ECONOMIC VALUE OF UKRAINIAN POLICY ON STANDARTIZATION IN THE CONTEXT OF EURO INTGRATION PROCESS

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Abstract.

The economic impact of standardization in the context of euro integration process is considerate in this article. The standards are the instrument of assistance trading development in not only commodities but also services, in the modern global world, and they also promote integrations of countries in the world economic system. Production function Cobb-Douglas and official statistics and data of Patent Foundation are used in this article. Our study shows that the impact of standardization is about 0.7% of the GDP. The urgency of this problem for Ukraine is determined.

Keywords*: Standardization, Economy Efficiency, Ukraine.*

JEL Classification*: F10, F15, F40*

INTRODUCTION

Policy on standardization is one of important factors and prefaces of the Ukrainian integration to the system of world economy.

In general, international practice testifies that principle task is a approach of accommodation about mutual confession certificates of accordance commodities, and also harmonization of countries standards, and wide collaboration between the statistical departments of countries which trade and carry out co-operation and realize other forms.

An important function of standardization is the unification of the state economic parameters of international standards aimed at optimizing of the specialized production of exports, preventing of low-quality products inflow.

Economic efficiency of standardization confirmed by its wide distribution, since the nineteenth century. Standards operate on the international trade in three ways. They act as a form of non-price comparison, they help to improve performance because they provide information about the quality; and international standards can also increase the potential for international trade, improve compatibility, product information and measurements.

Recent researches done in Europe that the standards rendered a positive impact and played an important role in improvement of the labour productivity.

Through standardization increases profitability by growing competitiveness and the possibility of rising prices for quality products. And thanks to the use of quality management system it is possible to reduce the cost of production competitive products and optimize costs.

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Financial and economic benefits from the implementation of standardization policy are: increase of profitability; increase in income; costs; reduce budget execution; improvement return on investment; improvement of competitiveness, optimal use of resources.

Standardization assists realization of rational organization and competent management of various sectors. It affects the development of the economy as a whole in the country and in certain industries.

The author made a first attempt to estimate the cost-effectiveness of Ukrainian standardization. The mandatory certification is operated in Ukraine previously.

Article consists of three parts: cover the literature review; analysis of selected macroeconomic indicators for Ukrainian; model specifications and the results of applied model.

1. COVER THE LITERATURE REVIEW

The problem of scientific evaluating of the effectiveness standardization policy has been reflected in numerous foreign and domestic literatures. Among the scientific works in which the theoretical approaches for determining of the economic efficiency of standardization, we can note national scientists – L. Kyrichenko, N. Merezhko (2010).They propose classification of economic efficiency types for better understanding of the standardization nature, correctness of economic calculations and using the developed methods in practice. R. Bychkivskyy , P. Stolyarchuk (2004) suggest methods of qualitative assessment and quantitative evaluation of the economic efficiency of standardization. For the evaluation of profits from standardization they offer direct or mediated methods

Russian scientists – L. Bezfamilna, L.Sokolov, V. Rezchykov (1988) offer to devide the methods for determining the economy efficiency of standardization into two groups: methods for calculating the efficiency of standardizations production and methods for calculating of the efficiency of general technical, organizationally and methodical standards thus take into account the life cycle of production.

The special attention should be paid to works of foreign scientist. Instead, ever since R. Solow (1979) carried out his empirical work factor are considering has taken the forefront: human knowledge. Solow was able to show that not only were the quantitative increase of capital and labour important for the US economy, but above all the qualitative improvement of labour and capital through technical progress leads to sustainable economic growth. It is extremely difficult to quantify these qualitative components – referred to as »total factor productivity (TFP) « in growth economics – in empirical investigations.

Economists must therefore identify and gather data that approximates the generation of new knowledge on the one hand and the dissemination of this knowledge on the other.

K.Blind, A. Jungmittag, A.Mangelsdorf,(2000) that investigated the impact of standards on economic development, thanks to the improvement of development (diffusion) of technological knowledge. They proved that the standards carries out a stable impact on economic development at the level for 0.7-0.8% of GDP. This contribution standards of

economy growth was 0,9% - Germany, 0.8% - France, 0.3% - UK. However, the publications of recent years influence of standards on the economic development Ukraine in the context of European integration processes were not investigational.

## 2. ANALYSIS OF SELECTED MACROECONOMIC INDICATORS FOR UKRAINIAN

In order for companies in national economies to be able to produce goods and provide services (output), they must have access to the necessary production factors (input). In classical economic theory since the time of Adam Smith and David Ricardo three factors are considered: labour, capital and land. The significance of land in terms of agriculture is of secondary importance as a production factor, however, it cannot increase indefinitely

In general – and for this study, specifically – the number of patents is used to describe the generation of new knowledge within Ukraine, and the number of (technology) license payments abroad is used to describe the import of knowledge from other countries. Figures 1and 2 shows the development of both indicators from 2008 to 2013. It is shown that the number of patents has decreased since 2008, where as the number of license payments for knowhow from abroad continued to increase throughout the same time period. It means that Ukraine is becoming increasingly reliant on inventions from abroad. The volatility of license payments over the last two decades can be explained by the great significance of multinational companies for research and development activities. Whether or not a transfer of technical knowledge occurs within these companies doesn't depend only on the actual services provided, but also on accounting practices, i.e. the taxation of profits domestically or abroad. However, a precise analysis of internal knowledge flows within companies cannot be carried out due to non-disclosure issues.

Figure 1. The number of patents in Ukraine 2008-2013.
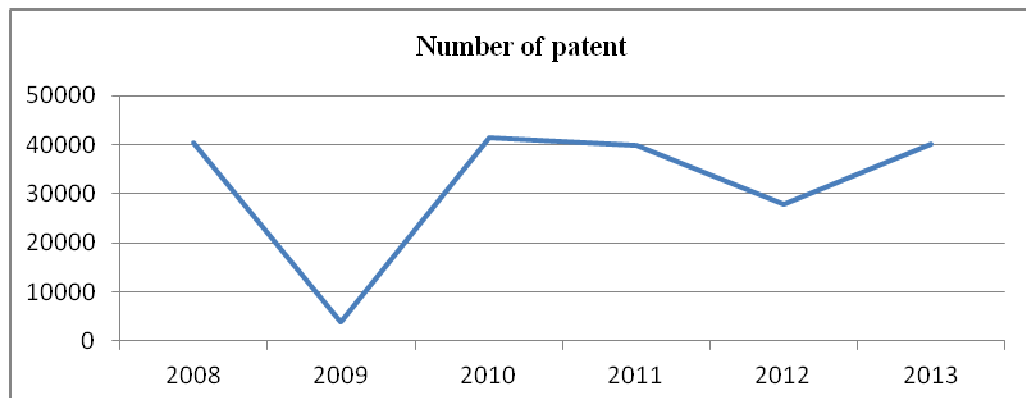
Reference: State service of intellect property in Ukraine,http://sips.gov.ua/ [Date Accessed: 10.05.2014].

Figure 2. The number of license payments in Ukraine 2008-2013.
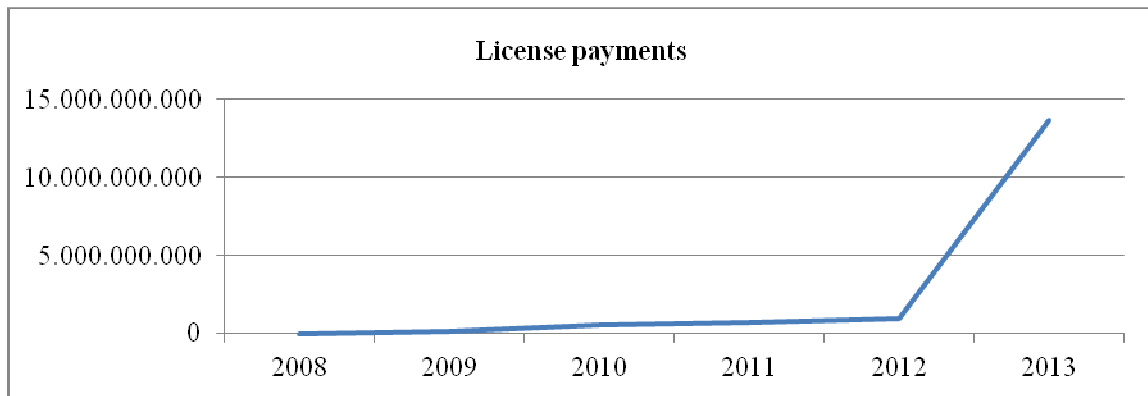
Reference: Governmental   service   of   export   control   in   Ukraine,
http://www.dsecu.gov.ua/control/uk/publish/article;jsessionid=3149C29630A468DA1A39798
A0532411C?art_id=37683&cat_id=35125 [Date Accessed: 10.05.2014].

For economic growth it is not only necessary that knowledge be generated or imported, it must also be disseminated or – in other words – diffused throughout the entire economy as rapidly and broadly as possible. The diffusion of knowledge – i.e. above all technical knowledge – is described in this empirical model by the number of standards. Standards are an excellent indicator of knowledge diffusion due to their following characteristics: As opposed to patents, standards are not normally subject to intellectual property rights and therefore any company can obtain them for a low price that covers the cost of the standardization process, which is carried out in non-profit organizations. Internal knowledge from companies is supplemented by knowledge from research and scientific organizations, as well as that from specialists with particular interests – e.g. consumer protection or occupation health and safety. Standards are developed which contain a considerable amount of technological knowledge in codified form. In our empirical analysis these standards are described as a body of documents, that is, new documents increase this body while withdrawn documents decrease it. This assumption is realistic because the consistency of the body of standards is continually being evaluated to avoid duplication of work and discrepancies.

Figure 3. shows the Fund of standards in Ukraine – including those of national, European and international origin – from 2008 to 2013. The graphic shows that this body continually grew throughout this time period. The sudden downturn in 2012 was a result of the simultaneous withdrawal without replacement is not current regulation.

**Figure 3. Fund of standards in Ukraine 2009-2013.**
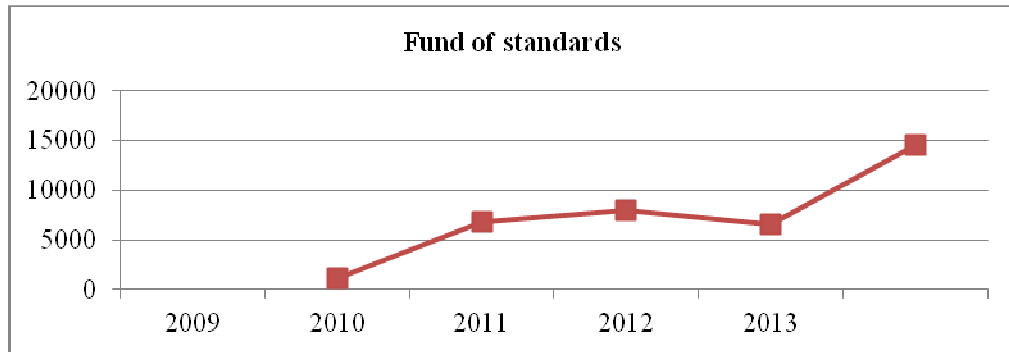
Both classic production factors – capital and labour – are depicted in Figures 4 and.6. The capital stock is the result of previous investments and during the current period contributes to the production of goods and services. Here capital stock is represented approximately by the gross fixed assets. The production factor "labour" is depicted here by the number of employed persons subject to social security contributions (labour force), excluding those working in the agriculture and forestry sector, in property services, or in domestic services. Figure 5 shows the total value of goods and services produced in Ukraine (gross value added) – this is the output that is empirically described by the input factors.

Figure 4. Labour force in Ukraine 2001-2012.

Figure 5. Gross value added in Ukraine 2001-2012.
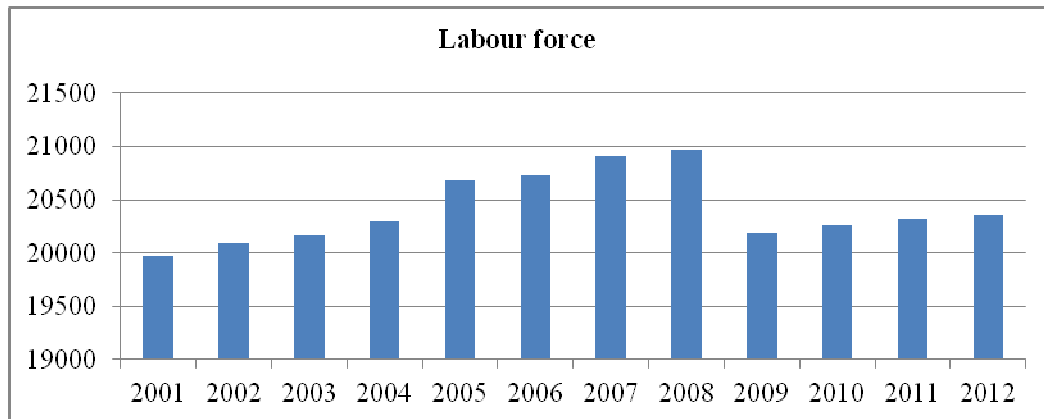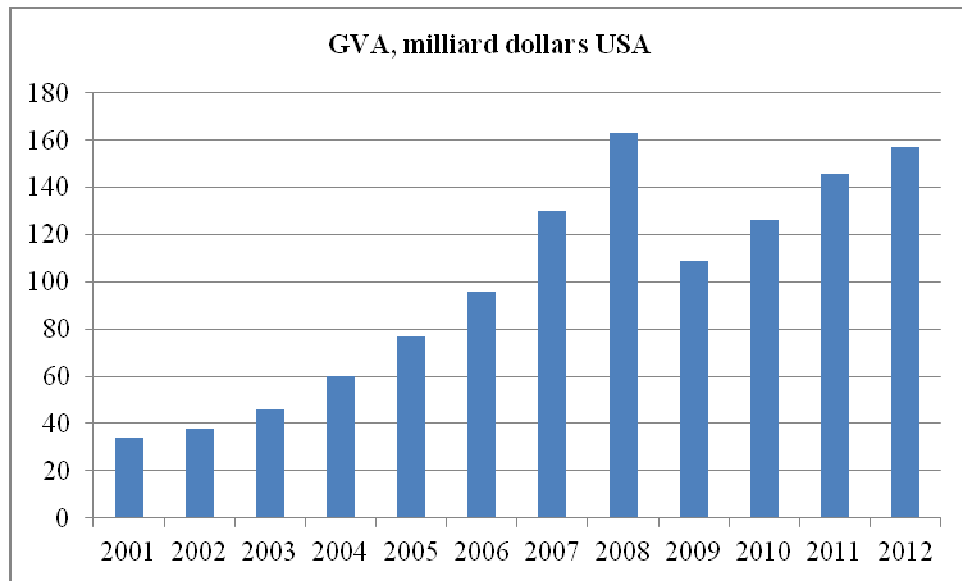
Reference: State Service of statistics in Ukraine, http://www.ukrstat.gov.ua/ [Date Accessed: 16.05.2014].

Figure 6. Capital stock in Ukraine 2001-2010.
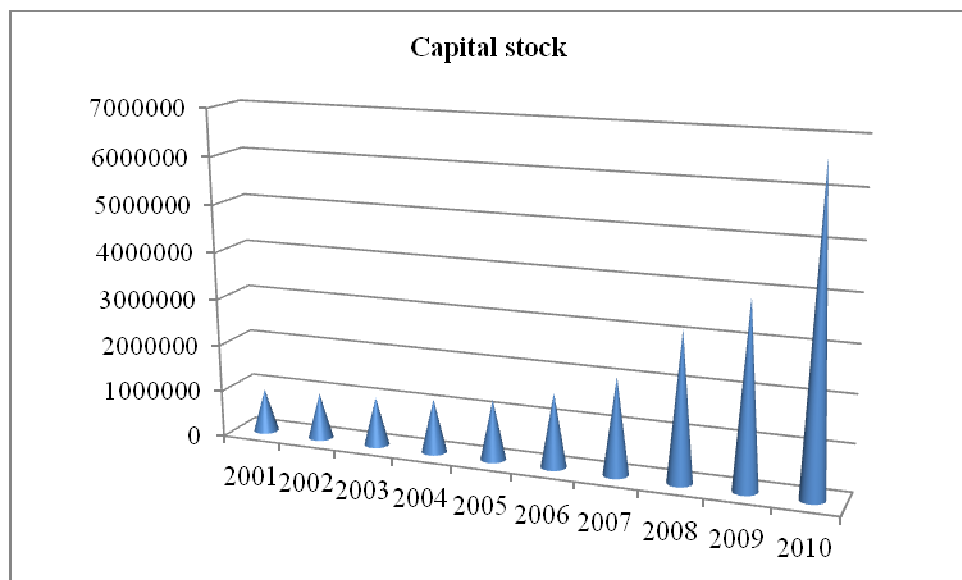
Reference: State Service of statistics in Ukraine, http://www.ukrstat.gov.ua/ [Date Accessed: 16.05.2014].

3. MODEL SPECIFICATIONS AND THE RESULTS OF APPLIED MODEL.

The first step in the empirical calculation of the economic benefits of standardization is to set up a production function that encompasses the entire business sector. This function describes the relationship between overall economic output, i.e. the gross value added and/or gross domestic product, and the input factors capital, labour and technical progress.

The Cobb-Douglas production function takes the form:

$$Y(t) = A(t)\big[F\big(K(t), L(t)\big)\big] \quad (1)$$

Where Y(t) is the total economic production over the time period t, K(t) is the capital input over the time period (t) and L(t) is the size of the workforce (labour input) at the time (t). However, the Cobb-Douglas production function is characterized by the so-called "diminishing returns", that is, although economic growth continually increases with increasing capital and labour input, the magnitude of this increase diminishes over time.2 This effect is counteracted by technical progress, or "total factor productivity (TFP)", A(t). Even if labour and capital remain constant, there is still economic growth as a result of technical progress. The more technological knowledge exists within the companies of a particular country, the greater that country's technical progress will be. This means that economic growth is not solely dependent on the inventions of a few companies, and also that technological knowledge disseminates widely among as many companies as possible. In mathematical terms, technical progress A(t) is a function of technological knowledge Z(t).

$$A(t) = F\big(Z(t)\big)$$

Technical progress comprises the following three factors:

* ❖ Technological knowledge generated in Ukraine,
* ❖ Technological knowledge imported from abroad,
* ❖ The diffusion of this technological knowledge.

The benefits of standardization for economic growth are thus generated through the dissemination of technological knowledge among as many companies as possible. As a result, the innovative strength of the national economy increases and the rate of technical progress rise. It in turn counteracts the effect of diminishing marginal returns of capital and labour and leads to sustained economic growth. In the next step, we take the logarithm of both sides of equation (1), transforming the initial non-linear equation into the simplified linear equation (2). This also has the advantage that the coefficients or elasticity resulting from the regression – these are the Greek letters in equation (2) – show what effect a1% increase of a variable – here the Latin letters – would have on economic growth y(t). The resulting equation (2) is the starting point for the following simple linear regression.

$$y(t) = a + \alpha\, k(t) + \beta l(t) + \gamma\, pat(t) + \delta\, ex(t) + \varepsilon\, std(t) +_{;} \zeta\, dum(t) + u(t) \quad (2)$$

Where y(t) is the economic growth – the variable to be explained – which is described by means of the independent variables on the right side of the equation.

Here:

❖ k(t) are the gross fixed assets (capital),
❖ l(t) is the number of persons employed (labour),
❖ pat(t) is the number of patents,
❖ ex(t) is the license expenditure, and
❖ std(t) is the number of standards.

In addition to economic effects such as innovative strength or the dissemination of knowledge, a national economy is naturally also affected by external political factors which the model needs to take into consideration. These additional effects, such as the 2008 crises, are negated by means of dummy variables, so that the effects of the economic variables can be described correctly. In the model such additional effects, or »special factors«, are represented by dum(t). The variable u(t) is the error term of the model representing all effects which lie outside the model.

Measuring the impact of standardization on the economy following equation (Canadian Council of Standards, https://www.scc.ca/en/standards/applying-standards):

$$TFP(t) = c + dknor_t + ekbrev_{t-2} + \sum_i^n f_i x_t + \varepsilon_t \qquad (3)$$

Thus the growth of technical progress can be explained by the vitality of the portfolio of standards (knor), scientific and technological knowledge (kbev) and other factors.

After the regression model has been specified, the data is entered into the statistical software and the regression analysis is carried out on the basis of past results. The elasticity for capital and labour is set at 0.3 and 0.7, respectively.

Table 1 shows the results for the parameters describing technical progress (patents, licences and standards) and for the special factors (such as the economic crisis in 2008 etc.)

The positive coefficients show that patents, licence expenditure and standards have a positive impact on economic growth, while the negative coefficients for the special factors have – as expected – a negative impact. The t-statistics in the last column indicate the probability at which the null hypothesis (that is, the variable has no influence) can be rejected. For instance, a t-statistic greater than 1.96 means that at a significance level of 10 percent the variable has a significant impact on economic growth.

Table 1. Coefficients of payments of technical progress and special factors.

	Coefficient	Standard deviation	t-statistics
Constants	-9,43	0,67	-13,99
Patents	0,34	0,05	6,37
Licenses	0,17	0,01	8,78
Standards	0,18	0,02	7,9
Economic crisis 2008	-0,03	0,01	-2,82

The positive coefficient shows that standardization has a positive impact on growth. The larger the standards collection is, the greater the effect in the form of the diffusion of technological knowledge will be, and the greater will Ukraine economic growth be. The impact of standards is roughly the same as the effect of knowledge imported from abroad (licenses) and half as great as the effect of innovations (patents). Thus, for the enter period under investigation, 2007 to 2012, it has been empirically shown that standardization has a significant impact on economic growth in Ukraine.

Table 2. Contribution of various production factors in economic growth of Ukraine (%)

	2007	2008	2009	2010	2011	2012
Capital	1,10%	0,90%	0,90%	0,90%	0,50%	0,30%
Labour	0,60%	-0,40%	1,20%	-0,70%	0,60%	0,70%
Patents	0,60%	1,00%	0,00%	-0,70%	-0,60%	-0,60%
Licenses	0,30%	0,50%	2,00%	1,70%	0,10%	0,50%
Standards	1,20%	0,70%	0,60%	0,70%	0,80%	0,70%
Special factors	-0,20%	-1,30%	0,01%	0,01%	1,10%	1,10%

Table 2 show the contribution to growth of production factors over 2007-2012 periods. As regards standards, the results show an increasing contribution throughout the studies years. After crisis period Ukraine reunification the values stabilize at 0.7 to 0.8%.

Using the econometric results presented Table 2, we can estimate the overall impact on total factor productivity (TFT) gives in Table 3.

Table 3. Impact of standards on TFP.

Years	Growth of GDP 1=2+3	Contribution of factors (K+L) 2	Total Factor productivity (TFP) 3=4+5+6	Stock of standards 4	Stock of patents 5	Special Factors 6
2007	3,30%	1,70%	1,60%	1,20%	0,60%	-0,20%
2008	0,90%	0,50%	0,40%	0,70%	1,00%	-1,30%
2009	2,71%	2,10%	0,61%	0,60%	0,00%	0,01%
2010	0,21%	0,20%	0,01%	0,70%	-0,70%	0,01%
2011	2,40%	1,10%	1,30%	0,80%	-0,60%	1,10%
2012	2,20%	1,00%	1,20%	0,70%	-0,60%	1,10%
2007-2012	1,95%	1,10%	0,85%	0,78%	-0,05%	0,12%

In Table 3 gives, impact of standards for the period 2007-2012 on TFT (and consequently on the total growth of the Ukraine economy) is 0,78% per year on average.
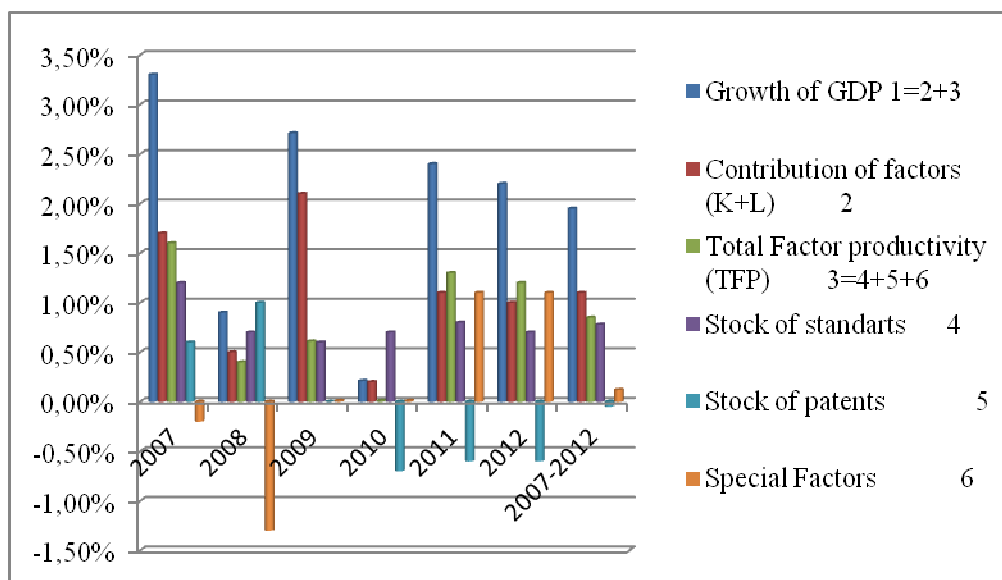
Figure 6. The impact of standards of growth in Ukraine (yearly average)

Figure 6. shows that the impact of standards has been uneven for the study period. Thus the impact of standards of growth Ukraine in 2007 year was high, there is noticeable deceleration of general growth in 2008-2009 years. In the last few years the level of traditional factors of growth grew and recommended payment of knowledge (what is measured the number of patent requests).

CONCLUSION

The conducted research is shown by economic impact of standards on Ukraine economy. It is very important, especially presently in the period of deepening of euro integration processes. As harmonization of policy standardization is instrumental in integration of Ukraine to EU.

The macroeconomic analyses revealed that standards have a positive effect on technological change and innovation. Ukrainians standards collection its basis has a positive effect on exports and imports. This corresponds to the positive link between intra-industry trade and technical rules.

A prerequisite for international involvement is active participation in standards work at a national level, and businesses must be convinced of the benefits of this as an effective export strategy.

As a result of empirical investigation, we saw that standards have a stabilizing effect on growth corresponding in Ukraine to about 0.7% to 0.8% of the gross domestic product.

With its broad-based dual approach, this study produced numerous new insights into the economic effects of standardization, giving results which are unique in the international context.

Our results can be used as the basis for a strategic discussion regarding the future of standards work. All those who are directly or indirectly affected by standards now have access to information which can help them define their future standardization strategies. First, Ukranian standards bodies can use our results to identify areas which could be improved in order to respond to current developments, and those areas with which their customers are satisfied. Furthermore, the interested parties now have a broad overview of the different effects of standardization, and can use this knowledge to shape their strategies. Overall, the study can act as long-term motivation for a strategic discussion of the future of standardization.

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