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Does Polish Macroeconomic Policy Fit the Paradigm of Increasing Innovation in the Economy?[1]

This historical perspective on innovation leads the author to unorthodox and important conclusions and recommendations for economic policy. The author argues that innovation has always played a pivotal role in economic and societal progress and the contemporary era is just no exception. Then he analyzes statistical data attempting to quantify the relation between innovation and economic growth and concludes that the modern paradigm of innovation as the key to a greater competitiveness is not supported by observations. Observations on Poland's innovativeness, its impact on economic growth, and recommendations for policy makers consist the final part of the article.

BRIEF GLANCE AT ROLE OF INNOVATION IN PAST ECONOMIC DEVELOPMENT

Before attempting to answer the question whether and to what extent the macroeconomic policy currently fits the paradigm of increasing innovation or, in other words, whether innovation guides research, scientific thought, and macroeconomic policy, we will devote some space to the issue of influence of innovation on the economic development in the long and even very long time horizon. These considerations will be useful in formulation of assessments and conclusions concerning the present.

Human history shows that knowledge, inventions, and innovation generated the basic, critical economic changes. They led to the upset of social equilibrium and the appearance of new opportunities with a relatively higher rate of growth and subsequently higher incomes.

One can point out the following epoch-making inventions, whose implementation defined the milestones on the path of economic development of the humanity:

- fire (the skill of striking, harnessing, and using fire)
- the wheel
- print (multiplication of the capacity of thought exchange)
- steam power
- electric energy
- electronics (computers).

All these inventions required knowledge advancement, resulting from experience or random occurrence, and finally scientific knowledge. They also required conditions enabling putting innovation into practice—only then they could influence the economic reality.

In every epoch however, irrespective of the turning-point innovations that focused development and scientific thought, economic growth depended on general, often small advances of knowledge, experience, technology, and innovation.

The historians maintain that when there is a dramatic increase in applications of new technologies in many domains in a relatively short period, then one deals with a revolution.

[1] Originally presented as a paper at the Conference of Polish Economic Society and the Jagiellonian University in Kraków, December 2003

For example, the first industrial revolution was associated with the innovations in various domains linked with application of steam power, the second industrial revolution, associated with the innovations in various domains linked with application of electric energy, and the third industrial revolution – innovations in various domains linked with electronics.

When pondering about why one idea succeeds and another fails or why knowledge develops faster or slower, one is unavoidably brought to certain inherent properties of human nature. There is a consensus as to the fact that the scientific success stems largely from:

- the inclination towards putting to doubt the existing knowledge (scepticism and challenging of the authorities),
- the propensity to learn,
- the curiosity and the inclination to search for new solutions,
- the capacity of making use of new knowledge for changing the reality.

According to Thurow[2], these properties of human nature are distributed over the world relatively uniformly, but they do not occur everywhere with the same intensity. In order for them to manifest, that is – to be translated into effects, appropriate conditions have to arise. The creativity (propensity to innovate), as distinct from innate properties, is not evenly distributed over the world, and it changes across time and space.

Historians point to the significance of the broadly conceived culture and political system as the elements, which may be conducive to, or hampering, social creativity— may be advantageous or disadvantageous to change. Given all this, the fear of change was typical of the majority of societies. A culture may facilitate doing away with the fear or to the contrary – strengthen it.

A typical example, cited many times over, is the one of the Chinese economy. In the period preceding the 15th century, the development of knowledge in China brought such a development of technology, which might have in a short period reached the stage of an "industrial revolution". At that time China had already large metallurgical furnaces, steel was produced on a large scale, gunpowder, the compass, and rudder had already been invented, several types of machines, modern for that time, were being used in agriculture, and the surplus of agricultural produce was increasing. The Chinese also mastered the skill of extracting natural gas. Moreover, the decimal system was used in mathematics, the notions of negative numbers and zero were known. Therefore, China could have become the place of the first industrial revolution. This, however, did not happen, since in the 15th century the culture and the organisational structure developed, which were opposed to furthering technology. They barred the country from the rest of the world and doomed it to stagnation of scientific thought.

The subsequent example indicating the influence that a certain culture and social worldview can have on human attitudes, on the propensity to innovate, and consequently on the economic development, may be observed during Europe's Middle Ages. Even if we abandon the negative stereotype of the "dark ages", recognise the charm and significance of the medieval culture, and find the values of that time worth admiring[3], we cannot help but consider this period, notwithstanding certain elements of progress, a time of economic stagnation and intellectual regression[4]. Medieval culture, shaped by the domination of the

[2] see Thurow, p. 101
[3] see Geremek
[4] Le Goff, p. 152

Church, led to stifling of the rational thought by the omnipotent theology. The religious worldview was permeated with fear, the threat of hell and evil. The rich were threatened by tortures in hell. Against this background, attitudes inimical to the changes in the socio-economic relations took shape in the hierarchically organised society and the propensity of change and innovation declined. It was only the Renaissance that brought a turn and opened a new perspective for development of science and innovation by accenting the role of reason in cognition of the world. Eventually, Europe became the place of the first industrial revolution initiated in England at the end of the 18th century.

Another example, originating from a much closer time. The communist system in the then Soviet Union and in the subordinated countries brought stagnation and technological backwardness through its conservatism and isolation from the world science. The apotheosis of the simple manual labour and the disdainful attitude toward the intellectual work formed a specific social climate. The concept of the material sphere as the sole area in which national product is created, functioning in science, as well as exaggeration of the role of heavy industries as the basis for development, had a negative impact on the development of other domains of the economy.

Despite significant funds directed to the scientific (and pseudo-scientific) institutions, the system of central planning was not capable of producing societal creativity and innovativeness. This was one of essential reasons behind the decay of economic growth and the collapse of the entire system, founded on the omnipotence of the state and the Communist Party apparatus.

All these considerations lead to the conclusion, that economic development was always strongly associated with innovativeness that has been the "instrument of all progress"[5]. This is not a specific feature of the 20th or 21st century. The propensity to innovate has always been strongly dependent upon the culture, prevailing worldview, and the institutions—either hampering development or creating conditions advantageous for development. There are rather some examples in history when they truly supported inventions and new discoveries—"Columbus would have not discovered America without the support from Ferdinand and Isabel"[6].

INNOVATION AND CURRENT ECONOMIC DEVELOPMENT

Innovation and more precisely the level of innovativeness can be measured in a variety of ways. The European Commission measures regularly the innovation activity of the Member States together with the Candidate and Associate countries as well as the U.S. and Japan. There are 28 composite indicators used for this purpose, characterising various aspects of innovativeness (they are divided into four categories such as human resources for innovation, creation of new knowledge, transmission and application of knowledge, and

Designations of countries, used on the diagrams

Australia	**Au**
Austria	**Os**
Belgium	**Be**
Canada	**Ca**
Czech Republic	**Cz**
Denmark	**De**
Finland	**Fi**
France	**Fr**
Germany	**Ge**
Greece	**Gr**
Hungary	**Hu**
Ireland	**Ir**
Italy	**It**
Japan	**Ja**
Korea	**Ko**
Mexico	**Me**
Norway	**No**
POLAND	**Pl**
Portugal	**Po**
Slovenia	**Sv**
Spain	**Sp**
Sweden	**Sw**
Switzerland	**Ch**
The Netherlands	**Ne**
United Kingdom	**UK**
United States	**US**

[5] Braudel, p. 268
[6] quoted after Thurow

innovation finance, outputs, and markets). On this basis, the **Summary Innovation Index** of a country is calculated.

In Poland, innovation outlays comprise of: R&D expenditures, purchases of off-the-shelf technologies (patents, licenses, etc.), expenditures on fixed assets made for the purpose of introducing technological innovations, expenditures on implementation into production as well as marketing of the new and modernised products.

The fundamental significance in the innovation processes ought to be attached to research and development activities, with the share of R&D expenditure in the GDP (see Table 1) being highly correlated with the Summary Innovation Index (R^2=0.80). The output of the R&D sector, through innovations, transforms the value of newly installed and modernised machinery and equipment as well as means of transport.

Measuring R&D expenditures and those borne for implementation of innovations to production processes is relatively simple. This is also the case with construction of the measures defining indirectly (the symptomatic measures) the level of innovativeness or an activity in the R&D sector (like, for instance, employment in the R&D sector as a percentage of total workforce), as well as various kinds of information characterising innovation effects (like the number of patents, number of citations in scientific literature). None of those measures though reflects the actual influence of innovations on economic development. Such influence is very hard to quantify. It must be stressed that for similar levels of expenditures, the effects may be quite diverse, and, as a rule, the expenditure increases do not bring proportional effects.

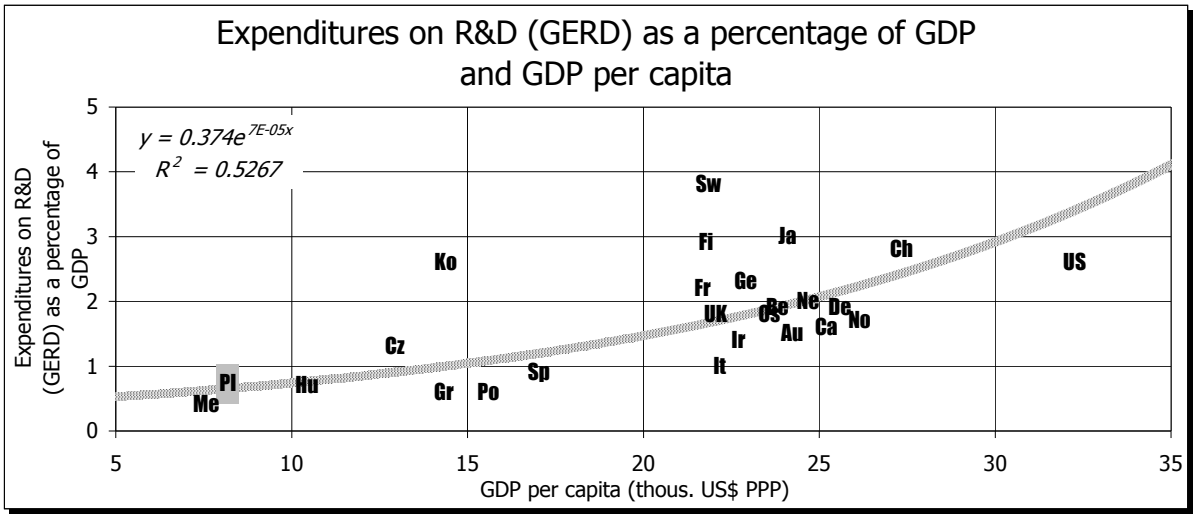


Figure 1

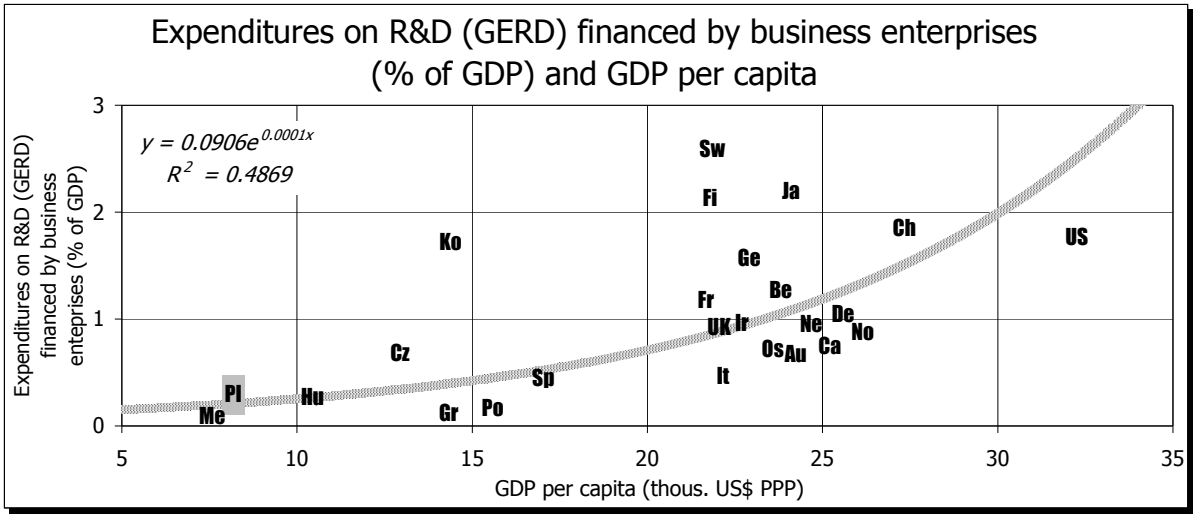


Figure 2

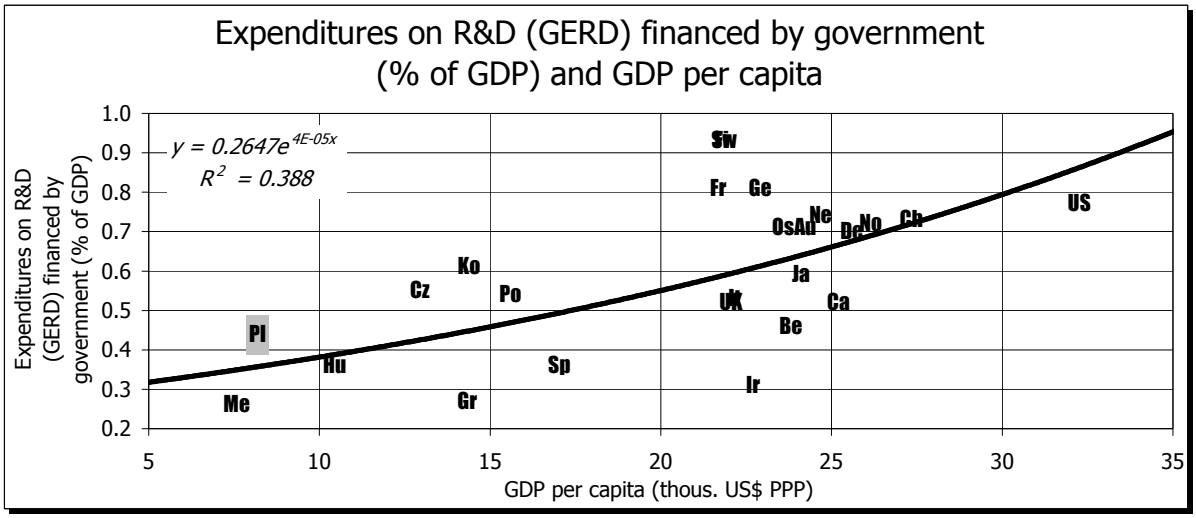
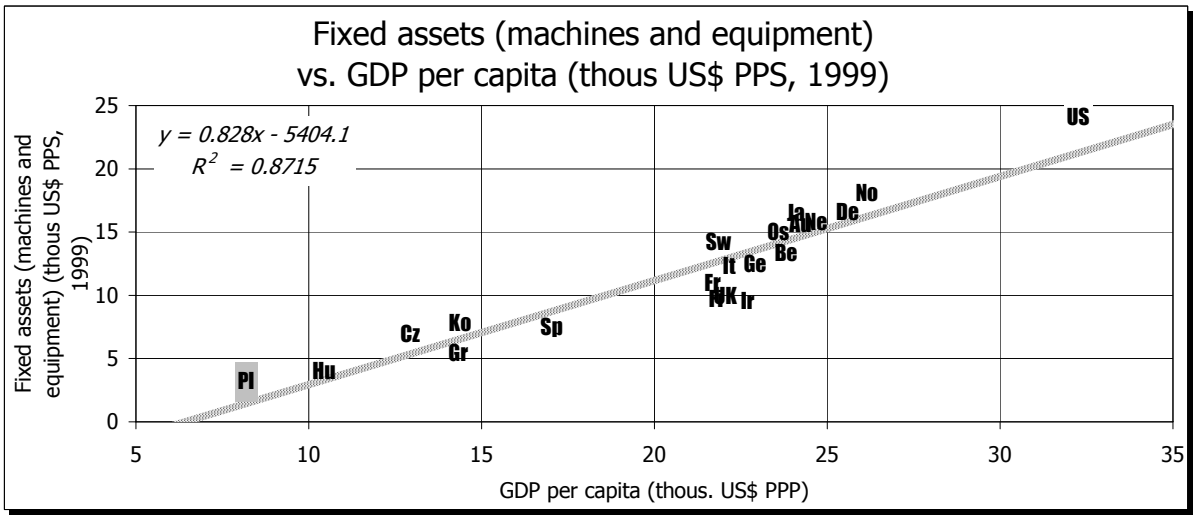


Figure 3



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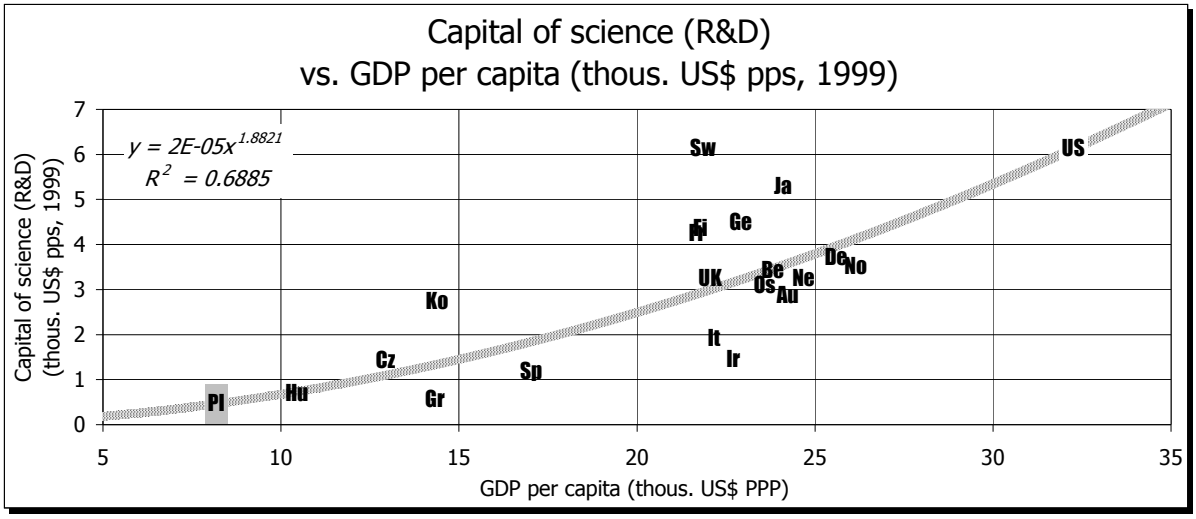

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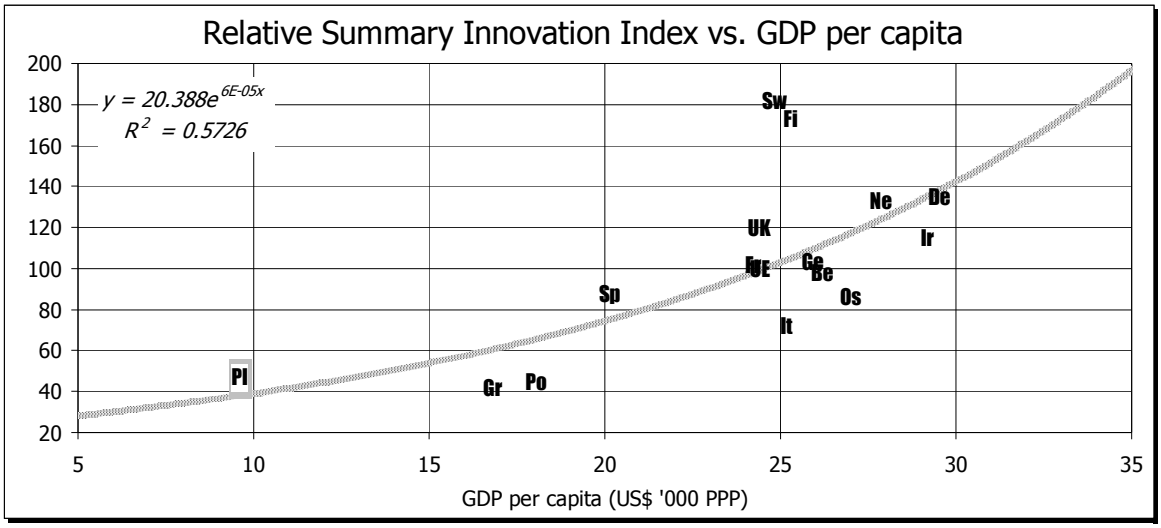

Figure 6

Table 1. Relative Summary Innovation Index and R&D Expenditures

Country	GDP per capita (US$-PPP)	Relative Summary Innovation Index	R&D Expenditures as % of GDP		
			Total	Government	Business
Sweden	24,843.2	182	3.78	0.94	2.84
Finland	25,259.8	173	3.66	0.98	2.68
Denmark	29,495.4	135	2.07	0.75	1.32
The Netherlands	27,836.2	133	2.02	0.88	1.14
United Kingdom	24,398.3	120	1.86	0.66	1.21
Ireland	29,173.6	115	1.21	0.33	0.88
Germany	25,892.9	103	2.52	0.72	1.80
France	24,215.3	102	2.13	0.77	1.36
Belgium	26,169.3	98	2.01	0.56	1.45
Spain	20,124.4	88	0.97	0.44	0.52
Austria	27,000.8	86	1.79	0.65	1.14
Italy	25,160.6	72	1.06	0.53	0.53
Portugal	18,021.1	45	0.76	0.58	0.17
Greece	16,816.7	42	0.67	0.48	0.19
Poland	9,588.2	47	0.70	0.45	0.25
EU-15	24,395.2	100	1.94	0.67	1.28

Source: Orłowski

The results of international comparisons7 demonstrate indirectly the influence of innovations on economic development. There is a statistically significant relation between the level of economic development achieved by a country (as measured by the real GDP per capita) and the intensity of innovation (measured both through the share of R&D expenditure in the GDP and through the innovativeness indicators). This applies both to current R&D expenditures and to the cumulative knowledge capital[8] expressed through the cumulative R&D expenditures.

Yet, we cannot conclude that we deal in this case with the cause-and-effect relation. It should also be emphasised that essential divergences are observed between the empirical data and the theoretical curves obtained from regression.

Among the OECD countries, those with relatively high R&D expenditures in relation to the GDP are the Nordic countries except for Norway (Sweden, Finland, Denmark), as well as Germany and the Czech Republic, and, besides, in the group of the non-European countries – Korea and Japan. In case of the cumulative knowledge capital, the composition of the top of the ranking is similar, with the Czech Republic replaced by France.

At the other extreme – the relatively low R&D expenditures and low knowledge capital – we find the countries of Southern Europe (Greece, Spain, Portugal, Italy).

Poland and Hungary are situated – similarly as the other countries of the OECD – at the level close to that defined by the theoretical curve. It should be emphasised that R&D expenditures are particularly low in Poland in the business sector (the expenditures of the government sector in relation to the GDP are somewhat higher than the number resulting from the theoretical values).

Two countries – Ireland and the U.S.A., draw our attention as the specific cases of the relations considered here.

Ireland is the country that attained the highest GDP growth rate among the OECD countries during the 1990s. The rates of growth of the R&D expenditures as well as the expenditures on fixed assets were in Ireland also the highest among the OECD countries. The data for 1999 characterise Ireland as having a very high share of exports of high- and medium-technology products (ranked second after Japan). Despite this fact, at the same time, the R&D intensity (ratio of R&D expenditures in industry to total industrial production output) and the ratio of the R&D-expenditure to the GDP were relatively low, below the majority of the OECD countries.

During the 1990s, the growth of exports of the high- and medium-technology products (products of technology-intensive industries) significantly exceeded in Ireland the average for the OECD countries (the mean annual growth rate in the OECD countries being at about 7% while in Ireland – at roughly 18%). Ireland made an extensive use of the imported technologies (results of research conducted in other countries). Moreover, it imported from other countries, mainly from the U.S.A., high-technology products used as inputs in production (the intermediate consumption), to then export the final products. We can therefore conclude that the success of Ireland was made possible by the simultaneous high growth of

[7] The results of the study carried out by Żółkiewski indicate the appearance of such correlation also for an analysis concerning exclusively Polish economy during the period of transformation

[8] see Zienkowski

both the fixed assets and R&D expenditures combined with the skilful use of the technological achievements having originated from other countries9.

In the U.S.A., the high absolute levels of R&D expenditure and the high value of knowledge capital do not appear high any more when related to the level of GDP per capita. The respective numbers for the U.S.A. are close to the values resulting from the theoretical regression curve for knowledge capital and even fall below the theoretical value for expenditure. Yet, the effects of modern production and technological advancement are more pronounced than this would result from the R&D expenditures alone. We can therefore propose that the effectiveness of R&D expenditures expressed in terms of competitiveness of a country is higher in the USA than in Europe and, particularly—in large European countries such as Germany, France, and United Kingdom10.

International comparisons allow formulation of the following conclusions:

- the structure of use of the available production factors may differ significantly between countries at similar levels of economic development (various "development paths" are possible),
- the influence of innovation on economic development depends not only upon the volume of expenditures on R&D but also on their effectiveness, on the creativity of the research and development personnel, and on the institutions existing in a given country either promoting or hampering the initiative and innovativeness,
- the innovativeness of the economy is not only the effect of the internal research and development activities but also of the import of modern technologies and the "know-how"
- it can be proposed that there is a mutual synergistic interrelation between the level of the GDP and the R&D expenditures (the R&D outlays increase along with the level of GDP, and the level of GDP increases as the outlays grow),
- innovativeness is relatively strongly correlated with the value of knowledge capital – this relation is important especially from the long-term perspective; the above is also true for the value of GDP per capita.
- The capacity of creating and absorbing technological progress, necessary for achieving high rates of economic growth, must be combined with high expenditures on fixed assets, including infrastructure. This is particularly true for the countries "catching up" with the highly developed ones—there, the growth in value of fixed assets is the factor decisive for the rate of economic growth. However, in order for growth to happen, improvements in the legal system and administration (simplicity and clarity of legal regulations, limitations to bureaucracy, etc.) are indispensable.

MACROECONOMIC THEORY AND POLICY

The mainstream of the present-day economic thought apparently belongs to the endogenous growth theory and to the formal models based on this theory. Let us recall a summary of its basic assumptions:

[9] OECD, p. 130
[10] see Aiginger

- all production factors (not only fixed assets) originate in the accumulation processes, this applies, in particular, to accumulation of the knowledge capital,
- the technological and organisational advances depend upon the broadly conceived socio-economic policy and the similarly broadly understood culture and mentality of the society,
- production factors are used effectively only when there exists a stable framework regulating economic activity and safeguarding property rights.

Hence, in theory (and in models), knowledge capital is one of the production factors. Accumulation of knowledge capital, that is – the effects of expenditures on science (R&D) and on education give the foundation for increase of innovation in the economy, which in turn is the decisive factor for the competitiveness of the economy. Side-by-side with knowledge capital, the expenditures on fixed assets play a varying role in determination of the rate of economic growth— depending upon the level of development. Contrary to numerous opinions, fixed assets play a significant role as a production factor.

We can therefore pose the question whether a concept of the "knowledge-based economy" has any sense at all. As we discussed earlier, knowledge has always played an important role in the economic growth processes, and if so, what this expression actually means. A knowledge-based economy is the one in which knowledge became a decisive growth factor, as distinguished from fixed assets and labour. Does, however, such an economy exist? The econometric analysis does not confirm the supposition of its existence. Yet, the European Union, in the framework of the Lisbon agenda, puts ahead of its member countries the task of enhancing their innovativeness. It is the position of the EU that this is the main basis for a more competitive European economy.

Can we therefore assume that the increase in innovation that is considered, in the contemporary economic theories and in the recommendations of the EU, one of the major factors of economic growth, is currently the paradigm of macroeconomic policy? We shall leave this question open.

How does then Poland's economic policy affect innovativeness? The politicians from various parties make numerous official declarations speaking of the significance of science and innovation in the process of economic growth. These declarations though, do not get translated in a visible manner into action in socio-economic policy. There is perhaps some truth to the statement of Stanisław Lem who wrote in the *Tygodnik Powszechny* weekly that in reality "the awareness of the role of science in the economy and development of the state is currently beyond the perception horizon of our political class". Perhaps the politicians are shortsighted and think mostly in the "here and now" categories while the increase of innovation necessitates long-range action that does not bring immediate effects. Very frequently, the problem of innovation increase is being reduced to the increase of the R&D expenditure, as if just additional money could by itself solve the problem.

The direct influence of the state on the R&D is limited to the expenditures in the government sector. The issue would have been relatively simple if it boiled down to just the increases in the R&D expenditures in the government sector. There exist, of course, budgetary limitations, but if it were certain that the increase in outlays would bring an overall rise of innovativeness and result in massive implementations of technological advancements, there would presumably be no problem with finding appropriate means. Yet, it is beyond doubt that it is the increase of the private sector's R&D expenditure that has fundamental importance. As already mentioned, the R&D outlays are particularly low in Poland's private sector. However,

the decisions made by the private owners are autonomous and the macroeconomic policy of the state can influence them only indirectly.

Finally, as also indicated before, the propensity to innovate and technological advancements do not depend uniquely and proportionately upon the volume of R&D expenditure. The increase in innovativeness of the economy depends upon numerous factors, as observed throughout history. In order to have an effective influence, all these factors must appear at the same time. It can actually be postulated in general that not just one factor but rather a combination of them is decisive for increase of innovation. The effects, however, are not immediate, to the contrary – they lag in time.

The following issues of the government policy have fundamental significance for the increase of innovativeness of the economy:

a) promotion of **competition**,

b) establishment of a stable **legal framework** regulating economic activity,

c) stable and foreseeable **fiscal policy**,

d) securing **property rights**, including intellectual property rights,

e) creation of a **supportive atmosphere** for creativity and talents,

f) **remuneration** of the intellectual achievements adequately to their significance,

g) increase in **R&D expenditures**,

h) support for the **import of new technologies**,

i) directing **government spending** to formation of human capital.

Here are some comments on the relations between the above issues and innovation:

a) **Competition** seems to be only loosely associated with innovativeness. However, in the economic reality, nothing has a greater negative impact on the propensity of the entrepreneurs to introduce innovations than lack of competition on the market, especially the existence of monopoly or oligopoly or a public support allowing for the existence and prosperity of the inefficient enterprises. If the entrepreneurs can gain profit without a special effort, they would not get involved in new, often highly risky, ventures. On the other hand, under strong competition, when a genuine threat exists that an enterprise would get behind the competitors who increase their market share due to innovative products and services then the managers of such enterprise are forced to take action also aimed at innovation. Therefore, protecting and promoting competition should be one of the fundaments of the state's policy.

b) Substantial and risky R&D and other expenditures generally precede innovation implementation. Lack of stable **legal** norms regulating economic activities would increase the risk even further and the higher risk has a negative impact on the propensity to innovate.

c) Similar reasoning as in b) applies to the risk related to lack of stability and foresight concerning **fiscal policy**.

d) The state's commitment to the appropriate protection by law and enforcement of the intellectual **property rights** protects the effort put into inventions and innovations—if this commitment is insufficient then motivation for creative work decreases.

e) As indicated by the examples from both the ancient and modern history, the propensity to innovate is significantly influenced by the "**social climate**". The state can establish the attitude conducive to the creative activity and the deployment of talent, through its socio-cultural policy, by putting forward the role of human thought in the development processes. In doing so, the state should promote the elites in all kinds of environments, starting with the schools, and not accept mediocrity. This is not an easy task.

f) An appropriate social climate may give rise to conditions for adequate **remuneration** of the intellectual achievements, corresponding to their significance, and one should then not be afraid of the social stigma resulting from the income differentiation. The ethos of a poor, outstanding scientist or inventor – if it actually existed at any time – disappeared in the past. This is certainly not the model to be followed by the students at the higher education institutions. Young, gifted people, who could be usefully busying themselves with their scientific careers, and who even value the freedom that dealing with science gives them more than the money, are not ready to accept the exceptionally low material status of a scientist in Poland (a medium-level officer at the Ministry of Foreign Affairs, let alone the banking sector, earns more than a full-time professor).

   One must agree that a simple doubling of the salaries of all the persons employed in science and technology would certainly not yield the desired effect. A perspective, though, must be created, of an advance in the case of scientific success, including significant financial gains, in order to motivate the gifted and ambitious people. The economic development of the country is due to the elites and it is the common good that should motivate a better remuneration of the elite members, since only then the brain drain can be stemmed. "A single outstanding professor brings more glory and effect than a great many of less capable people" – these are the words of the Austrian emperor Joseph II from the 18th century[11].

g) The state can only have an indirect influence on the **R&D expenditures** in the private sector. The joint projects co-financed by the state and the private sector are a promising form of such influence. Organisational and financial support ought to be extended especially to the small and medium enterprise sector in order to help them limit the risks associated with the innovation-oriented research programmes. The large companies can much more easily undertake such research. For them lack of success in one or another project does not entail a serious blow to their financial situation as this is the case with small and medium size enterprise while the results of their programs as the whole still improves their situation on the market. Governmental support would ultimately lead to the emergence of strong, excellent domestic research and development centres in the enterprise sector.

It is generally recognised that in the end, the relative level of knowledge of the society is a significant if not decisive factor for its innovativeness and competitiveness of the economy. Therefore investing in human capital formation with the state playing a pivotal role in this process is so important.

[11] after Zienkowska

WHAT DEVELOPMENT SCENARIO FOR THE FUTURE?

There are two countries in Europe, which had a spectacular economic success using innovation as the growth lever – Ireland and Finland. These countries, though, are essentially different. We can formulate a somewhat exaggerated and simplified proposition that the basic factor of development made use of in Ireland was the import of new technologies in connection with the active policy of the entrepreneurs and the state, and to a lesser extent, the results of own research conducted in the R&D sector, with a relatively limited level of the educational capital (and the expenditure on education). In the case of Finland, it was quite an opposite. There, significant means were directed to the R&D and the country used its own educational capital. Finland features higher rate of increase of expenditures on education, the educational capital is higher, and the level of population's education is also higher than in Ireland. It appears therefore, especially if we account for the historical experience, that the persistence of achievements of Finland is much more certain that of the Irish success.

What can be the hypothetical optimum scenario of developments in Poland?

Taking as the point of departure the realistic assessment of the situation in our country – the relatively low level of R&D expenditures, especially in the business sector, the insufficient number of high quality research and engineering personnel, the relatively low level of education capital, and the dramatically low level of actual literacy (as distinct from the formal educational level) – one cannot count that a high increase of the R&D expenditure in the nearest years, even if it were feasible, might have far reaching consequences.

The chance of the increase of innovativeness of the Polish economy in the nearest future seems to be not so much connected with a rapid increase of R&D expenditures but rather with the increase of the new technology imports and know-how, as it was the case with Ireland, and their proper use for transformation of the economic structure. The R&D expenditure would then be mainly directed towards ensuring a better absorption of imported technologies.

The transition to a more intensive increase of the domestic R&D expenditures (getting on the Finnish development path) must be preceded by an educational offensive in order to both increase the numbers of the highly qualified, creative research personnel and engineers and to make a decisive improvement of the general level of actual literacy.

It is only the improvement of human capital through education and, on this basis, the development of intellectual elites in all domains of life in addition to the proper socio-economic policy and culture supporting innovation that may bring about the situation, in which the Poland's own scientific and technological achievements would constitute one of the fundamental development factors. Only then, a significant increase in the expenditures on the domestic R&D, up to the level observed in Finland in terms of the share in GDP, might yield tangible effects. The example of Greece[12] indicates that the financial effort of a country, directed to R&D, may get wasted and the economy may be incapable of an effective absorption of the generated scientific and technological progress. The simultaneous increase in education expenditure is indispensable in order to increase the general level of knowledge and the number of educated personnel.

Let us also add, though, that we should not overestimate the influence exerted on the rate of economic growth by the innovation, especially in the countries, which are catching up with

[12] see Orłowski

the highly developed ones and Poland is exactly in this group. This is "one of", but not the sole factor decisive for the bridging of the development gap.

In the less economically developed countries trying to catch up with the more developed ones, the fixed asset resources are much smaller than in the highly developed ones. That is also why the importance of the fixed assets expenditures, in relation to the expenditures on knowledge and innovations, as the production factors, is different in these groups of countries. The proposition suiting the more developed countries is not adequate for the less developed ones.

In the economies in which there is a relatively low volume of fixed capital, each additional unit of capital yields a much higher effect than in the economy in which there is relatively a high volume of capital due to the decreasing marginal productivity of production factors. Hence, the influence of the fixed asset expenditures is relatively much higher in the less developed economies than in the more developed ones. Thereby the impact of knowledge and innovations is relatively smaller than in the highly developed economies. These economies, in view of their significant saturation with the fixed assets, have to base their development to a large extent on the so-called non-material factors. It should be noted, though, that in such economies, as well, there has been in the 1990s a statistically significant correlation between the rate of growth of capital expenditures and the rate of growth of the GDP.

Thus, also in Poland, along with the increase of the value of capital and the decrease of the distance to the highly developed countries, the significance of knowledge and innovations as the economic development factor will be increasing. For this reason the importance of R&D expenditure will increase as well. Still, economic growth will depend, especially during the next decade or even several decades, to a large extent on the increase of the volume of fixed capital and the associated absorption of the imported technological progress, and on the advancement of the economic reforms.

According to the model-based simulations of Witold Orłowski[13], the gradual increase of R&D expenditure, starting from the current level of 0.7% of the GDP to the level of 3.7% (observed currently in Finland) by the year 2040, may produce an additional increase of the GDP value by 8% in comparison with the case when the ratio of the R&D expenditure to the GDP does not increase. At the same time, this model shows that a relatively slight increase of the share of capital expenditure in the GDP (by just two percentage points) in relation to the current low level may bring – given that the share of expenditures on R&D in the GDP does not increase – virtually the same percentage increase (by 7%) as the increase of the share of the R&D expenditure in the GDP by three percentage points at the end of the period analysed.

The overall conclusion can be reduced to the statement that the rate of our economic growth will depend to a large extent upon the way in which the macroeconomic and the sectoral policies will be capable to effectively accommodate both the paradigm of the increase of innovativeness of the economy and the real conditions while stimulating at the same time the propensity to invest and the propensity to innovate.

The matter of fundamental importance is that the politicians fixed on the paradigm of increase of innovativeness and production growth, serving some vague idea of progress, must not lose from their perspective the real people and their real situations. They ought not forget somewhere the most important objective, after all, that is – the improvement of the living standards of all the citizens. There are limits to the rate of change, directed towards the economic advance, which cannot be exceeded without giving rise to social pathologies. The

[13] see Orłowski

policies that overlook this aspect may lead to the circumstances "worse even than the backwardness that they are meant to remove"[14].

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[14] Pomian, p. 51