

Systems Competition

Ben Kriechel[Ⓜ]

Abstract

This paper reviews the ideas of 'Systems Competition' which were the topic of the NAKE-Lectures by Hans-Werner Sinn.¹ An analysis of the competition between countries over factors of production in a framework of mobile factors is derived and applied to questions with relevance for current policy. Using the 'selection principle' Sinn is able to provide deeper insights in the questions of social dumping, the provision of infrastructure and product standards.

1 Introduction

The 'New Systems Competition' lends its intellectual roots from its ancestor: the 'systems competition' between economic ideologies that captured economists ever since the Russian Revolution. During the time of the cold war, the question which economic system | capitalist or communist | is superior was at the center of the debate. After the cold war and the 'defeat of communism' systems competition can move on to another level. It is no longer the question which economic system prevails, but which form of capitalism will be able to attract the necessary factors of production in order to flourish for the years to come.

Increasing globalization and progress in transportation and communication allows for higher and higher mobility of factors. Capital moves by now quite freely between most western countries, and increasingly so between western countries and the rest of the world. Labor mobility is also greatly increasing | especially, but not only, within the European countries | but also through immigration into western countries.

As factors of production become more mobile they react more rapidly to difference in elements of the national systems: taxes, regulations, infrastructure, services et cetera. The idea of new systems competition is to evaluate the competition between nation states

[Ⓜ]University of Maastricht, Business Research Center

through their choices of systems-elements geared to attract those factors of production that allow them to prevail.

1.1 The Case of Europe

It can be expected that the systems competition will be especially important for the European countries. Through the European Union the mobility of production factors is not only facilitated but guaranteed in the famous treaty of Maastricht². Through the introduction of the Euro, the flows of capital have been eased, and the burden of exchange-rate uncertainties no longer play a role in the decision on capital investments across the Euro-countries. This abolition of exchange rate risks can be most easily observed in the tremendous narrowing of the interest rates paid on bonds in the different Euro currencies. While they differed several percentage points two years before the introduction of the Euro, just after the introduction the differences were a mere twenty to thirty basis-points, less than one tenth of the former differences. This allowed for improved allocation of capital over the entire Euro region without the exchange rate burden.

The free movement of goods have allowed firms to choose optimally the country to produce in, irrespective of the national markets they want to serve. To a smaller extent has the right to settle freely in any European country allowed for labor mobility. The barriers due to differences in cultures and language still impede a 'competitive' outcome of movement: that workers move to the countries which pay the highest wages. However, in this context does the enlargement of the European Union and the recent immigration of Eastern European workers into the European countries predict interesting outcomes. The large wage differentials between the Eastern countries, and especially the northern part of the European Union suggest bigger than so far observed movements from East to West, allowing for higher productivity of the labor in the western countries, i.e. generating higher marginal products than at the countries of their origin.

The question of systems competition remains and becomes more prominent the more the differences between the countries in terms of factor rewards become equalized. It is the final differences between the systems that will be channeling the allocation of production factors between the countries. In this context the fear of social dumping, of a race to the

²This right of free movement of capital, services, goods, and settlement was included in the treaty of Maastricht. But only lately with several years of delay can we see the implementation of all its implications into national law. This can be expected to lead to increasing labor mobility at least at some levels of the labor market.

bottom appears. Will it be possible to save the Western European welfare state in such a world of systems competition? Or will it lead to a relocation of industries through flows of capital and workers towards countries which have lower standards, and lower costs of the welfare state? Can stringent environmental regulation be kept in a competition between nations for the investment of firms?

1.2 Selection Principle

\It has often been argued that systems competition is comparable to competition in private markets.[...] Governments are seen as firms which compete with one another by offering attractive packages of services and tax prices and, although they are driven by national goals, competition makes them behave in a way compatible with an international welfare optimum." (Sinn, 1997, p. 248)

In order to evaluate the question whether the governments do compete like firms for the factors of production, or for the maximization of rents, we have to be careful in using analogies between firms and governments. We should be critical of any direct comparison, and evaluate its credibility. Sinn (1997, p.248) does not agree with the simple analogies, since

\[...] governments undertake a variety of economic activities which cannot be handled satisfactorily by competitive markets. Since governments have stepped in where markets have failed, it can hardly be expected that a re-introduction of a market through the backdoor of systems competition will work. It is likely to bring about the same kind of market failure that justified government intervention in the first place"

This is in essence the selection principle. Rooted in the German public finance literature which explains the existence of public production through market failures, it postulates the existence of national public production in an international context. In other words, if the reason for the establishment of rules and elements of the different systems are market failures, it is unlikely that they will be abolished through the competition between nation states. However, in the spirit of Hayek we could ask ourselves whether many of the public goods provided are really necessary, and whether they will survive the international competition for factors of production. This will be evaluated with the aid of the selection principle.

2 Provision of Public Goods and Systems Competition

The first example to illustrate the usage of the selection principle given is the fiscal competition for the provision of public goods. In the framework of two factors of production, labor and capital, the question of taxing the mobile factor capital is evaluated. This analyzes the question whether countries can tax firms to provide infrastructure or necessary public goods. Consider the case of Figure 1 in which the downward sloping line gives the marginal value product of labor, r^* is the world rate of return for capital which cannot be affected by the countries³. The capital level 'employed' at the world rate of return would be K^* , where the workers are considered to receive the residual rents depicted in the triangle AEG. If public goods have to be provided | say infrastructure | the government might consider taxing the capital at tax rate t . This would, however, not be welfare enhancing since capital would flow out of the country, until it reaches the level K_t , which equalizes the return, net of taxes with the world rate of return. However, the total wealth of the country, considered to be labor income and tax is now diminished by the triangle CDE, the welfare loss of the tax.

If we now consider the case of a necessary investment in infrastructure on a one-to-one basis with the investment in capital. This infrastructure can be paid for by a tax on labor income or the return on capital. Let:

$$f(K; L) \quad (1)$$

be the production function producing a homogeneous product. The firm works under profit maximization, such that

$$f_K = r + c(K; W) + \tau \quad (2)$$

Where r is the world rate of return on investment, $c(K, W)$ is the congestion function describing the public good, and τ is a percentage tax levied on capital income. The congestion function can be most easily understood if we consider it to describe the case of a street. Using the street has a cost $c(K; \tau)$ depending on the capital intensity | say trucks | using it, while W gives the width of the infrastructure, say width of a street, and the wider it is the more trucks can drive on it congestion free. So $c_K < 0$ and $c_W > 0$.

³Countries are considered to be small open economies, hence cannot affect the world interest rate

¹These lectures are based on the forthcoming book by Sinn

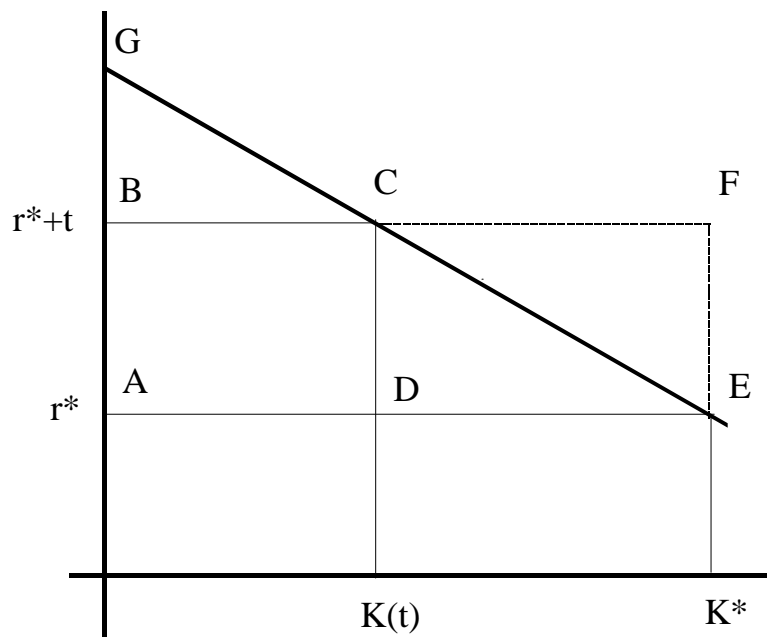


Figure 1: Erosion of source tax

The government's budget constraint is given by

$$\frac{3}{4}L = \frac{1}{2}W + \tau K \tag{3}$$

where $\frac{3}{4}$ is the proportional tax rate on labor, and $\frac{1}{2}$ gives the price of 'one unit of the public good'. Rent maximization of the government can be evaluated as

$$\max_{\tau, W} f_L + f_K K + rK - \tau L \tag{4}$$

Using the equation (4) we can rewrite it to be:

$$\max_{W, K} f(K; L) + r(K - \tau K) - c(K; W) - \frac{1}{2}W \tag{5}$$

We get two first order condition from the maximization problem of the government:

1. $f_K = r + c + c_K K$
2. $\tau c_W K = \frac{1}{2}$ 'Samuelson Condition'

From this we can derive the optimal benefit tax to be

$$\tau = c_K K \tag{6}$$

So the tax is exactly at the marginal congestion level of capital. Given the return on capital and the labor income government chooses τ_c and K such that it maximizes the sum of labor income and capital tax revenue. This is the case when the tax rates equals the marginal congestion of capital $c_K K$ as has been shown above.

However, we did not check yet whether the revenue generated by this source tax level is sufficient to cover for the necessary infrastructural outlays. For the case of a pure public good, it is straightforward that it is not the case. $c_K = 0$, hence the optimal capital tax $\tau_c = 0$. So the full cost of the infrastructure has to be shouldered by a tax on the immobile factor, labor. However, if the goods are not of the pure public good type, we can derive from Euler's theorem, stating that:

$$c_K K + c_W W = \alpha C \quad (7)$$

Where α is the degree of homogeneity of the user cost function. Inserting the Samuelson condition and equation (6) into equation (7) yields:

$$\tau_c K = \tau_l W + \alpha c_K K \quad (8)$$

This result shows that the optimal congestion charge will only cover the cost of providing the public good if $\alpha \geq 0$. In other words if the congestion cost function is of degree zero or higher. If the cost function is of negative homogeneity, at least part of the cost have to be covered by a tax on the fixed factor.

2.1 Club goods

The interesting question in the context of systems competition is whether the government should provide the infrastructure for capital and who should pay for it. We have seen above mathematically that there are conditions under which the government will provide the public good, and sometimes it is (partly) financed by the immobile factor rather than the mobile factor which actually benefits most from the public good. In order to sign the degree of homogeneity, the α as we denoted it above, we can examine whether the infrastructure is a public good, or a club good. A club good means that the provision could be organized privately since exclusion is feasible and the club members pay for the infrastructure. The difference between club and public provision is that among clubs we can imagine competition, whereas the public provision imply at least a 'local'² public monopoly type of provision.

²The term local is chosen rather than national since we can imagine that the provision of public goods can also be done on a state, regional or city level

Given that we have many clubs offering different bundles of infrastructure for different prices we can postulate the following market outcome:

$$P_i + \tau_i + c(K_i; W_i) = \tau_j + c(K_j; W_j) \quad \forall i, j = 1; \dots; n \quad (9)$$

The price plus the price of congestion is the same. In other words better infrastructure (higher W) comes along with lower prices for a given level of usage. If in this context $\tau_j < 0$, private clubs will not be able to provide the infrastructure, the competition would imply a race to the bottom. So the selection principle suggests that governments concentrate on public goods with a $\tau_j < 0$, in other words with goods which involve scale economies.

2.2 Underprovision of the public good?

It is natural to ask what happens if no subsidy on the mobile factor, capital, can be given. That is the case in which $\tau_K = 0$. Fully differentiating we get:

$$\tau_j \frac{dK}{d\tau_j} \Big|_{\tau_K=0} = \frac{1 + c_W \frac{K}{W}}{f_{KK} + c_K + c_W \frac{K}{W}} \quad (10)$$

This implies the following first order condition for revenue maximization of the domestic population:

$$\frac{dR}{d\tau_j} = \tau_j \cdot (f_{KK} + c_K) K = 0 \quad (11)$$

The two equations above imply that τ_j has to be equal to zero. This can only be the case when $\frac{K}{W} = \frac{1}{c_W + c_K}$, which is the Samuelson condition for optimal provision of a public good. In essence there is a balancing between the infrastructure provided, attracting investment, and the deterrence that higher tax rates will yield. We can thus derive the optimal tax rate under the self-financing constraint to be:

$$\tau_j = c_K + c_W \frac{K}{W} \quad (12)$$

According to the selection principle only the case of $\tau_j < 0$ is relevant, in which case the tax rate is higher than the marginal externality $c_K + c_W \frac{K}{W}$. This implies that less capital than in the first best case will be invested, but given the self-financing constraint, the amount is optimal.

Returning to our example of the European Union, we have to lift one crucial assumption of our model. The second factor of production, labor, is in principle also mobile. This implies that no infrastructure equilibrium exists, since the workforce will not be willing to subsidize the infrastructure of capital.

2.3 Tax Harmonisation

One solution suggested to alleviate the above problem is tax harmonisation. Tax harmonisation can be shown to lead to a competition in terms of infrastructure at the cost of the non-mobile factors of production that have to finance it. This can be seen by differentiating the total rents:

$$\frac{dR}{dW} = (f_k + r_i - c_K + K_i - c) \frac{dK_i}{dW} - i - c_W + K_i^{-1/2} \quad (13)$$

$$\frac{dK_i}{dW} = \frac{c_W}{f_K K_i - c_K} > 0 \quad (14)$$

From equation (14) we can see that an improvement in infrastructure at a given tax rate always attracts more capital into the country when the cost are shouldered by the fixed factor.

Both equations together imply that:

$$\frac{dR}{dW} = (i - c_K + K) \frac{c_W}{f_K K_i - c_K} - i^{-1/2} \quad (15)$$

$$i - c_W + K = i^{-1/2} (i - c_K + K) \frac{c_W}{f_K K_i - c_K} \quad (16)$$

there is an oversupply of infrastructure compared to the first best case. Equation (16) defines the new optimum in the infrastructure competition.

A solution for this problem could be to adhere to the above derived result: tax revenues of capital should only be used to finance infrastructure for this factor. This would allow competition in the bundles of tax-rate and infrastructure while avoiding the over-supply through infrastructure competition. Again this result only holds if we assume labor to be immobile.

Other possible ways to avoid both the race to the bottom and the infrastructure competition is to introduce the residence principle for capital incomes, i.e. domestic capital owners' earnings are taxed in their home-country even if the revenue is generated abroad. Alternatively, and a more radical change would be to change the tax system to a cash-flow taxation (cf. Sinn, 1985).

3 Erosion of the Welfare State

Gains from trade are one of the generally accepted concepts in the economic profession. Countries trade those goods in which they have a (relative) advantage for goods in which

their trading partner has specialized. Both countries are usually better off, given normal assumptions. However, one of the main fears of the free trade opponents is that the welfare state cannot be upheld. Given that free trade is in essence a trade in factors used in the production, it is clear that the free movement of factors will lead to similar problems and possible gains than free trade does. In this section the problem of financing the welfare state under trade and factor movements will be examined. The selection principle allows us to analyze this problem.

Sinn (1997, forthcoming) analyzes the welfare state by choosing a framework in which the social insurance covers uninsurable risks. He characterizes the welfare state as the provision of the government of these insurances which a private insurance could not bring forward. As an example Sinn gives that parents would like to insure that the future of their children will be (financially) secured. However, at the date of birth when they are still ignorant about the possibility whether their children will need some transfer payment they cannot insure this risk privately, since they would have to take an insurance in the name of their child for the remaining (working-) live of their kid. This is legally impossible. At a latter stage, when the child becomes an adult and can legally decide for itself, part of the risk will probably already be observable, hence uninsurable.

The welfare state provides for this problem by redistributing wealth from those inhabitants which are productive, and those who are not productive enough to support themselves. The question in the context of free movement and free trade is however, whether we can finance such a redistribution, or whether the system would break down since the productive persons are not willing to provide for the needy, hence emigrate away from the high-welfare state.

3.1 Basic model

Assume an initially closed economy, producing a homogeneous product using capital and labor³ as its inputs in its production function: $f(K; L)$. The factor rewards reflect the marginal products, i.e. $f_L = w$ and $f_K = r$. Assume the total amount of capital and labor to be fixed on the national level.

At the micro level, workers are 'endowed' with efficiency units depending on two random processes, which is modeled as follows:

$$X \sim \mu_1 \otimes \mu_2 \quad (17)$$

³Labor can also be thought to be measured in efficiency units.

Where $E(X) = E(\mu_1) = E(\mu_2) = 1$. It is presumed that μ_1 describes the genetically determined characteristics which are known when a child grows up. μ_2 describes career risks such as promotions, health, accidents, et cetera. Both variables are i.i.d. over time and across workers. Since workers are risk averse, they would like to take a wage insurance. Private insurances would in principle only be willing to insure the risk of the second type, since the first type is already revealed at the age that a person is able to take an insurance. Let us define the income of a single individual by:

$$Y = \mu_1 \mu_2 I - E(C) + rK \quad (18)$$

In which K are the assets owned by an individual, and C is some stochastically independent risk, in addition to the wage risk. We assume perfect insurance markets, thus, since the workers are risk averse they will fully cover the risk of C and the insurance premium will be the expectation of the risk. The insurance markets open after μ_1 is realized, and before μ_2 and C is known. If risk aversion is small enough, adverse selection implies that both μ_1 and μ_2 are not insurable since μ_2 also depends on μ_1 .

One can show that there is a welfare increase through redistributive taxation. Let

$$T = \frac{3}{4} \epsilon I \quad (19)$$

be the governments budget constraint. While the post-redistribution income is:

$$Y = \mu_1 \mu_2 \epsilon I \epsilon (1 - \frac{3}{4}) + T - E[C] + rK \quad (20)$$

Where the mean and standard deviation (sd) of the income is:

$$E[Y] = I(1 - \frac{3}{4}) - E[C] + rK \quad (21)$$

$$sd[Y] = (1 - \frac{3}{4}) I \epsilon sd(\mu_1 \mu_2) \quad (22)$$

Since the mean or expected income is exactly the same as before the redistribution, the only difference lies in the standard deviation. The standard deviation in the welfare state is lower, hence there is an improvement of social welfare if we assume the agents to be risk averse.

3.2 Redistribution under Systems Competition

Will the opening of the borders for free capital movement and also for free movement of labor lead to a breakdown of the welfare state? This is the question we want to

answer in this section. We will assume an open capital market, with a world interest rate: $r_i = r_j = r^w$. In the labor market we will also assume factor price equalization:

$$l_i[\mu_1\mu_2 i^{-\frac{1}{\sigma_i}}(\mu_1\mu_2 i - 1)] = l_j[\mu_1\mu_2 i^{-\frac{1}{\sigma_j}}(\mu_1\mu_2 i - 1)] \quad (23)$$

Now it can be shown that having a welfare state imposes positive externalities on the other countries. Taxation of rich, productive, workers leads to lower (gross) wages in the other countries, since productive workers will be willing to immigrate to the low-tax countries, and work there for a lower gross wage, but higher net wages. Net payers of taxes would emigrate from high-tax countries while net receivers would immigrate. This is of course not a sustainable equilibrium.

4 Conclusion

Sinn has shown how the 'Selection Principle' can be used to address many policy relevant issues. Only two main subjects were treated here, but in Sinn(forthcoming) the additional issues of environmental policy, product standards, and the competition of competition laws are evaluated. With the use of simple but powerful models Sinn has been able to show the problem of the free factor movement for the established economic system. This has been done especially for the European case, which shows the actual character and the policy relevance of this research. The concept of systems competition has been elaborated extensively on the future of the welfare state and the provision of infrastructure.

References

- [1] Hans-Werner Sinn. Kapitaleinkommensbesteuerung. Eine Analyse der intertemporalen, internationalen und intersektoralen Allokationswirkungen. J.C.B. Mohr, 1985.
- [2] Hans-Werner Sinn. The selection principle and market failure in systems competition. Journal of Public Economics, pages 247-274, 1997.
- [3] Hans-Werner Sinn. Systems Competition. Blackwell-Basil, forthcoming.