand

for labour, which is downward sloping due to the assumption of diminishing marginal products. The steepness of the demand curve depends on local industrial structure. The more capital intensive the structure is the steeper is the curve and vice versa. (Burda & Wyplosz, 1997, s. 136-150.)

Assume that the economy consist of two municipalities A and B, which cover relevant labour market areas so that residence is work-based. The firms are fixed to their locations in the short term, and so is the constant capital stock. People are able to monitor possible inter-municipal differences in real wages, and there are no transaction costs or other frictions distorting their decisions on residential location. Figure 1 illustrates the setting and the effects of migration by merging the classic model of labour migration (Armstrong & Taylor, 2002, pp. 141-143; McCann, 2001, pp. 192-196) with a model of international trade policy (Krugman & Obstfeld, 2000, pp. 187-253). (Laurila, 2002.)

(Figure 1 here)

Figure 1 presents the labour market of municipality A in the left panel, that of municipality B in the right panel and the inter-municipal labour market in the middle panel. The labour demand curves $D^A$ and $D^B$ differ due to different capital stocks, industrial structures, trade patterns etc. and the labour supply curves $S^A$ and $S^B$ differ because of demographic, educational and other such reasons. The initial labour market equilibrium in A is at point $e^A$ for the real wage $\omega^A$, and that in B is at point $e^B$ for the real wage $\omega^B$. The real wage gap causes that some people in A are tempted to work in B, while some firms in B are tempted to hire labour from A. The middle panel presents these interests. The market supply curve $S^a$ (the horizontal difference between $S^A$ and $D^A$) describes the supply of labour from A for real wages higher than $\omega^A$ and the market demand curve $D^b$ (the difference between $D^B$ and $S^B$) describes the demand for labour to B for real wages lower than $\omega^B$.

Migration from A to B makes the real wages adjust in both ends. Emigration reduces labour supply in A causing nominal wages to rise along the labour demand curve. At the same time the demand for local goods, services and housing falls. Production falls too, but taken that the supply side is less elastic in the short term, it is quite reasonable that the local price level falls somewhat. The reverse is true in B: the nominal wages fall and the prices rise. The real wages rise in the out-migration end and fall in the in-migration end until the market equilibrium $\varepsilon$ in the middle panel of Figure 1 is reached by real wage equalisation to $\omega^*$. Employment is $L^a$ in A and $L^b$ in B. Emigration from A is $L^{a1}\text{-}L^a$ and immigration to B is $L^b\text{-}L^{b1}$, which displaces $L^B\text{-}L^{b1}$ of the original workers. In the inter-municipal equilibrium, the migration flow thus amounts to $L^{a1}\text{-}L^a = L^b\text{-}L^{b1} = L^\varepsilon$.

In municipality A, the firms' surplus decreases by the area $\omega^A\omega^*ae^A$, of which $\omega^A\omega^*aa^4$ goes to the workers, whose surplus is $a^3\omega^*aa^2$. The net welfare loss is $a^2ae^A$. In B, welfare increases because the firms gain $\omega^*\omega^Be^Bb$, of which $\omega^*\omega^Be^Bb^1$ comes from the original workers so that the net gain is $b^1e^Bb$, and because the immigrants gain $b^2b^1b$ (or $a^2aa^1$ in the left panel). These effects sum to $b^2b^1e^Bb$ in the right panel of Figure 1. Since the migrants' welfare gain more than covers the welfare loss in A, the remainder $aa^1e^A$ measures the net effect of emigration. Summing this to the firms' gain in B the total welfare gain amounts to $\omega^A\omega^B\varepsilon$ in the middle panel, of which $\omega^A\omega^*\varepsilon$ equals $aa^1e^A$ in the left and $\omega^*\omega^B\varepsilon$ equals $b^1e^Bb$ in the right panel. Migration reallocates labour to higher-productivity use resulting in efficient resource allocation. Thus, migration is not a zero-sum game.

The effects of emigration depend on the local market conditions. First, the more capital intensive the local industrial structure compared to the rest of the economy the steeper the local labour demand curve and thus the oversupply curve to the inter-municipal labour market. Local real wages adjust more, and migration flows and welfare are smaller than in Figure 1. Second, the smaller the local labour force with respect to the rest of the economy the flatter the labour demand curve faced in the inter-municipal market. All the effects are magnified compared to those in Figure 1.

# 3 The effects of taxation on migration and welfare

## 3.1 The initial situation

In a labour market model it is quite reasonable that labour income taxation should affect migration. To explore the comparative-static effects of such taxes around the short-term migration equilibrium, consider the final stage of Figure 1, where the labour markets within and between the municipalities have settled to their equilibria with $\omega^*$ everywhere. Municipality A is the original out-migration municipality and B is the in-migration one. Figure 2 provides a reformulation of the setting.

(Figure 2 here)

The left panel of Figure 2 shows that emigration has resulted in a twisted labour supply schedule $S^A$ in municipality A. The lowest segment of the initial supply curve, from $a^3$ to $a^2$ in Figure 1, has remained unchanged, but because those along the segment from $a^2$ to $a^1$ have emigrated, the supply curve has turned vertical at $a^2$ so that the segment above $a^1$ has shifted adjacently inwards. The labour demand curve $D^A$ remaining unaltered the equilibrium is at point $a$.

In the right panel of Figure 2, immigration from municipality A has shifted the labour supply curve outwards after the horizontal summing of the dashed segment $b^2b$ to the initial labour supply curve in Figure 1. Below the equilibrium wage $\omega^*$ the curve has thus become flatter, and above $\omega^*$ the curve has shifted out adjacently by the number of emigrants. As a result, the twisted labour supply curve $S^B$ intersects with the unchanged labour demand curve $D^B$ at point $b$.

In the inter-municipal labour market in the middle panel of Figure 2 all possible demand and supply curves start from the same point on the vertical axis. The curves $D^a$ and $S^a$ derive from the overdemand and oversupply in municipality A, and the curves $D^b$ and $S^b$ derive respectively from

those in B. For the equilibrium real wage $\omega^*$ there is no oversupply or overdemand, and there is no other wage such that would balance the market. The market equilibrium is stable.


### 3.2 Taxation in an out-migration municipality

Asume that a constant unit tax is imposed on labour time units in the original out-migration municipality A (Cullis & Jones, 1998, p. 159-189). The comparative static effects are presented in Figure 3 for two alternative tax rates, $t$ and $t'$.


(Figure 3 here)


Examine first the effects of a tax of rate $t$. The tax wedge splits the labour demand curve so that the original curve $D^A$ gives the gross wage that the firms are able to pay, and the curve $D^A_t$ gives the net wage according to which people make their choices. Since the tax wedge $t$ occurs on the vertical segment of the labour supply curve, the gross wage remains at $\omega^*$ and labour demand remains at $L^a$. The net wage is $\omega^A_t$, for which labour supply also remains at $L^a$. Since there are no effects on the inter-municipal labour market, taxation does not affect migration, the circumstances in B nor welfare. The only effect of taxation concerns distribution of income in municipality A.

Since the tax revenue $\omega^A_t\omega^*aa^3$ in the left panel of Figure 3 is collected wholly from the workers of A, the net wage becomes lower than in B. Yet, this does not necessarily imply a difference in the real wages – the equality would be maintained in a system, which provides public services and transfers fairly against the tax payments so that $\omega^A_t\omega^*aa^3$ would be reverted. But if the system is not fair, for example if the repayments benefit the firm sector, taxation redistributes income from the workers to the firms, and the real wage in A remains lower than that in B. The system may be unfair also because of high transaction costs, ienefficiency in public provision etc. In any case, the result is that tax-induced differences in real wages do not trigger inter-municipal migration in the short term.

The vertical segment of the labour supply curve says that the workes staying in municipality A get higher wages than they require. Under a fair system, this gives them extra surplus measured by the area $\omega^A_2\omega^*aa^2$. Since the tax revenue $\omega^A_t\omega^*aa^3$ is only a part of this extra surplus, even an unfair tax system would be accepted without voting with feet. The tax wedge can thus be as wide as the vertical segment of the labour supply curve without affecting migration and social welfare. The vertical segment constitutes a threshold for moving, which gives degrees of freedom not only in the design of the local tax system, but also in the private wage-setting. Because there is no threat of emigration, the firms in A may try to shift the workers' extra surplus to their own profits. However, the main results of the short-term analysis do not depend on this issue.

Next, consider the higher tax $t'$ in Figure 3. The tax wedge makes the gross wage adjust to $\omega^A$ and the net wage to $\omega^A_{t'}$. Labour supply in A falls by $L^a-L^{a5}$ because the net wage falls below the reservation level $\omega^A_2$. The higher wages in B make the labour supply curve in the middle panel shift from $S^a$ to the twisted $S^a_{t'}$. Migration from A to B continues until labour supply $S^a_{t'}$ and labour demand $D^b$ meet at point $e$ for the market wage $\omega^e$. In B, the fall of wages to $\omega^e$ makes $L^b-L^{b2}$ of the original workes quit working, but the new immigrants ($L^a-L^{a5} = L^{b3}-L^{b2}$) more than replace them thus increasing employment to $L^{b3}$. Note that in A, the gross wage $\omega^A$ is higher and the net wage $\omega^A_{t'}$ is lower than $\omega^e$ in B. The tax $t'$ thus creates an inter-municipal difference in workers' real wages, which is not equalised even if the local policy is fair. Returning the tax revenue $\omega^A_{t'}\omega^A a^5 a^4$ according to the tax incidence ($\omega^*\omega^A a^5 a^7$ to firms and $\omega^A_{t'}\omega^*a^7 a^4$ to workers) yields $\omega^*$ as the workers' real wage, which is still higher than in B.

Welfare in A decreases by $a^4 a^5 aa^2$, of which $a^7 a^5 a$ is due to declining profits in the firm sector and $a^4 a^7 aa^2$ is due to lost labour income of the workers. In B, the firms' profits increase by $\omega^e\omega^*bb^3$ and

the original workers' incomes decrease by $\omega^e\omega^*bb^2$ the net benefit being $b^2bb^3$. In addition, the new immigrants bring with them $a^4a^6a^8a^2$. Thus, the welfare increases in B by $\omega^A_{t'}\omega^*ee^1$, measured in the middle panel of Figure 3. The gain in B does not fully compensate the loss in A. The net welfare loss $a^7a^5aa^8$, measured in the left panel, is the cost to the whole economy due to the tax-induced market distortion and the consequent inefficiency in resource allocation.

The effects of taxation depend on the market conditions. Suppose that municipality A in Figure 3 is of atomistic size and faces a flat demand curve in the inter-municipal market at $\omega^*$. Then the emigrants' welfare gain is bigger and the welfare loss of the economy reduces to $a^7a^5a$ in the left panel. Furthermore, let A be also capital intensive in production so that its labour demand curve is steeper than $D^A$ (the dashed lines in the left panel). Levying $t'$ would then cause the internal gross wage to adjust more and the net wage to adjust less so that emigration and the welfare effects would be smaller. A capital intensive production sector can carry a heavy tax burden without big effects on employment and the consequently small fall in net wages induces only modest emigration. Small capital intensive municipalities are thus less vulnerable to taxation than large diverse ones.

### 3.3 The case of an in-migration municipality

Empirical findings suggest that also in-migration municipalities may experience short-term pressures for tax increases (Kallio et al., 2001). Figure 4 presents the analysis of the tax effects from the viewpoint of in-migration municipalities.


(Figure 4 here)


In the right panel of Figure 4, the tax $t$ imposed in B creates a tax wedge between gross and net real wages and splits the labour demand curve into $D^B$ and $D^B_t$. Because the labour supply curve slopes everywhere upwards, the tax wedge shifts the labour supply decision backwards to $b^4$ along the flat

segment of the labour supply curve, and labour demand decision backwards to $b^5$ along the original labour demand curve. Of the workers of B, $L^{b5}$ continue working, and the segment between $b^4$ and $b$ of the labour supply curve is shifted to the inter-municipal labour market so that, together with the original supply curve $S^b$, it forms the new labour supply curve $S^b_t$ in the middle panel.

The inter-municipal labour market equilibrium is reached at $e$ in the middle panel of Figure 4. The market real wage falls to $\omega^e$ determining the migration pattern. Migration from B to A is $L^{b8}$-$L^{b5}$ and the welfare loss of municipality B is $b^4b^5b$ in the right panel. In municipality A welfare increases, because the immigrants gain $b^4b^6b^8$, and the firms gain $a^{10}aa^9$. The sum of these areas is $\omega^B_t\omega^*e$ in the middle panel (or $b^4b^7b^8$ in the right panel) measuring the social welfare that B transfers to A by its tax policy. The net welfare loss caused to the whole economy is $b^7b^5bb^8$. The tax income in B is $\omega^B_t\omega^Bb^5b^4$, of which $\omega^*\omega^Bb^5b^7$ incides to the firms and $\omega^B_t\omega^*b^7b^4$ to the workers. The real wages are again not equal between municipalities in the market equilibrium, not even in a fair programme.

The effects depend again on size and capital intensity. In Figure 4, the migration effect is the greater the smaller B is relative to the rest of the economy. If B is atomistic so that the demand curve in the middle panel is horizontal, emigration from B grows to $L^b$-$L^{b5}$, the whole welfare gain $b^4b^7b$ attaches to the emigrants, and the welfare loss of the whole economy shrinks to $b^7b^5b$ (note that the welfare effect in B does not depend on its size). Thus, the smaller B the bigger the migration effects and the smaller the welfare effects and vice versa. The role of relative capital intensity can be analysed by making the labour demand curve in B steeper in the right panel (the dashed demand curves). Taxation would then cause smaller effects on migration, market wages and welfare. Thus, the more capital intensive the industrial structure in the original in-migration municipality the less significant the economic effects of taxation. A general conclusion is that a big in-migration municipality with a capital-intensive industrial structure can use taxes without notable effects on migration and welfare.

# 4 Conclusions

The paper examines the common conception that migration makes tax-induced wage differences unsustainable, and that out-migration municipalities are, under obvious fiscal pressures, doomed to a vicious circle of tax-accelerated emigration. A closer investigation of the theory of labour migration reveals, however, that the conclusion is not so self-evident, at least not in the short run.

Analysis of the comparative static effects of labour income taxation in the present model shows that there is an asymmetry in the effects depending on whether the imposing municipality is originally an out-migration or an in-migration one. An out-migration municipality can impose modest taxe increases without affecting migration and welfare at all. The tax increase must be decidedly high in order to trigger such effects. On the other hand, even a small tax increase in an original in-migration municipality induces emigration and causes both local and economy-wide welfare losses.

The minor tax effects in out-migration municipalities are explained by the vertical segment that former emigration has incorporated to the local labour supply curve beneath the equilibrium wage level. Thus, there is a threshold for migration, which means that the reservation wage of the remaining workers is considerably lower than the current market wage. This may be so because of age, marital status, profession, education, owner-occupancy of housing, real estate values, social networks and other such factors, which determine both the personal productivity (in terms of nominal wages) and the personal price level (of the personal consumption bundle). The concept of personal prices is of particular importance in the present model, because the price system is assumed to reflect all economic and non-economic factors of migration, including individual transaction costs, externalities etc. On the aggregate, the height of the migration threshold depends on the local labour market conditions in relation to the rest of the economy.

In the original in-migration municipalities there are no migration thresholds. Immigration does not bend the local labour supply curves vertical for any segment. In fact, it makes the curve even flatter by including the labour supplies of both the original workers and the recent immigrants. Therefore, migration is sensitive to taxation, and levying a labour income tax turns the municipality from an in-migration municipality to an out-migration one. This is reasonable because taxation exerts a first-time incentive for emigration over the original residents, and a second-time incentive over the recent immigrants. Emigration consists of the most mobile of the original residents, and of those recent immigrants, who have not rooted in their new location.

Taxation draws a wedge between the local and the inter-municipal real wage thus distorting the market equilibrium and causing inefficiency in resource allocation on the economy level. However, the analysis suggests that the short-run effects of labour income taxation on migration and welfare are less significant than what is commonly thought. Low taxes in out-migration municipalities have no effects at all, and even higher taxes have only minor effects, if they are imposed by small and capital-intensive municipalities. At least in Finland, most of the declining rural municipalities belong to this category. On the other end, taxes imposed by big capital intensive in-migration municipalities have no significant effects on migration either. Finnish in-migration municipalities are mostly of this type. There may thus be room for inter-municipal tax differences in the Finnish economy without threat that taxation would accelerate migration and concentration of the population.

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Figure 1: Labour market migration

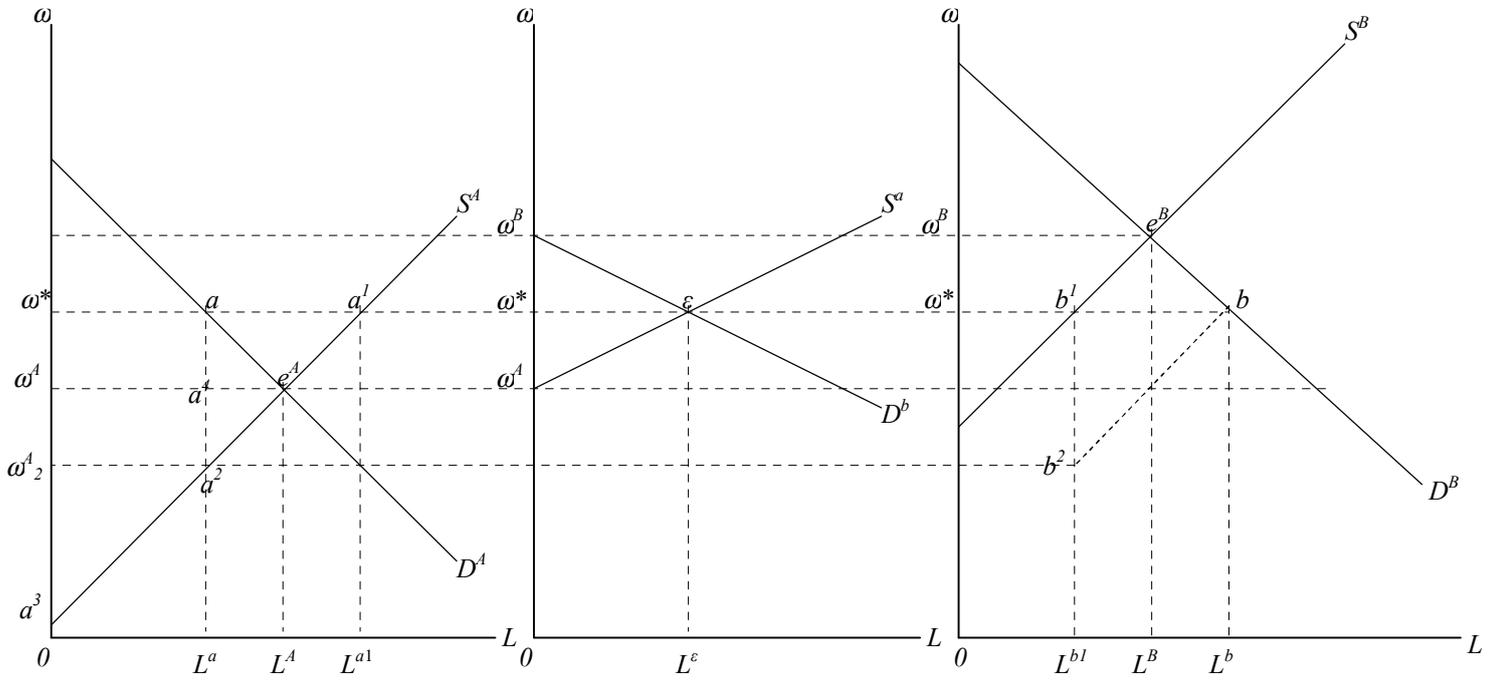Municipality A:                    Inter-municipal labour market:          Municipality B:
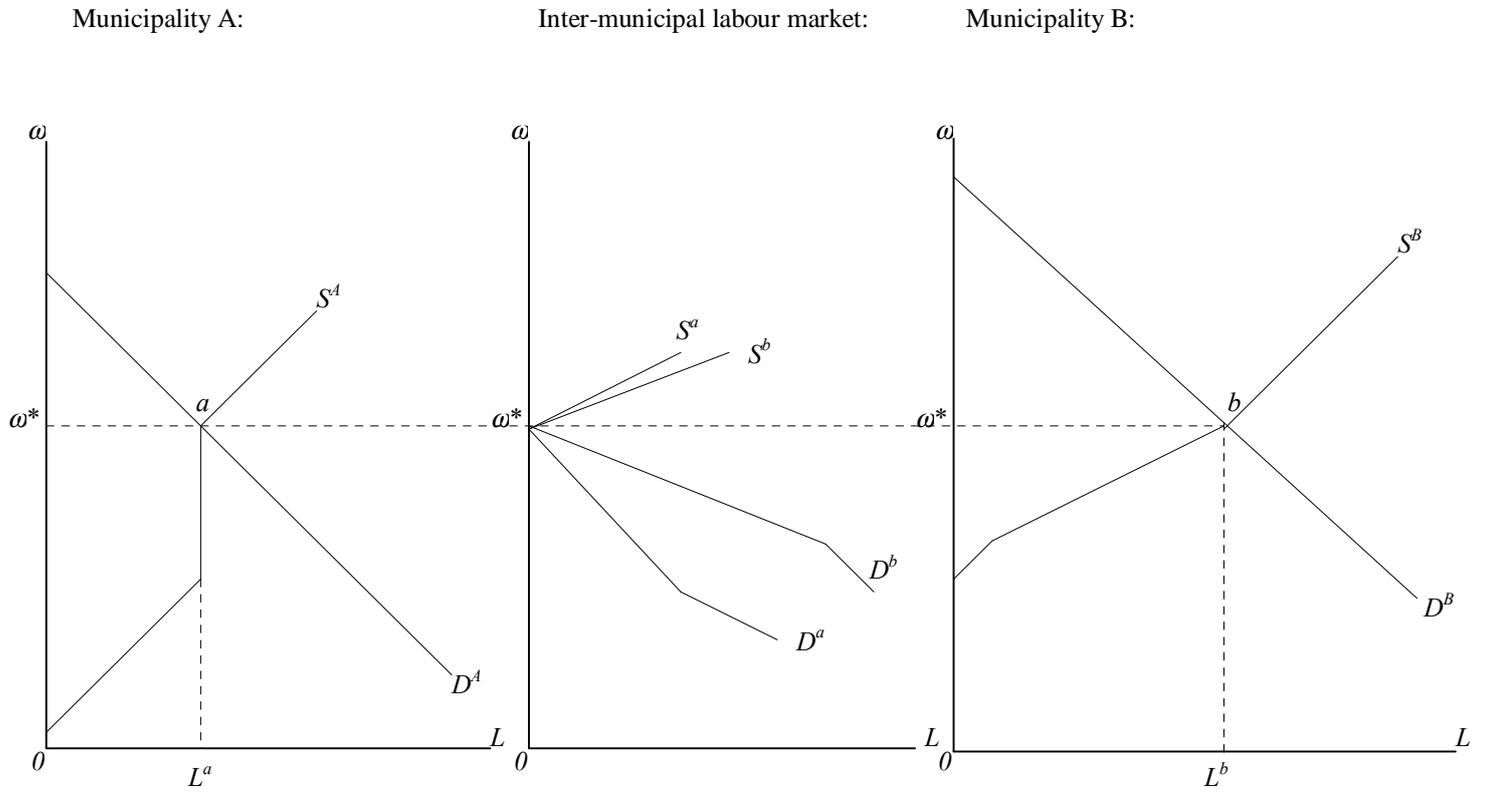
Figure 2: Short-term migration equilibrium

Municipality A:                Inter-municipal labour market:        Municipality B:

Figure 3: Effects of taxation imposed in the out-migration municipality

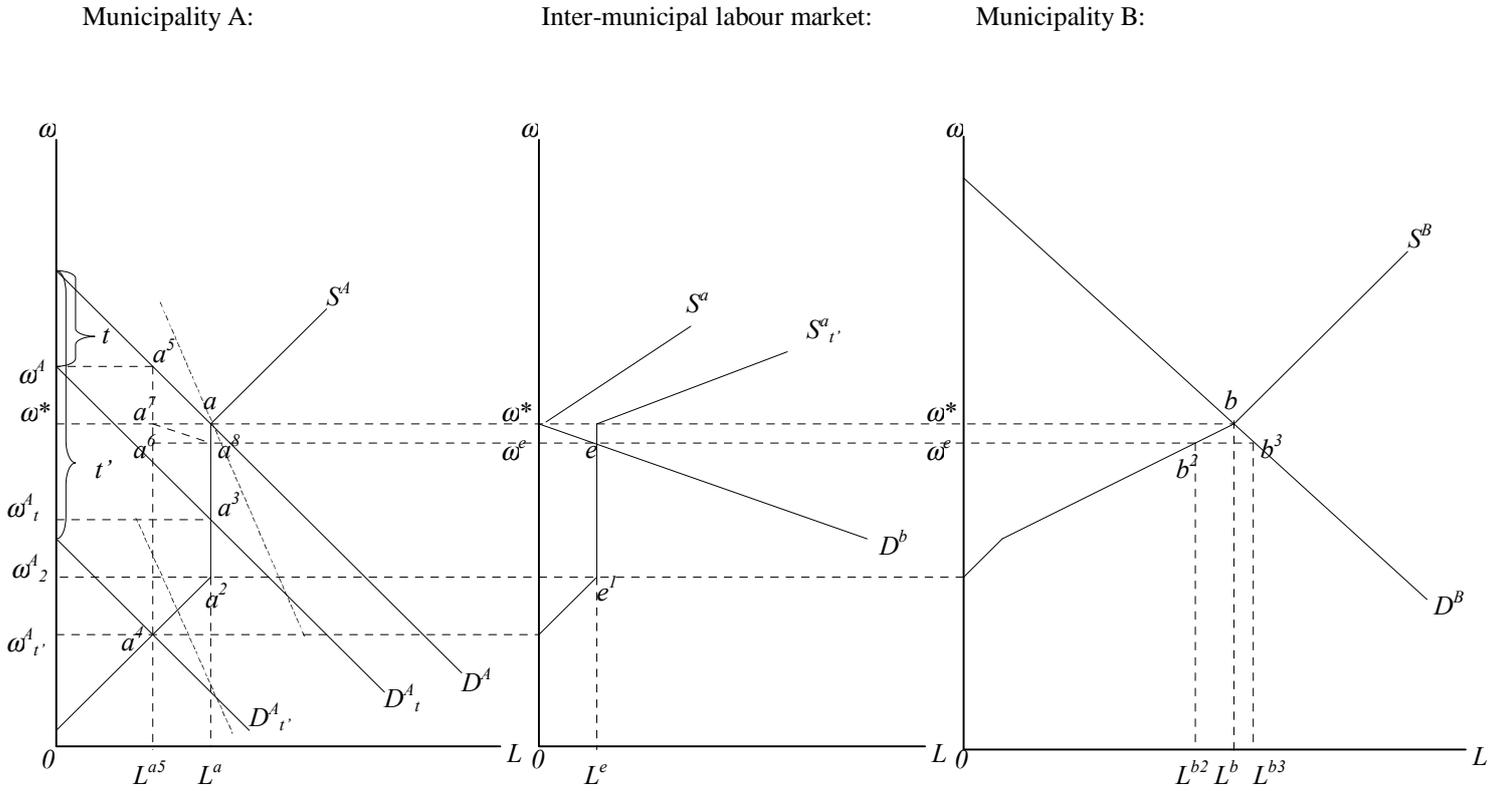Municipality A:                    Inter-municipal labour market:        Municipality B:

Figure 4: Effects of taxation imposed in the in-migration municipality