

# **Interactive learning, social capital and economic performance**

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## **Abstract**

There is a tendency among scholars working on innovation and knowledge not to confront macro-economic issues. Seen from the other side, with few exceptions, it has been quite acceptable among macroeconomists to assume that what happens at the macroeconomic level can be well understood without bothering too much about institutions related to innovation.

In this essay I will present some arguments for why this might not be correct. Specifically I will argue that the institutional preconditions for establishing interactive learning that interconnects users and producers in processes aiming at new products (social capital) has a major impact on economic performance of the economy as a whole.

Learning by interacting is fundamental since it transforms the outcomes of learning by doing and learning by using from being local to becoming non-local. Embodying knowledge in new services and products may be seen as an alternative to codification as mechanism of generalizing local knowledge.

The argument is predominantly conceptual and will be built up through references to contributions from a handful of outstanding economists (among them are Adam Smith, Kenneth Arrow, Nathan Rosenberg, Luigi Pasinetti, Oliver Williamson and Douglass North). The paper is a follow up of ideas first developed in the booklet 'Product Innovation and User-producer interaction' (Lundvall 1985).

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## **Introduction**

It was more or less by chance that I got interested in interactive learning between users and producers of new products in the first half of the eighties (Lundvall 1985). Conversations with Christopher Freeman as well as empirical studies from Science Policy Research Unit – such as the Sappho-study (Rothwell 1977) - were important and another background was a major empirical project on microelectronics in Denmark (MIKE).<sup>1</sup> I also had some bright students that helped me see the importance of the issue.<sup>2</sup>

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<sup>1</sup> This project was mainly reported in Danish. But some of the empirical results of general interest were presented in Lundvall (1985) and Lundvall (1993).

<sup>2</sup> Gert Willumsen, developed some of the ideas I worked on in the following years in his master thesis from 1981. He is still working as researcher in our IKE research group besides his main job as university librarian.

When I finished the MIKE-project beginning of 1984 I got a year's sabbatical spent half at SPRU, Sussex and half at Stanford in connection with the TIP-seminar led by Paul David. During this period I had the privilege to discuss my ideas with outstanding scholars such as Chris Freeman, Luc Soete, Keith Pavitt, Carlota Perez, Kenneth Arrow, Nathan Rosenberg, David Mowery and Paul David and many others.

Through the sabbatical I worked on the booklet 'Product Innovation and User-producer interaction' (Lundvall 1985) that was published on our local University Press in a very modest format – I believe the number of prints were 200 copies. I still believe that I wrote down several good ideas in this book-let. Some of them I followed up in a number of papers the next couple of years with variations on the general theme (see Lundvall 1988; Johnson and Lundvall 1989; Lundvall 1991; Lundvall 1992b; Lundvall 1993) but some of the most important implications of my analysis I never got the opportunity to follow up.<sup>3</sup> And this is what I would like to do in this brief essay.

In general, with the exception for new growth theory and the literature on national systems of innovation, there is a tendency for scholars working on innovation and knowledge not to confront the macro-economic issues. (I am afraid that this was somewhat reflected also in the program for the Washington-seminar.) Seen from the other side, it has been quite acceptable among macroeconomists to assume that what happens at the macroeconomic level can be well understood without bothering too much about technology and institutions related to innovation.

One temporary exception, when macroeconomists actually did get involved in the debate, was 'the new economy'-episode, when even mainstream OECD-economists – stimulated by Alan Greenspan's speeches on the new economy – for a short period referred to technology, and especially information technology as a factor that might affect the workings of the aggregate economy. It was a pity that the basic hypotheses behind this concept were too crude (Lundvall 2003). This episode might actually have reaffirmed macro-economists that it is best to stay away from difficult themes having to do with knowledge and innovation.

In this essay I will present some preliminary arguments for why this might not be a good idea. Specifically I will argue that the kind of interactive learning that interconnects users and producers in processes aiming at new products may have a major impact on economic performance of the economy. To understand the prerequisites for such learning to take place should therefore be of major concern not only for management but also for policy-makers at the national level.<sup>4</sup>

The argument in the essay is predominantly conceptual but my reasoning reflects experiences from several big empirical studies and from policy-making at OECD and as councilor to national

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<sup>3</sup> The successful introduction of the concept of 'national system of innovation' (also developed in close collaboration with Christopher Freeman, Dick Nelson and, of course, with my Aalborg colleagues Dalum, Johnson, Andersen and Gregersen) got me heavily involved in more policy related research and debate (Lundvall 1992a).

<sup>4</sup> The argument in this paper relates to the contribution to this volume by Eric von Hippel where it is demonstrated that, in certain areas, users – including consumers - become increasingly active in developing new products for their own use and that this phenomenon may have positive impact on economic welfare. Superficially there is a contradiction with the view in this paper that 'process innovation' is less useful at the system's level since it remains local. If we introduce feed-back mechanisms from users to producers, entrepreneurial initiative among users and 'communities of sharing' in the von Hippel-framework the two perspectives may be seen as complementary since user experimentation contributes to diversity in learning. Without specifying such mechanisms it might, actually, be difficult to discuss the welfare impact of user innovation.

governments and the European Commission. I will build up my argument through references to contributions from a handful of outstanding – but often under-estimated - economists.<sup>5</sup>

## **Learning as the major source of economic growth – Pasinetti on Growth and Structural Change**

Pasinetti (1981) is, as I see it, one of the major post-war contributions to economic theory. Here I will just pick out some elements from this eminent work. Pasinetti builds a theoretical model with vertically integrated sectors each ending up with final commodities for private consumption. The dynamics comes from *producer learning* resulting in productivity growth in these sectors while the uneven growth in demand reflects *consumer learning* in connection with consumers' adoption of new and old consumption goods.

It is characteristic for Pasinetti's argument that product innovation – in the form of new consumption goods – is seen as *a prerequisite for avoiding stagnation* and thus for sustainable growth. This is in contrast to most production theory that simply ignores product innovation. And it is also, as mentioned, characteristic that the diffusion of new consumption goods is seen as requiring consumer learning. Consumer's preferences are shaped in such learning processes and not given once and for all. I believe that these assumptions bring us closer to the realities of the modern economy than standard production and consumption theory. Empirical studies show that new products, together with change in process technology and in work organization, are key elements in economic growth (Christensen and Lundvall 2004).

But the major aim of Pasinetti's model is to build a theory explaining the logics of value creation in a dynamic context without specifying the institutional context and the author, while recognizing the critical importance of the phenomena, abstains from explaining how and why learning takes place in respectively consumption and production. *To get closer to understanding how learning takes place, it is actually necessary to open the black boxes of the vertically organized production chains and to be explicit regarding institutional framework and its impact on interactive learning.* We will argue, first, that the organization of these chains in terms of markets, hierarchies and networks is of crucial importance for the rate of productivity growth within each chain and, second, that the framework conditions at the level of the national system have a major impact on the organization and thereby on the actual rate of growth of the whole economy.

## **The division of labor and the static scale effects**

What follows is very much in the spirit of Adam Smith (1776/1904). It may be seen as an attempt to bring his analytical framework up to date by taking into account the speed up of change and the increasing importance of knowledge creation and learning. The starting point is, his fundamental hypothesis, that economic development may be *defined as* a process where the degree of specialization and the division of labour becomes more developed and complex.

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<sup>5</sup> I found the presentation by Carliss Baldwin at the Washington-conference on 'Designs and design architecture – the missing link between knowledge and the economy' (see paper by Baldwin and Clark to this volume) fascinating in relation to the theme of this paper. Their paper demonstrates that a dramatic reconfiguration radically increasing the vertical division of labour has taken place in the computer industry over a rather short period. They link this phenomenon to modularization but also to the high rate of diversity at each single step in the production chain. I believe that this analysis combined with a consideration of social context could be most useful in qualifying my own argument. On the other hand analyzing the role of interactive learning in shaping the modular eco-system might enrich their analysis.

For our purpose it is fundamental to distinguish between two different dimensions of specialization. One where the specialization takes place within an organization and one where activities become separated from each other by organizational border. Specialization within the firm we call *internal specialization* and specialization between organizations we call *external specialization*.

The more developed internal specialization makes it possible to reap static economies of scale within the organization. These economies emanate from reducing the frequency of shifts in job tasks for each worker or team and as well as from workers and teams learning to pursue their tasks more skillfully through longer cycles of repetition. We call this the *internal static effect*.<sup>6</sup>

A similar static effect emanates from increasing the vertical division of labor among organizations. A single firm specialized in producer goods – components, equipment and systems – may – instead of serving a user within the same organization - serve many external clients and thereby obtain scale economies in production. Organizations become more efficient by reaping scale effects and by focusing their use of specialized resources on tasks that are well suited for these resources they also learn to pursue these tasks involved more proficiently. We call this the *external static effect*.<sup>7</sup>

Adam Smith did also take into account *dynamic effects affecting the rate of innovation* but I will leave these aside at this point and return to them later on.

### **Entering transaction costs – Williamson 1975**

Oliver Williamson's seminal book from 1975 has had a major impact on the understanding of industrial organization and especially on the analysis of vertical integration and disintegration. The argument is that scale economies ('technology' in Williamson's terminology – internal and external static effects in ours) are of secondary importance as compared to transaction costs when it comes to explain vertical integration.

Williamson's arguments are well known. Uncertainty coupled with opportunism – agents pursuing their aims with guile – will, in contexts of 'small numbers' - limited competition, lead to high transaction costs and thereby give incentives for firms to integrate vertically, i.e. substituting a hierarchy for the market. Today his analytical model has become more complex emphasising asset specificity, taking hostages and hold up-situations. But the main line of argument remains unchanged.

In my 1985-booklet I tried to figure out how Williamson's analysis could be made compatible with the empirical fact that product innovation (innovations addressing the market) is a frequent phenomenon – at least as frequent as process innovation (Lundvall 1985). My conclusion was that it was not compatible with his 1975-theory.<sup>8</sup> To solve the paradox I introduced the idea of 'organised markets' and different mechanisms that would limit opportunism in such markets. My most important point was, however, that there are *benefits emanating from interactive learning* between users and producers in these organised markets. I will return to this later.

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<sup>6</sup> It is observed in the so-called Horndahl effect where plant productivity grows year by year with little change in organization, equipment and products (Lundberg).

<sup>7</sup> This perspective is presented in Stigler (1958) to explain the vertical division of labour.

<sup>8</sup> Also I argued that 'perfect' competition – the textbook ideal framework for transactions - would form a very poor climate for product innovations. I still see this as a fundamental criticism of textbook economics presenting perfect competition as a kind of ideal state of the economy.

## **The organization of industry – Richardson’s contribution**

When it comes to explain vertical integration most scholars think about transaction cost theory and the contributions by Williamson. But actually G.B. Richardson presented a different approach to understanding vertical integration already 1972 in his excellent article *The Organization of Industry* (Richardson 1972).<sup>9</sup>

Richardson argued simply that what firms would choose to do inside the organization would be ‘similar’ activities – in a resource-base context it meant that they should draw upon similar capabilities. Ahead of his time, he went further and explained *network formation* as a governance form in between market and hierarchy, arguing that activities that were ‘complementary’ but not ‘similar’ would be traded in the network form.<sup>10</sup>

In a more recent paper he revisits his analysis from 1972 (Richardson 2002). Here he argues that an economy with vertically integrated firms would be quite vulnerable to shifts in demand. If demand goes down for an end-product a proportional reduction would be imposed at all stages of the production chain. If you assume that there are limited inter-organizational mobility of resources this would contribute to low rates of capacity utilization.<sup>11</sup>

Richardson argues that for the economy as a whole this rigidity can be overcome by vertical disintegration. In the case of parallel vertically integrated production chains a fall in final demand for specific end-products would affect the productivity of the vertically organized production chains significantly downwards. In the vertically disintegrated production system the specialized producer can address other users and even re-orient capabilities to other purposes more easily. We call this the *external flexibility effect*.<sup>12</sup>

## **Learning by doing and learning by using**

In recent publications I have presented as a basic hypothesis that we now are in the midst of a ‘learning economy’ (Lundvall and Johnson 1994, Lundvall 1996). The most fundamental characteristics of this new stage is a *rapid rate of change* driven by technology, not least information technology, globalisation and market deregulation forcing *a big proportion of firms and of the workforce to engage in building new competencies just in order to survive or avoid exclusion*. This change in context makes the following considerations especially urgent.

The concept ‘learning by doing’ was made known by Kenneth Arrow (1962). He used empirical observations of learning curves and productivity growth patterns from the production of aeroplane

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<sup>9</sup> I was not very well read in 1984 and had not heard about the contribution by G.B. Richardson. I was introduced to him by Nicolai Foss in the context of a DRUID-conference 1996 and over the last 10 years we have met twice a year and had conversations from which I have learnt a lot. Richardson represents a unique combination of theoretical depth and practical experience.

<sup>10</sup> A recent interesting contribution applying the resource-based view on the firm to vertical integration and confronting it with Williamsons transaction cost approach is Jacobides and Winter (2004).

<sup>11</sup> In order to reap the static internal benefits the division of labor within the organization needs to be characterised by a certain constancy. If workers were floating freely in and out the organization their learning would be limited. A different argument in the Williamson spirit would be that we must take into account that ‘transaction costs’ are higher in the labour market than in most other markets since what is bought is ‘labour power’ rather than concrete ‘labour’.

<sup>12</sup> Vertically organized firms might try to overcome the problem by introducing management techniques that promote functional flexibility. One aim of functional flexible organizational forms would typically be to reduce the negative effects on internal flexibility of a highly developed division internal specialization. *Learning organizations may be seen as a solution to rigidities that alternatively would require vertical disintegration.*

bodies as inspiration for the idea. Later Rosenberg (1982) developed the idea of ‘learning by using’ to explain the rapid reduction in the cost of using complex systems as users become more familiar with them. His empirical reference was to airway companies and their use of new generations of airplanes. As a follow-up Von Hippel and Tyre (1995) give interesting illustrations of how the introduction of new process technology normally involves a phase of solving unforeseen problems – a phase during which both operators and technology developers learn by doing/using.

These kinds of learning take place in all parts of the economy to different degree. The more innovations in terms of new products and systems the more learning will be imposed upon developers, producers and users. But you might argue that *their impact in relation to the whole economy is limited* since the learning is ‘local’ and ‘specific’ to one specific user or producer or perhaps it even remains embodied in individuals (this is argued in Foray 2000).<sup>13</sup> This brings me to my core argument that *‘learning by interacting’ is fundamental for the generalization of local learning*. (With the side argument that ‘generalization of local knowledge’ does not always take the form of codification!)

### **Learning by interacting**

As already mentioned, my major argument against Williamson’s assumption that calculating transaction costs would be sufficient to analyse and explain vertical integration, was that the separation of users from producers into two different organisations actually would enhance interactive learning.<sup>14</sup> The idea is simple. If a producer integrates with a user, or the other way around, the integrated couple tends to become less attractive as partners for interaction, information exchange and learning seen from the viewpoint of the remaining independent users or producers. The independent units have very good reasons to be wary about the self-interest of the integrated units and be reluctant to share information about what they have learnt from doing and using. We do not need to introduce ‘opportunism’ - it is simply a question of clear and legitimate self-interest.<sup>15</sup>

The reduction in transaction costs for the integrated couple might be substantial but the long term loss from being locked into learning with only one user (producer) may be much bigger, especially if we are in a sector with turbulent technology and rapid change in user needs. In the learning economy it is important to be able to draw upon a diversity of experiences among users (producers).

And, what is more important for the argument in this paper: From the view-point of the whole economy *the learning by interacting has the effect of transforming local learning into general knowledge embodied in for instance new machinery, new components, new software-systems or even new business solutions.*

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<sup>13</sup> There are different managerial ways to try to compensate for the limited learning capability of hierarchies. The establishment of a ‘learning organization’ where horizontal communication and interdivisional groups is combined with external networking may be seen as such an attempt. But learning organizations are as important for innovative capability in firms that have focused their attention to a few steps in the production chain and that operate in technologically dynamic sectors (Christensen and Lundvall 2004).

<sup>14</sup> The idea of benefits from interactive learning was inspired by a case where a Swedish dairy technology producer (Alfa Laval) kept an affiliate in Denmark in spite of making losses year after year. Asking the management of Alfa Laval why they did not close it down they responded that they were willing to pay a price for being close to and learning from the most advanced dairy technology-users in the world.

<sup>15</sup> It corresponds to situations in civil and public life where individuals could not be expected to be impartial and therefore – in spite of being regarded as trustworthy and good citizens - would be declared disqualified.

This argument is parallel to Richardson's argument on 'flexibility' but I take his argument a step further and point to vertical disintegration as fundamental for stimulating learning-based growth in the economy as a whole. We might call this *the external learning effect*.

### **Adam Smith and two modes of innovation - DUI and STI**

Adam Smith's arguments for the development of the division of labor went further than static internal and external economies of scale. He links the development of the division of labor to innovation in two different ways and he actually indicates two different modes of innovation. One is *experience-based* and corresponds to what I have called *DUI-learning* referring to learning by Doing, Using and Interacting. The other one is *science-based* and corresponds to what I have called *STI-learning* - referring to Science, Technology and Innovation (see Jensen, Johnson, Lorenz and Lundvall 2004). In the beginning of volume I of *Wealth of Nations* he gives the example of innovation based upon learning by doing: The boy who develops an easier way to handle a process in order to get more time to play with his friends (see Box 1). But immediately after he refers to 'men of speculation' – the scientists - who are 'often capable of combining together the powers of the most distant and dissimilar objects'.

#### **Box 1:**

##### **Adam Smith (1776: p. 8) on the DUI-mode of learning:**

A great part of the machines made use of in those manufactures in which labour is most subdivided, were originally the inventions of common workmen, who, being each of them employed in some very simple operation, naturally turned their thoughts towards finding out easier and readier methods of performing it. Whoever has been much accustomed to visit such manufactures, must frequently have been shown very pretty machines, which were the inventions of such workmen, in order to facilitate and quicken their own particular part of the work. In the first fire-engines, a boy was constantly employed to open and shut alternately the communication between the boiler and the cylinder, according as the piston either ascended or descended. One of those boys, who loved to play with his companions, observed that, by tying a string from the handle of the valve which opened this communication, to another part of the machine, the valve would open and shut without his assistance, and leave him at liberty to divert himself with his play-fellows. One of the greatest improvements that has been made upon this machine, since it was first invented, was in this manner the discovery of a boy who wanted to save his own labour.

##### **Adam Smith (1776: p. 9) on the STI-mode of learning:**

All the improvements in machinery, however, have by no means been the inventions of those who had occasion to use the machines. Many improvements have been made by the ingenuity of the makers of the machines, when to make them became the business of a peculiar trade; and some by that of those who are called philosophers or men of speculation, whose trade it is not to do any thing, but to observe every thing; and who, upon that account, are often capable of combining together the powers of the most distant and dissimilar objects.<sup>338</sup> In the progress of society, philosophy or speculation becomes, like every other employment, the principal or sole trade and occupation of a particular class of citizens. Like every other employment too, it is subdivided into a great number of different branches, each of which affords occupation to a peculiar tribe or class of philosophers; and this subdivision of employment in philosophy, as well as in every other business, improves dexterity, and saves time. Each individual becomes more expert in his own peculiar branch, more work is done upon the whole, and the quantity of science is considerably increased by it.

Both of these examples are relevant for our reasoning about vertical disintegration, diversity and interactive learning. For instance, the producer of process equipment may be involved in an interaction with users where he draws upon the experiences made by operators in user firms when developing new models and systems. But he might also be involved in an interaction with

knowledge institutions, as suppliers, in order to get up-dated on technological opportunities or even to buy R&D-results.

In both cases the separation line (some kind of market) between the producer and user may benefit interactive learning at the level of the involved parties as well as knowledge diffusion at the level of the economy as a whole. In the case of STI-learning a certain amount of in house-R&D may be needed to absorb knowledge from the outside sources and outsourcing R&D has been hampered by different factors. But the diversity argument remains relevant also here. The research laboratory or the software firm that addresses many users with different needs and experiences will learn more by doing so than the in house-lab or soft-ware department getting feed-back only from in house users.

But even if similar mechanisms are at work it might still be useful to make a distinction between the two modes because the prerequisites for interactive learning to take place are different. In the DUI-mode the generalisation of local learning will typically be embodied in new machinery and components while in the STI-mode innovations may reach the user in the form of disembodied codified knowledge. The first type of interaction may be based on social interaction and trust in a broad sense, while the second may be more demanding in terms of overlapping scientific competences and it might therefore thrive only on the basis of a common professional background. For instance, firms that are users of knowledge produced by academia may need to have, in house, employees with an academic background.

### **Douglass North on institutions, organizations and market competition**

In a brief essay developed on the basis of his Adam Smith lecture 1994 North introduces a discussion parallel to the one I have entered here (North 1996). The essay confronts with each other the gains from increasing division of labour with the costs to make the system work. He identifies a 'transaction sector' and refers to data showing that already 1970 as much as 45% of GNP in the US could be defined as 'transaction costs'.<sup>16</sup>

North does not make a clear distinction between internal and external 'transaction costs' and he tends to see all government expenditure as such costs. Controlling shirking within the organisation is referred to in parallel with costs of stipulating and enforcing contracts. In the beginning of his essay he refers to 'human learning, the most important source of long run economic change,' but in the rest of the paper institutions are discussed not in terms of how they affect learning but instead he discusses their impact upon transaction costs.

What I want to use from his analysis is his argument that it is more or less difficult to establish 'efficient markets' in different national economies and that the concept 'social capital' may be seen as opening up a new way of tackling this issue. I will however give the adjective 'efficient' a different meaning than he does when he says that 'the key to efficient markets are institutions that result in low costs of transacting'. I propose add that (in the learning economy) it is as important that *institutions support learning* within and between organisations.<sup>17</sup>

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<sup>16</sup> Anne P. Carter (1994) has introduced an alternative perspective where several of the posts that North count as 'transaction costs' are defined as 'costs of change' – that is as resources that have been used either to incite change or to cope with the consequences of change. Actually, this might be a more relevant perspective in the rapidly changing learning economy.

<sup>17</sup> At the DRUID conference on Bornholm 1998, I asked Oliver Williamson if he would define interactive learning as just another form of transaction. He responded modestly that his analytical model has its limitations especially when it comes to capture dynamic processes such as learning and innovation. Not all his proselytes are as modest, though.

There might be overlap between institutional forms that bring down transaction costs and forms that stimulate learning – the presence of trust and the absence of opportunism are obvious examples. But they are certainly not identical. For instance a restrictive intellectual property right regime may reduce transaction costs while at the same time reducing benefits from learning by interacting.

But the most obvious case where the two deviate is when producers and professional users are engaged in a process of interactive learning in connection with product innovation. Here you might reduce transaction costs by vertical integration but by doing so you would reduce the contribution from interactive learning to technical progress both on the user and the producer side.

## **Conclusions**

User-producer interaction in connection with product innovation is certainly of interest for management scholars. Getting the interaction to work well is a key to successful innovation. But I would argue that creating institutional frameworks at the national (and international) level that promote this kind of interaction in ‘organized markets’ is of major interest also for enhancing macroeconomic dynamic performance.

I agree with North that the vertical division of labor will be affected by ‘social capital’. It is a somewhat amorphous concept but it certainly points in the right direction. Here I will define it as ‘the willingness and capability of citizens to make commitments to each other, collaborate with each others and trust each other in processes of exchange *and* interactive learning’. A crucial issue is who is regarded as the ‘significant others’ – is it the members of the family, tribe, nation or does it include everybody on the globe?

I would propose that where a society is rich in terms of ‘social capital’ it will operate with a more developed vertical division of labor – including more organizational borders cutting through the production chains. Such a society would be more successful in terms of net wealth creation because its interactive learning would be based on more diversity and local learning would be more widely diffused in the economy. It would also be more flexible in its response to shifting demand – capacity utilization would be higher, *ceteris paribus* (cf. Richardson argument above).

We would follow North in assuming that in a society poor in terms of ‘social capital’ with a high GNP per capita and a highly developed division of labor much of the wealth would be absorbed by social costs – costs to control workers inside organizations and costs to control market transactions and access to intellectual property outside/between organizations.

This raises the next question – what determines the willingness and capability of citizens to make commitments, collaborate and trust others in processes of exchange and interactive learning? Here we propose that economists need help from other disciplines with more insight in what humanity and human societies are about. I believe that George Herbert Mead (1934) and the social interactionists have important things to say that could help us analyze these issues.

A predictive and transparent legal system may be helpful both in its own right and as bolstering trust while corruption in private and public sector is not supportive to social capital. I also believe that social inequality and unequal opportunities undermine social capital especially when seen as an

injustice by the have-nots.<sup>18</sup> Therefore, following North, and seeing public expenditure, including social welfare and regional policies, as ‘transaction costs’ may be a mistake. It might actually be seen as investment in social capital.

Taking it for granted that all citizens are free riders always ready to tell a lie and engage in ‘hold-up’ whenever they see an advantage in doing so might be a serious mistake making our economy much less efficient than it could be. If this pessimistic view were correct the learning economy would soon dwindle. Nothing is more demanding in terms of trust than interactive learning.

And, as Arrow (1971) says, you cannot buy trust – and if you could buy it ...it would have no value whatsoever! This is why the learning economy must anchor its efficiency, outside the economy, i.e. in society and good citizenship – greed is not enough to make the system work. And perhaps we should be grateful for that.

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<sup>18</sup> This qualification should be taken seriously. In the US the tolerance among poor people of their own fate as well as of the wealth of the rich seems to be much higher than in for instance Europe. I remember a conversation with a debt-ridden taxi driver in California who – when I asked him if he was not angry with the politics that let him bear the full burden of mishaps and illness – aggressively asked me if I was a communist!

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