

# Learning from Decentralised Economic Policy: The Demand Side

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**ABSTRACT.** A popular argument about economic policy under uncertainty states that decentralisation offers the possibility to learn from local or regional policy experiments. We argue that such learning processes are not trivial and do not occur frictionlessly: Voters have an inherent tendency to retain a given stock of policy-related knowledge which was costly to accumulate, so that yardstick competition is improbable to function well particularly for complex issues if representatives' actions are tightly controlled by the electorate. Decentralisation provides improved learning processes compared to unitary systems, but the results we can expect are far from the ideal mechanisms of producing and utilising knowledge often described in the literature.

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**KEYWORDS:** Policy decentralisation; fiscal competition; model uncertainty; learning.

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## 1. INTRODUCTION

In one of his most often-cited papers, HAYEK (1968) argues that competition on the marketplace serves as a “discovery procedure” for new, previously unknown problem-solving routines. With the argument being probably more or less undisputed with regard to the market for private goods,<sup>1</sup> it has in the meantime also been submitted with regard to public goods: Competition between jurisdictions is supposed to provide incentives both to conduct experiments with new policy routines and to learn from experiments conducted in other jurisdictions.<sup>2</sup>

What is common among these approaches is the (not always explicit) presumption of a motivation of individuals to learn, i.e., individuals are assumed to have some motivation to gather information on institutional evolution or on the evolution of economic policy in other jurisdictions and update their knowledge accordingly. For instance, in VANBERG/KERBER (1994) this motivation is explained by referring to the private gains that can be accrued from an efficiency-enhancing institutional change. This is certainly very plausible when we are interested in individuals considering their “exit”-option: If an individual considers herself mobile and has the option of leaving

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<sup>1</sup>See, for instance, KERBER/SAAM (2001) and the literature cited there for approaches to the knowledge-generating problem on markets for private goods.

<sup>2</sup>See, for instance, SALMON (1987), VIHANTO (1992) and VANBERG/KERBER (1994).

jurisdiction  $A$  for jurisdiction  $B$ , and if she can gather information about  $B$  at very low cost, then an individual obviously has an incentive to inform herself about the real disposable income that she can earn in  $B$ .

This incentive disappears, however, when the option of mobility does not exist and the only remaining option is “voice”. In this case and from the perspective of one citizen-voter among many, a change of policy is a pure, Samuelsonian public good. If there is not a sufficiently high probability for a representative citizen-voter to cast the decisive vote and if there are no external rewards for a change of mind, then the individual has no obvious incentive to incur costs to update her given, individual stock of economic policy-related knowledge. This point, however, seems to be widely neglected in most of the available literature on decentralised economic policy.

This paper intends to show that this lack of an incentive has important implications for the theoretical concept of decentralised economic policy-making as a discovery procedure. To be able to focus on collective learning processes involving voters and citizens, we assume a tightly controlled government throughout the paper. In other words, the policies preferred by the median voter are executed frictionlessly and there are no control problems to be solved. The argument will proceed as follows: In the following section, we will introduce our assumptions regarding the behaviour of citizen-voters and

governments and introduce two groups of citizens with differential inclinations to utilise the “exit”- and “voice”-options. In section 3, a hypothetical, yet very general starting point for factor migration will be introduced, and section 4 discusses the incentives following from factor migration to critically examine given policy routines and to experiment with new routines. Finally, section 5 offers some conclusions.

## 2. INDIVIDUAL UNCERTAINTY AND THE EMERGENCE OF COMMON BELIEFS

**2.1. The dissemination of policy-related conjectures.** The point of departure of the argument presented here is fundamentally different from that of normative approaches to fiscal competition, which usually involve omniscient maximisers of welfare, rents or something alike and ask whether such a maximising effort by a number of decentralised social planners leads to a result that would be considered optimal by an omniscient, centralised social planner. Instead of following this lead, the notion of model uncertainty is used here: individuals are theoretically uncertain in the sense that they do not know the true model describing the actual properties of the economy within which they are acting and making decisions.

Because the quality of economic policy is a public good and because we assume that there is a large number of citizens, so that the individual probability of having the decisive vote is approximately zero, individuals do not feel a need

to invest into acquiring “rational expectations” regarding economic policy, i.e. to utilise all available information in order to gain the most precise theoretical and empirical knowledge about their economy that can be gained at a given point in time. Individuals might be expected to build rational expectations if the necessary information was available costlessly and if it could be learned effortlessly. But both requirements are not met here.

Following HIRSCHMAN (1989), however, it is assumed that individuals do feel an intrinsic need to have *some* point of view on issues of economic policy – but, given the public good problem, they do not feel a need to take the scientifically most up to date point of view. On the contrary, it is assumed that, once individuals have learned a set of conjectures about different economic policy measures, they will attempt to retain them. To explain this tendency, assume that at a time  $t_0$ , a representative individual is completely uncertain and has no a priori knowledge at all to fortify an opinion on economic policy. Given his assumed intrinsic need for such an explanation, he will assume some set of conjectures  $\Omega^n \in \{\Omega^1, \dots, \Omega^N\}$  that is supplied to him in the public discourse. The supply side of the theory market is not explicitly modelled here. It is convenient to simply assume that every  $\Omega^n$  is backed by some rent-seeking organised interest group representing absentee interests and that all interest groups are willing and able to invest an equal amount of resources into convincing the public of their respective positions. These are certainly

unrealistic assumptions, but they are introduced to model the supply side of the theory market as simple as possible in order to focus on the demand side.

As a preliminary to explaining the choice of an  $\Omega^n$ , we assume for simplification that citizens are homogenous with regard to their maximand. They all wish to maximise the same objective of economic policy, such as the level of disposable income, employment, output growth rates or something alike. Since we focus on the general learning process about economic policy measures and not on some specific, well-defined policy problem, we do not need to concern ourselves with the details of the maximisation problem here and can simply assume that there is a common maximisation problem which concerns economic policy-makers and citizens.

In this case, a plausible criterion for choosing one  $\Omega^n$  among a possibly large number  $N$  of available sets is the number of individuals who are already convinced that  $\Omega^n$  gives an accurate description of the true working properties of the economy. If one is completely uncertain about the relative accuracy of the  $N$  available theories, then the number of individuals who already hold an  $\Omega^n$  may be interpreted by the individual as a signal for its usefulness relative to the other sets. It also may be the case that the uncertain citizen decides upon choosing an  $\Omega^n$  following personal communication with other, already decided

individuals. In this case, the probability that the uncertain individual communicates with an individual advocating  $\Omega^n$  will usually also depend on the fraction of already decided individuals who adhere to that set of conjectures.

Thus, it should be possible to model the individual choices of conjectures about economic policy as a frequency-dependent process.<sup>3</sup> A relatively large number of individuals who already hold an  $\Omega^n$  reassures an uncertain individual that  $\Omega^n$  is not an obscure, but a reasonable choice. One tool among others to model such processes of frequency-dependent self-organisation is the generalised Polya process, as proposed by ARTHUR ET AL. (1985) and further discussed in ARTHUR (1988). The essence of this process is shown in (1),

$$E[w_{t+1}^n | w_t^n] = w_t^n + \frac{1}{m+t} (q_t^n(w_t^n) - w_t^n) \quad (1)$$

which simply states that the expected value of the fraction  $0 \leq w^n \leq 1$  of individuals in the population of already decided individuals who adhere to an  $\Omega^n$  at a time  $t+1$ , given its fraction at a time  $t$ , depends primarily on just that  $w_t^n$  and on an arbitrary, upward-sloping function  $q_t^n(w_t^n)$ . Time in this

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<sup>3</sup>To some degree, there is obviously a similarity to KURAN (1987) here, in the sense that individuals decide on taking a certain position according to the number of other individuals who already hold that position. The important difference, however, is that in our model there is no place for preference falsification: There is no difference between what individuals privately believe in and what they publicly advocate. Nevertheless, the result, for which Kuran coined the term “collective conservatism”, will be quite similar.

model is equal to the numbers of individuals who have decided themselves for any  $\Omega^n$ , i.e., it is assumed that at any point in time exactly one individual decides which theory to choose. The parameter  $m$  stands for the number of individuals who were already decided at  $t = 0$  and henceforth, we will simply assume  $m = N$ , with the underlying assumption that every  $\Omega$  is backed by exactly one individual. The condition for an equilibrium is easily inferred from (1): There is no expected change in the value of the fraction of  $\Omega^n$  if  $E[w_{t+1}^n | w_t^n] - w_t^n = 0$ , which is the case if and only if  $q_t^n(w_t^n) - w_t^n = 0$ .<sup>4</sup>

**2.2. Choice and equilibria on a theory market with heterogeneous individuals.** The piece that is still missing in our depiction of the market for theories on economic policy is a set of assumptions on the shape of the function  $q_t^n(w_t^n)$ , assigning a probability for the next uncertain individual to choose  $\Omega^n$  to the current market share of this theory,  $w_t^n$ . If we were only interested in the choice of an average individual and, in accordance with the preceding discussion, presupposed that the average individual follows the majority in assuming an opinion on economic policy, the matter would be rather simple: The first individual at  $t_0$  would choose randomly one  $\Omega^*$  among all available theories and unconstrained herding behaviour would lead all following individuals to choose exactly the same  $\Omega^*$ . The process would be locked

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<sup>4</sup>For technical proofs regarding the existence and the (in-)stability of equilibria of a generalised Polya process, the reader is referred to the original work of W. Brian Arthur, Yuri M. Ermoliev and Yuri M. Kaniovski.

in on a path towards a stable equilibrium with  $w(\Omega^*) = 1$  immediately after the first individual has made his random decision. Obviously, the resulting complete consensus among individuals regarding their beliefs about the proper economic policy contradicts even casual empirical evidence.

As an alternative, consider the situation when individuals are heterogeneous regarding their tendency to follow the majority. Let  $\alpha$  denote the individual tendency to be conformist, with an  $\alpha \leq 0$  signifying a very conformist individual who always chooses the majority opinion and an  $\alpha \geq 1$  signifying a very nonconformist individual who always chooses the minority opinion. Values of  $\alpha \in (0, 1)$  reflect different degrees of conformism, with the actual choice depending on  $w$ . Furthermore, let  $\Omega_t^*$  denote the most popular theory at any given time,

$$\Omega_t^* = \arg \max_{\Omega \in \{\Omega^1, \dots, \Omega^N\}} w_t(\Omega). \quad (2)$$

If there is no unique  $\Omega_t^*$ , but a set of equally popular theories, then  $\Omega_t^*$  is chosen randomly from this set, with equal probabilities of choice attached to each equally popular theory. Then we can assume individuals to value the available theories according to (3):

$$v(\Omega) = \begin{cases} (1 - \alpha) \cdot w(\Omega) & \text{if } \Omega = \Omega_t^* \\ \alpha \cdot w(\Omega) & \text{if } \Omega \neq \Omega_t^* \end{cases} \quad (3)$$

and to simply choose that  $\Omega^v$  that maximises their individual  $v(\Omega)$ . Again, if there is no unique  $\Omega^v$  but a set of theories that yield equal values, the

individual is assumed to choose randomly with equal probabilities from the theories in this set.

With these assumptions made, the theory market is determined to effectively collapse from an arbitrarily high number  $N$  of available theories to  $N = 2$  after the first sufficiently nonconformist individual has made his choice. To illustrate this point, suppose that the first individual to decide randomly chooses a theory which subsequently becomes  $\Omega^*$ . If the next individual to decide is sufficiently conformist, he will pick the same  $\Omega^*$  and all other  $\Omega \neq \Omega^*$  remain equally valued. As soon as a sufficiently nonconformist individual appears, who rejects the majority theory, he will choose among those equally valued minority theories. But when one minority theory, let it be denoted by  $\Omega^m$ , is picked by a nonconformist individual, it will become the preferred choice for all other, later deciding nonconformists. This follows from (3), simply because  $w(\Omega^m) > w(\Omega) \forall \Omega \neq \Omega^*, \Omega^m$ . Therefore, all nonconformists appearing at later stages of the process will also choose  $\Omega^m$ , while all conformists will choose the majority theory  $\Omega^v$ . The market shares of all other theories will tend towards zero with more and more individuals deciding between  $\Omega^v$  and  $\Omega^m$ .

Therefore, extreme and deliberate obscurantism is excluded from the model. Even people who have a strong enough nonconformist tendency to pick the minority theory have a preference to be in a larger minority group, rather

than a smaller minority group. A different interpretation may view  $\Omega^m$  as a reservoir of heterogeneous nonconformists. In this case, all individuals who decide to disagree with  $\Omega^*$  gather within a group adhering to  $\Omega^m$ , where  $\Omega^m$  is not defined as a coherent theory itself, but as an amalgam of diverse theories whose common ground is the rejection of the majority theory.

As soon as a the theory market is collapsed to  $N = 2$ , (3) can be written as (3a),

$$v(x) = \begin{cases} (1 - \alpha) \cdot w(\Omega^*) \\ \alpha \cdot w(\Omega^m), \end{cases} \quad (3a)$$

and the  $\alpha$  for which an individual is just indifferent between conformism and nonconformism can be calculated by equating both cases of (3a), which yields

$$\bar{\alpha} = \frac{w(\Omega^*)}{w(\Omega^*) + w(\Omega^m)} \quad \text{with} \quad \lim_{t \rightarrow \infty} \bar{\alpha} = w(\Omega^*). \quad (4)$$

The convergence in time of  $\bar{\alpha}$  towards  $w(\Omega^*)$  follows simply from the fact that, once they are determined, only the majority theory and the preferred minority theory are chosen, so that the added market shares of these theories tend towards one. Knowing this, and knowing that the probability that an  $\Omega \neq \Omega^*, \Omega^m$  is chosen at this stage of the process is zero, the theory market is now restricted to  $\Omega^*$  and  $\Omega^m$  and  $w_t^* + w_t^m = 1$  is assumed to hold. From (4) and assuming that an individual shuns the majority only if he clearly values being a nonconformist higher than being a conformist, we can derive a simple decision rule for uncertain individuals:

If  $\alpha \leq \bar{\alpha}$ : choose  $\Omega^*$  (Be a conformist)

If  $\alpha > \bar{\alpha}$ : choose  $\Omega^m$  (Be a nonconformist).

To finally write down the  $q$ -function of the Polya-process discussed here, suppose that values of  $\alpha$  (i.e., degrees of conformism) are normally distributed over the population with mean  $\mu = 0.5$  and an arbitrary standard deviation  $\sigma$ . Given the simple decision rule, we can then state that as soon as  $\Omega^*$  and  $\Omega^m$  are selected from the  $N$  available theories, we have as probabilities of choice for those two theories

$$q^* = \int_{-\infty}^{w_t^*} \frac{1}{\sqrt{2\pi}\sigma} \cdot e^{-\frac{(w^*-0.5)^2}{2\sigma^2}} dw^* \quad (5)$$

$$q^m = 1 - q^*. \quad (6)$$

This leads to a characteristic sigmoidal graph for the two  $q$ -functions. Given that there is a positive probability that an individual has an  $\alpha < 0$  or an  $\alpha > 1$ , it follows that  $q^*(0) > 0$ ,  $q^*(1) < 1$ ,  $q^m(0) > 0$  and finally  $q^m(1) < 1$ . The numerical values depend on  $\sigma$ ; a rise of  $\sigma$ , would reflect a growing number of extreme conformists and nonconformists in the population. Such a change in the composition of the population is not modelled in this paper, however:  $\sigma$  is assumed to be constant.

The relationship between the actual fraction  $w_t^*$  and the probability  $q_t^*$  of the next individual also choosing  $\Omega^*$  is depicted graphically in *Figure 1*. There are two stable equilibria for  $w^*$  on this theory market, one at  $w_1^*$  and one at  $w_3^*$ . In both cases, the probability of the next individual choosing  $\Omega^*$  is higher

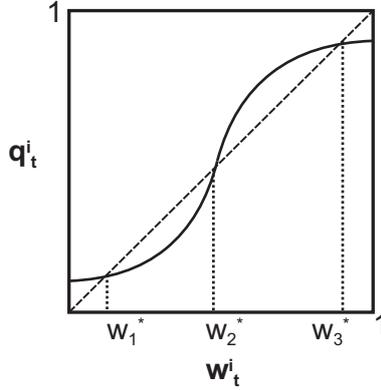


FIGURE 1. Equilibria on the theory market

than the actual fraction  $w_t^*$  for an interval around  $w_{1,3}^*$  where  $w_t^* < w_{1,3}^*$  and lower for an interval where  $w_t^* > w_{1,3}^*$ . The attracting intervals are delimited by the unstable equilibrium at  $w_2^* = \mu = 0.5$ . For any  $w_t^* < w_2^*$ , the process will converge towards  $w_1^*$  and for any  $w_t^* > w_2^*$  it will converge towards  $w_3^*$ . Since  $\Omega^*$  has been defined the majority theory at the outset, we can expect its market share to converge towards  $w_3^*$  without further interventions into the process; the market share of the preferred minority theory  $\Omega^m$  will then converge towards  $w^m = 1 - w_3^*$  if the process runs long enough to make the  $N - 2$  other theories that competed on the market at the outset negligible.

### 3. INTERJURISDICTIONAL LABOUR AND CAPITAL MARKETS

**3.1. Three variants of mobility.** As a preliminary to the introduction of interjurisdictional labour and capital markets, we will introduce three different types of mobility that are assumed to be found within our population.

Suppose that individuals can develop loyalty towards the jurisdiction they live in, and suppose further that this loyalty depends on the concurrence between the policy-related theory an individual believes in and the policy that is actually conducted. Deliberately ignoring the control problem and assuming economic policy to be always perfectly in line with the median voter's preferences, the group of individuals who do in fact experience such a concurrence are the supporters of  $\Omega^*$ . The median voter can never be a supporter of  $\Omega^m$ . Thus, the loyal individuals will always be the individuals who believe in the majority theory, while the illoyal individuals will be those who have assumed the preferred minority theory.

The concept of loyalty here simply means that an individual is not only interested in his real disposable income, but also in the policy conducted in his jurisdiction: A loyal individual can gain a utility  $u(x) > 0$  from the policy, depicted by the vector  $x$ , that is conducted in his polity and that is not contradicting the  $\Omega^*$  of this polity. For an illoyal individual, we will always have  $u(x) = 0$ : The illoyal individual has abandoned any pondering about policy and restricts his attention to his disposable income. He has no directly policy-related preferences and therefore, he receives neither a utility, nor a disutility from the economic policy itself. If, however, a loyal individual who by definition is directly interested in economic policy, experiences (maybe due to an accidental error on behalf of the governing) a policy  $x$  that contradicts  $\Omega^*$ , then he will experience a disutility  $u(x) < 0$ .

Further, it is assumed that both loyal and illoyal individuals are not behaving as permanent maximisers, but as satisficers. Generally, the aspiration level of the loyal individuals may be written as  $\delta^L = \bar{y} + \bar{u}(x)$ , where  $\bar{y}$  is a long-run weighted average of the individual's past real disposable incomes, which he at least expects to earn in the future, and  $\bar{u}(x)$  is the minimum utility a loyal individual wishes to gain from economic policy itself. Given the discussion in the last paragraph, we will simply assume that  $\bar{u}(x) = 0$ , i.e., the individual wishes at least not to experience a direct disutility from economic policy. The illoyal individual, on the other hand, uses the time and effort that the loyal individual invests into domestic policy to screen his income-generating opportunities in other jurisdictions. He is always informed about the highest level of attainable income in other jurisdictions,  $y^*$ , and accordingly sets  $\delta^I = y^*$ .

Therefore, the illoyal individual will out-migrate whenever  $y < y^*$ , while the loyal individual will not consider migration unless  $y < \bar{y} - u(x)$ , i.e., a positive direct utility from economic policy can compensate for a lower than expected income. Henceforth, we will assume that  $y + u(x) > \bar{y}$  always holds, which leads to the factual immobility of loyal individuals. Finally, we assume that a positive share  $0 < \gamma < 1$  of illoyal individuals is socially tied to loyal individuals and therefore also factually immobile. This share of illoyal individuals, deprived of their exit-option, is assumed to substitute voice for exit. They do not consent to  $\Omega^*$  and, not being able to migrate but interested in earning a

$y^* > y$ , they instead broker information about other jurisdictions' economic policies leading to  $y^*$  to their loyal companions, who would not be interested in  $y^*$  by themselves.

**3.2. Signals produced by decentralised policy.** To investigate the signals produced by factor migration, we introduce probably the simplest equilibrium conditions available in the literature on decentralised fiscal policy. We assume that individuals supply homogeneous labor and own homogeneous capital. They allocate their factors between two regions,  $A$  and  $B$ , with the private sectors in both regions being characterised by standard, neoclassical production functions. Adding to this, we assume that the vector  $x = (\lambda, \theta, G)$  comprises the policy conducted by the public sector with  $\theta$  denoting a head tax,  $G$  denoting the quantity of a public good and  $\lambda$  denoting the technology used to provide the public good. Presuming a perfectly controlled government which frictionlessly enforces the median voter's preferred policy in order to suppress control problems, the entire tax revenue is used to provide productive public goods and no rents are accrued by individuals in the public sector. Public policy enters the private sector production function through a function  $\rho(x)$  with  $\rho > 0 \forall x$ . The effect of  $\rho(x)$  is exactly the same as that of a Hicks-neutral, factor-augmenting public input. Thus, the complete production function for each of the two jurisdictions  $m \in A, B$  is

$$Y = \rho(x_m) \cdot F(L_m, K_m). \tag{7}$$

Individuals are assumed to be uncertain regarding the function  $\rho(x)$ , and uncertainty here implies not only parameter uncertainty, but also uncertainty regarding the functional form of  $\rho$  – in other words, individuals act under model uncertainty and are compelled to act upon fallible hypotheses about the effects of policy changes on the aggregate output and on the marginal productivities of labour and capital.

Since we assume a perfectly controlled government and exclude rent-seeking activities, it is evident that the entire tax revenue is used to provide the public good  $G$ . The effective level of  $G$ , however, is assumed to also depend upon the technology of public good provision, which is represented by the technology parameter  $\lambda > 0$ , so that

$$G = \lambda\theta L. \tag{8}$$

In essence, the choice of policy can then be reduced to a choice of a tax rate  $\theta$  and of a technology  $\lambda$ , with the level of public goods being fully determined by these parameters. In our context, the term technology is supposed to encompass a wide range of real-world phenomena: not only physical means of production, but also the composition of a portfolio of different types of public goods. For instance, a relatively low value for  $\lambda$  could signify an excessive emphasis on redistributive activities compared to efficiency-enhancing public capital, whereas a relatively high value for  $\lambda$  signifies the opposite. This rather

imprecise account of possible influences on  $\lambda$  mirrors the problem of model uncertainty that the individuals in the model face.<sup>5</sup>

With a production function that is linear-homogeneous and factors being paid their respective marginal product, the net incomes accrued by labour and capital amount to

$$l_m = \rho(x) \frac{\partial F}{\partial L} - \theta \quad (9)$$

and

$$k_m = \rho(x) \frac{\partial F}{\partial K} = r^*. \quad (10)$$

Capital is always assumed to be perfectly mobile and  $A$  and  $B$  are assumed to be small in relation to the world capital market, so that the net income from capital in both  $A$  and  $B$  always equals the world rate of return  $r^*$ . As far as labour is concerned, we assume no mobility at all at the initial stage (e.g., due to laws preventing migration) and introduce mobility between  $A$  and  $B$  subsequently.

Suppose that  $B$  is the relatively efficient region, i.e., the same amount of public goods is financed in  $B$  with a lower tax rate, or a higher amount of public

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<sup>5</sup>Since the policy-space is not one-dimensional here, involving the choice of  $\lambda$  and  $\theta$ , this would traditionally contradict the stability of a median-voter equilibrium and therefore the assumption of a tightly controlled government frictionlessly following the median preferences. Note, however, that stability here effectively comes from the theory market, where majority preferences are clearly defined in a stable equilibrium.

goods is, due to a more advanced technology, financed with the same tax rate in  $B$ , compared to  $A$ . At the initial stage, before labour mobility is introduced, we thus have higher net incomes from labour in the low-tax jurisdiction  $B$ ,  $l_B > l_A$ . This is the first type of signal produced by decentralised economic policy, namely a price signal, which sends two messages: (i) given the current policies, a positive number of units of labour could be utilised more efficiently in  $B$  than in  $A$  and (ii) the policies in  $A$  and  $B$  lead to different incomes from supplying labour. This type of signal will henceforth be called a *differential signal*. If we also introduce labour mobility, then this will obviously lead to a change of  $l_A$  and  $l_B$ , as labour and capital migrate out of  $A$  into  $B$ . An equilibrium on the interregional labour and capital markets is reached when both conditions  $l_A = l_B$  and  $k_A = k_B = r^*$  hold simultaneously.

The sign of the impact of migration on  $l_A$  and  $l_B$  is not determined in this model, and it is probably not fully determined in reality. Differentiating (9) yields

$$\frac{\partial l}{\partial L} = \frac{\partial \rho(x)}{\partial L} \cdot \frac{\partial F(L, K)}{\partial L} + \rho(x) \cdot \frac{\partial^2 F(L, K)}{\partial L^2} \cdot \frac{\partial K}{\partial L} \quad (11)$$

and, depending on the actual functional form of  $\rho(x)$ , there may exist intervals for  $L$  where the positive first term overcompensates the negative second term. A migration of productive factors from the relatively inefficient region  $A$  to the relatively inefficient region  $B$  then leads to a rise of  $l_A$  via the direct effect of out-migration on marginal productivity, but it also leads to less capital

being used in  $A$  and to a decline of  $\rho(x)$  via a loss of tax revenue. Similarly, an inflow of additional units of labour to  $B$  would then lead to a decline of marginal labour productivity, but that would be overcompensated by the positive effects generated by the additional productive public input financed with an enlarged tax base. It is therefore not *ex ante* clear whether the net effect of migration on the net incomes in  $A$  and  $B$  will be positive or negative. This ambiguity of the effects on labour income leads to four different scenarios, which are summarised in *Table 1*.

Scenario	I	II	III	IV
$l_A$	$> 0$	$> 0$	$< 0$	$< 0$
$l_B$	$> 0$	$< 0$	$> 0$	$< 0$

*Table 1:* Possible reactions of wages to factor migration.

While the differential signal results from given prices, we observe here changing prices of labour in  $A$  and  $B$  resulting from a regional shifting of resources. Such signals associated with price changes will thus be called *shift signals*.

Note that a reliable equilibrating tendency is associated only with scenario II. In scenario III, there is a clear disequilibrating tendency resulting from factor migration, and in the other two scenarios the existence of an equilibrium depends on the relative velocity of the income effects of migration. If the marginal effect of migration on marginal productivity and on the tax base in  $B$  are consistently smaller than that in  $A$ , then there will be a tendency towards

an equilibrium, associated with higher (I) or lower (IV) incomes in both  $A$  and  $B$ . However, given the fact that there is a group of immobile individuals in our model, factor migration can come to a rest even with persisting income differentials.

#### 4. LEARNING FROM ANOTHER JURISDICTION'S POLICIES

**4.1. Collective learning on the theory market.** It is one of the delightful properties of the generalised Polya process that the  $q$ -function is allowed to change over time, and a change of the  $q$ -function obviously implies a change of the equilibria of the self-organising process on the theory market. This allows for experience to have an impact on the equilibrium. At the outset, before experience was considered,  $\mu = 0.5$  was assumed, i.e., individuals are assumed to be symmetrically distributed along the lines of conformism and nonconformism. But it appears to be a plausible assumption that  $\mu$  changes when, grounded in experience, individuals have reason to believe that  $\Omega^*$  is faulty.

If a policy based upon the majority theory produces disappointing results, we should expect that for individuals who still have to decide themselves, the propensity to be a conformist is reduced. The more implausible the theory appears in the light of evidence, the higher would the internal costs – e.g., cognitive dissonance – be that have to be beared when such a theory is held.

But this necessitates high external benefits – a large and influential network of similarly thinking individuals – to make the relatively implausible theory nevertheless the preferred choice. The more contradictory the evidence is, the higher  $w(\Omega^*)$  has to be in order to induce a conformist choice. In other words,  $\mu$  rises when the majority theory grows dubious.

In *Figure 1*, such an increase of  $\mu$  results in a shift of the  $q$ -function to the right. This implies at least that the attracting region of  $w_3^*$  decreases and that  $w_3^*$  moves to the left. If the shift goes far enough, the set of equilibria on the theory market shrinks to  $w_1^*$ . In this case, the self-organisation process on the theory market leads to a collapse of the social networks supporting  $\Omega^*$  and the minority theory,  $\Omega^m$  takes its place as the new majority theory. Once the transition is made and popularity of the two theories is reversed, so that  $\Omega_1^* = \Omega_2^m$  and  $\Omega_1^m = \Omega_2^*$ , we can assume the distribution of  $\alpha$  to normalise again with  $\mu = 0.5$ . A change of collective opinion thus simply follows from a temporary rise of nonconformism, which enters the model as a rise of  $\mu$  for a transitory period.

The actual learning process can then be expected to set in amongst the remaining supporters of the now dethroned  $\Omega_1^*$ , who have just experienced their set of conjectures to be gravely inept and who saw the social network supporting their conjectures collapse to a small number of staunch believers. In this situation, they are unlikely to give up their entire set of conjectures –

they are staunch believers, after all – but it is obvious that the vast majority of individuals has lost confidence, so that some revision of the falsified set of conjectures is necessary to be able to regain popularity and influence. The supporters of the now popular  $\Omega_2^*$  on the other hand have no reason to revise their theories. Having gained popularity and influence and having seen the rival  $\Omega_1^*$  fail, their confidence is likely to be bolstered and reasons for scepticism are scarce. Thus, while  $\Omega_2^*$  is stabilised,  $\Omega_1^*$  is likely to change syncretically, and this hints at the fact that collective learning is to be seen as a piecemeal process where novel conjectures are slowly incorporated into given theories.

**4.2. Learning from differential signals.** What seems particularly appealing about learning from differential signals is that individuals can learn from the policies conducted in neighbouring jurisdictions without the occurrence of any potentially distorting spatial factor movements. This is what, among others, BESLEY/CASE (1995) have empirically analysed under the term “yardstick competition”. On first sight, the evidence is encouraging as far as the usefulness of yardstick competition as a learning mechanism is concerned: *“Voters are able to appraise incumbents’ relative performance. From the media or other sources, voters can gain access to information about what other incumbents are doing, which serves as a benchmark for their own jurisdiction”* (BESLEY/CASE (1995: 30)). Besley and Case do indeed show that voters tend to deny re-election to incumbents who raise taxes while their

colleagues in neighbouring jurisdictions do not, while they tend to accept tax raises when neighbouring governments also raise taxes.<sup>6</sup>

The problem is, however, that while yardstick competition functions for the tax rate, it fails for other issues of economic policy: for regionally differing income levels and unemployment rates, Besley and Case find no significant influence on the individuals' voting decisions. This is a somewhat puzzling result: if voters learn from the comparison of regionally differing tax policies, and a lone tax raise is deciphered as a sign for inefficiency, then why does the same mechanism not work for other fields of policy? The discussion in the preceding subsection has shown that once the theory market within one jurisdiction is out of equilibrium due to rising nonconformism, some collective learning initiated by the losers of this transition can be expected. But the underlying problem is if and under which conditions decentralised policy can be expected to disturb the peace of local theory markets.

The evidence from Besley and Case cited in the above subsection is clearly to be categorised as learning from differential signals. Yardstick competition implies that only the fact that policies and results in one jurisdiction are different from those in another jurisdiction is used to learn about the relative

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<sup>6</sup>The presumption that yardstick competition plays a role in determining tax rates is also supported by evidence for tax mimicking in other countries than the United States, as for instance REVELLI (2001, 2002) shows for the United Kingdom, HEYNDELS/VUCHELEN (1997) show for Belgium and FELD/REULIER (2003) for Switzerland.

usefulness of economic policies – information flows across borders, while productive factors not necessarily do so. In our model, these streams of information about the relative efficiency of different policies meet a population that is mostly characterised by a rather limited propensity to care for such information. Considering themselves to be immobile, loyal individuals have principally no interest at all to invest into gathering information from other jurisdictions: being reluctant to migrate, they have no private benefits to gain from monitoring policy in other jurisdictions. And being part of a social network that stabilises their given majority conjectures  $\Omega^*$ , they are most likely also reluctant to critically compare  $\Omega^*$  to the theories that underlie policies in other jurisdictions.

By assumption, there is, however, always also a share of illoyal, yet immobile individuals in every jurisdiction. These are individuals who do not feel attached to the jurisdiction they live in as such, who oppose the given  $\Omega^*$ , but who for some reason are not able or willing to migrate to another jurisdiction. This opposition, if it manages to organise in parties or interest groups, may serve as a channel to diffuse information about the policies in other jurisdictions within the own population, in order to weaken the popular support for  $\Omega^*$ . The aim is to raise the level of nonconformism,  $\mu$ , possibly above the critical mark where the stable equilibrium at  $w_3^*$  in figure 1 disappears. Thus,

internal heterogeneity of jurisdictions can be seen as an important prerequisite to initiate collective learning processes. In the Tiebout world, which consists of jurisdictions with internally homogeneous populations, this inlet for information from outside is missing. If there were internally completely homogeneous populations in the model presented here, differential signals would most probably be blinded out in order to stabilise a given consensus theory.

Nevertheless, even in a heterogeneous community learning from differential signals involves barriers that prevent the collective learning processes from being perfect mimicking mechanisms capable of finding the most efficient policy and implementing it wherever this would be reasonable. With social networks that are working to stabilise their respective conjectures, it is unlikely that all the differential signals from outside that are available and contradict the majority theory do indeed lead to a destabilisation of the equilibrium on the theory market. If the signal that  $l_B > l_A$  is received in  $A$ , the underlying differences of  $\Omega_A^*$  and  $\Omega_B^*$  still have to be brought to public attention, which is usually scarce. Moreover, it is often possible to “explain” such a differential signal and at the same time maintain the relatively inefficient  $\Omega_A^*$  if one accepts convenient auxiliary hypotheses, which may for example hint at principal differences between jurisdictions  $A$  and  $B$ , so that they are perceived as uncomparable.

Furthermore, it may be the case that some issues are easier to bring to public attention than other issues. Some issues, such as tax policy, may be more salient in the public discourse because observing and comparing tax rates is a matter of relatively low complexity while, for example, comparing technologies of public good production or expenditure structures in budgets is a matter that is much more costly to communicate and, more importantly, costly to learn about. To sum up, learning from differential signals alone in a decentralised setting is a highly imperfect mechanism of collective learning about the relative efficiency of policies. It is, however, easy to see that it should still be superior to a completely centralised framework. There, the differential signal does not even exist. There is only one laboratory where policy experiments can be conducted. But such an experiment is much less likely to happen in a centralised setting, because instability on the theory market is less likely to be induced without signals from outside. With every step of centralisation, policy experiments occur less often in time and in a fewer number of jurisdictions.

**4.3. Learning from shift signals.** For price signals following from a shift of productive factors from the relatively inefficient to the relatively efficient region, generally the same statement holds as for the differential signals: they are unreliable if one expects them to induce efficient learning processes. Table 1 shows that, if one does not enforce restrictive assumptions, the sign of the effect of migration out of the relatively inefficient region on net wages is

not fully determined. A larger tax base allowing to finance more productive infrastructure may overcompensate the direct effect on marginal labour productivity, or it may not. In the relatively inefficient region, net incomes may rise as a result of out-migration if the public goods effect does not overcompensate the direct effect on marginal productivity.

If there are barriers to migration at the outset and if these are lifted, migration out of the relatively inefficient and into the relatively efficient region may therefore lead to perverse incentives for collective learning. If scenarios I or II occur, the remaining individuals in the relatively inefficient region experience a raise of their incomes after labour mobility is implemented. This signal, on its own, is certainly not the right incentive to revise the relatively inefficient  $\Omega_A^*$ . A satisficer, who benefits from his income rising above his aspiration level, there is little reason to increase his scepticism and nonconformism in such a scenario.

In scenarios *II* and *IV*, perverse incentives are also present for individuals in the relatively efficient region *B*, as they experience a decline of their net incomes as a result of incoming migration from *A*. In this case, the trend of net incomes as a result of migration is unsettling for the wrong individuals, namely those who hold the relatively more efficient conjectures. Only in scenario *III* are the effects of migration on net incomes suitable to set incentives for efficient collective learning processes.

These problems may be reduced if individuals learn from both type of signals considered here. To also reckon that the level of incomes is higher in  $B$  than it is in  $A$  is certainly an improvement compared to an exclusive reliance on the shift signals. Especially in scenarios that imply a further divergence of income levels, the additional information would enforce justified scepticism in  $A$ . If there is no divergence, though, then a convergence of income levels can easily serve as an argument to defend  $\Omega_A^*$ : if the income level in  $B$  is decreasing, then this can be easily interpreted as an indicator that, for instance, circumstances have changed and  $\Omega_B^*$  is out of time.

Thus, there is even more information necessary to ensure that individuals have the correct incentives. They have to know the differential signal, the shift signal *and* they have to reckon that the shift signal follows from migration and that migration out of  $A$  is a sign of relative inefficiency of  $\Omega_A^*$ . This may be trivial for an economist – but for an individual who defends his set of conjectures behind a veil of insignificance and within a stabilising social network, a willingness to face the facts cannot be simply presupposed.

Nevertheless, from a knowledge-producing perspective, decentralisation is still preferred to centralisation. Decentralisation delivers a systematic tendency to destabilise equilibria on the theory market. Even if this does not necessarily occur in the correct (the inefficient) jurisdiction, a change of  $\Omega_B^*$  would also produce new knowledge about the efficacy of economic policies. A unitary

system is missing this inherent instability that comes with the signals discussed here and is thus bound to produce less knowledge.

## 5. CONCLUSION AND OUTLOOK

It has been argued that under decentralised economic policy-making, more knowledge about the relative efficacy of different theories underlying policies is produced compared to unitary systems. The problem is only that incentives to revise a given set of conjectures and thus to experiment with new policies are not necessarily to be found in the relatively inefficient region. While more knowledge is produced in decentralised systems, it cannot be ensured that there is a frictionless diffusion process where the relatively efficient policy is adopted by all jurisdictions.

Somewhat surprisingly, this result has also an encouraging facet, because diversity of policies is likely to be sustained. There is no *ex post* harmonisation towards one efficient policy, but rather an ongoing process where distorted equilibria on the theory market lead to a continuing revision of theories, which in turn leads to experiments with new policies. In this process, an abrupt disappearance of theories is unlikely, and a syncretic change in which small, seemingly successful elements of policies in other jurisdictions are incorporated into one's own theories are more probable.

As far as future research is concerned, the discussion hints at the fact that decentralisation as a knowledge-generating process may be made more efficient if it comes with supporting institutions that set incentives for the electorate to gather more information than it is assumed in the present paper. Empirical research shows that such incentives may for example come from direct democracy,<sup>7</sup> so the interaction between institutions allowing for a large extent of political participation and decentralisation may be a worthwhile subject of future research.

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