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(Un)finished transition. Stock of knowledge in Poland, 1924–2012¹

*Jacek Wallusch*²

Abstract: Technological underdevelopment of the Polish economy has been remarkably persistent. In this paper I focus on the stock of knowledge, approximated by the 10% depreciation rate of accumulated patents granted in Poland, to show its long-term structure and to distinguish its growth phases. I test for long memory and run a Markov-switching autoregressive model. The stock of knowledge is found to be non-stationary and mean reverting. I also discover two well-separated regimes representing slower and faster changes in the stock of knowledge. The latter regime characterises the years between the 1920s and mid-1950s (interrupted by the Great Depression and World War II), mid-1970s and the period after accessing the EU.

Keywords: patents, transition, stock of knowledge.

JEL codes: N34, O30, P51.

Introduction

For Polish economic history, the time span between the 1920s and 2010s marks the final stage of the great transition from feudalism to capitalism. A transition interrupted for almost half a century by centrally-planned socialism. Ironically, socialism was more efficient in speeding up industrialisation than the interwar governments but did not get rid of post-feudal habits, substituting officials of the Polish United Workers Party for the Polish gentry. The time span of 1920s–2010s also marks the final stage of technological underdevelopment. Its origins can be traced back to the 17th century. The lack and waste of capital (especially human capital) explains the technological underdevelopment and its remarkable persistent. Even during the first 15 years of transition this characteristic has changed only slowly.

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Recent events show that the technological gap has become considerably smaller. Does it mean that the catching-up is successfully over? Economic history has registered at least three similar periods since the 1920s. The initial boom of the 1920s, the fast industrialisation of the early 1950s and the socialism-with-a-human-face of the early 1970s have noticeably sped up technological development. The speed ups ended quickly, and the Polish economy has failed to achieve a long-lasting technological development.

Does the historical background overshadow recent successes? A long-term analysis presented in this paper calls for caution. Focusing on the stock of knowledge (approximated by the accumulated number of granted patents) in Poland between 1924 and 2012, I investigate its long-term structure and distinguish its growth phases. Since the accumulated stock of knowledge returns to its long-run average, the persistence of technological underdevelopment is not surprising. More importantly, the fast technological catch up caused by the accession to the EU might be soon over. The last time the Polish economy enjoyed a similar speed-up was in the 1970s. What followed this short period were 25 years of a decreasing stock of knowledge. Let us hope that *this time is different*.

The remainder of this paper is as follows. In the next section I describe the historical background of Polish technological underdevelopment. Section 3 presents the accumulated stock of knowledge approximated by the accumulated number of patents with a 10% yearly depreciation rate. Sections 4 and 5 show the results of long-memory tests and Markov-switching autoregressive model estimations. The accumulated stock of knowledge is a mean reverting process. I found two well-separated regimes, first representing faster changes in the accumulated stock of knowledge, second characterised by slower changes in the stock of knowledge. Last section concludes.

1. An inherited underdevelopment

The Polish economy during the interwar period has struggled with many structural obstacles. Low capital level, considerable regional disparities, unsolved social problems and unfinished social reforms, as well as the constant threat of military confrontation with neighbouring countries did not allow Poland to transform into an industrial country. Nor have the obstacles allowed Poland to overcome technological underdevelopment.

Baten and Labuske [2004] noted that Poland had belonged to a group of countries with high primary schooling rates combined with average patenting activity. Indeed, the number of patents granted in Poland during the interwar period has never exceeded 20% of the patents granted in Germany (see Figure 1), the educational gap between Western Europe and Poland has fast become smaller but technological progress lagged behind. Agriculture offered the best example [Roszkowski 1989]. Compared to 1921, the number of ag-

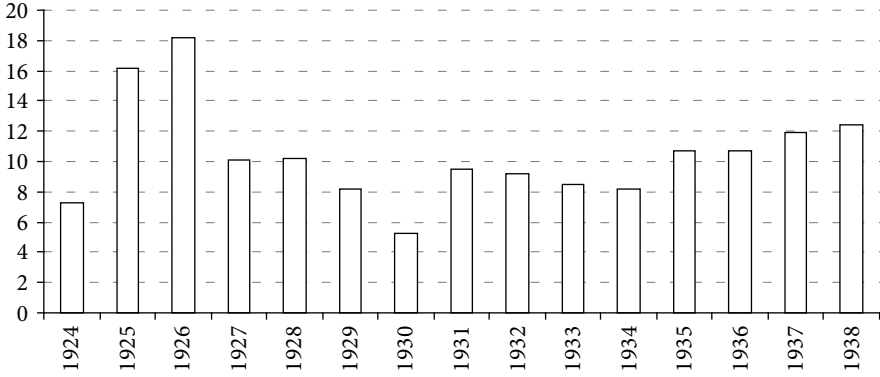


Figure 1. Patents granted in Poland compared with patents granted in Germany (%)

Source: Own estimations based on statistisches reichsamt, Główny Urząd Statystyczny Rzeczypospolitej Polskiej, Wiadomości Urzędu Patentowego, various years

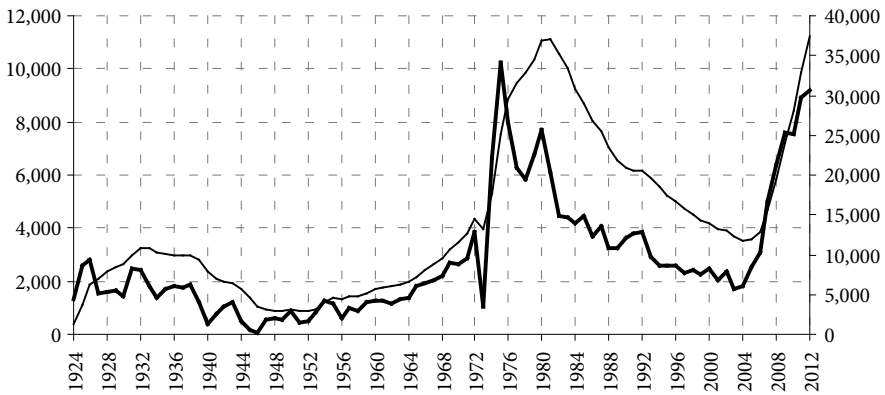


Figure 2. Patents granted and the accumulated stock of knowledge in Poland (1924–2012)

Source: GUS and Wiadomości Urzędu Patentowego, various years

ricultural primary schools and high schools in 1936 has doubled, whilst the number of students has increased from 1900 to 5000. A similar pattern has applied to university education. Improvement of the soil, the use of fertilisers, and mechanisation, however, stopped or even decreased. The number of patents granted in Poland (1924–2012) is presented by Figure 2.

Technological development also suffered from regional disparities. The technological centre moved from southern voivodeships to Warsaw. Wolf [2007] explains this tendency by the installation of universities in Warsaw and elsewhere, but strong centralisation might be considered as well. Another aspect of regionalisation is connected to the influence of German and Austrian tech-

Table 1. International comparison of granted patents in 1936

Country	Number of patents	% of patents granted in Poland
Latvia	113	6.3
Estonia	155	8.7
Bulgaria	253	14.1
Yugoslavia	712	39.8
Romania	1,099	61.4
Poland	1,791	100
Hungary	2,009	112.2
Czechoslovakia	3,650	203.8
Austria	3,800	212.2
Germany	16,750	935.2

Source: Schlag nach! and own calculations.

nology on Polish industry. For instance, in 1924 the share of all patents granted to German residents slightly exceeded 40%. (This picture has not changed much, as in 2005 the share was equal to 33%). The entire Central and Eastern Europe, however, shared this characteristic. Even Czechoslovakia, the technological and economic leader among the newly-established countries in Central Europe with a number of granted patents two times larger than Poland, lagged far behind Germany (see Table 1).

After the devastating war, the Polish economy once again struggled with underdevelopment. Ironically, industrialisation, induced by market forces in the West, has been performed by anti-market hardliners. Even more ironically, the development of technology became an integral part of plans at every level. A plan of technological development at the company level was strictly connected to central administration plans and '*constituted an organic part of the technological-industrial-financial plan*' [Przewodniczący 1952]. Obviously, the socialist period had its technological highlights. The USSR handed patents and licences to Poland free of charge [Minc 1950]. Technological progress was the central issue of the 4th plenary session of the Central Committee of the Polish United Workers Party in 1969. New R&D centres and institutes were created. A new government in the early 1970s started a rapid, yet short-lasting, technological boom.

In socialist practice, however, science was never a factor of economic development. The co-operation between science and industry failed, the complexity of research was questionable, and the percentage of implementation was dramatically low [Jeziński and Petz 1980]. The systematic, structural problems

connected to planning, determined the inability to catch up at both the macroeconomic and microeconomic level [Winiński 1988].

Pajestka [1983] noted that economic policy and planning in Poland had almost exclusively focused on economic development through productive capital, investment and employment. Science and technology became an empty platitude without any application to planning practice. But the malady went even deeper and infected the microeconomic structure of centrally-planned economies. Winiński [1988] presented a detailed explanation at the micro-level:

Every innovation, technical or managerial, is introduced into the already existing productive facilities; and personnel operating these facilities are interested in implementing plan targets, first and foremost for the present planning period. [...] Even if innovation would result in increased output, the risk associated with introducing it – a risk of too long a period of technology absorption or resource reorganisation and resultant disturbances to production schedules – would cause managers generally to avoid such methods of expansion. In addition [...], increased productivity, if successful, would result in having the plan targets raised in the next planning period [...], so an extra effort could even be counterproductive, for it would be more difficult to implement the next year's plan and to get related premium and bonuses (pp. 17–18).

Moreover, the centrally-planned system created specific microeconomic barriers to technological imitations. The scanning of the technological horizon as well as the decisions on the implementation of imitation were made by ministerial bureaucrats outside the targeted enterprise [Winiński 1988]. Even the Polish Patent Office multiplied bureaucratic boundaries [Roszkowski 1995].

The most symptomatic story on Polish inventors is the celebrated case of Jacek Karpiński,³ a pioneer in computer engineering, whose computers were way ahead (by approximately one decade) of their time. Karpiński described the Institute of Mathematical Machines as a bastion of ignorants and spongers unable to build a modern computing machine. Due to overemployment and costly administration, the Institute had generated a one billion (zloty) deficit every year. Managed in a manorial fashion, the Institute promoted scientists with limited creativity, yet with an obedient attitude to managerial positions.

The Polish economy under transition inherited more than just an inflationary overhang or an industry incapable of fast, market-oriented changes. Simple remedies had ended the transition recession but wage structure and R&D spending have placed Poland far behind the G7-like countries. Figure 3 depicts the regional distribution of R&D spending in Poland (2002–2012). The horizontal axis presents the *per capita* intramural expenditure on R&D (con-

³ This paragraph is based on Adam Kochajkiewicz's [2012] paper.

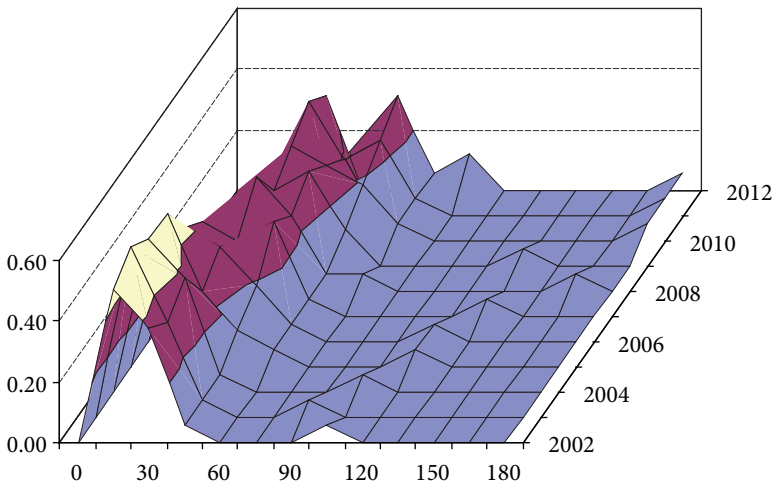


Figure 3. Distribution of regional R&D spending

Source: Own calculations based on BDL and NBP, various years

stant prices, 2002) in voivodeships expressed in Euros. The median spending in 2012 was equal to 52.20 Euros *per capita*. The distribution is right-skewed and highly leptokurtic. The latter characteristic is produced by Mazowieckie, a voivodship that has stimulated Polish technological development since the mid-1920s. The regional disparities have also not changed as the standard deviation for the spending in 2012 was 40.01.⁴ Last but not least Figure 2 provides yet another argument that the historical perspective might, in fact, be helpful in analysing current events. Comparing the numbers for 1924 and 2004, the picture has not changed much.

2. Quantifying the stock of knowledge

Studying long-term economic growth in transition countries is very challenging. Wars have changed borders (and substantially reduced the primary sources); politics has changed economic systems and social structure. There is also a technical limitation: different economic systems have developed different measures of economic activity. Attempts at unifying the measures have been made but even the most notable by Maddison, Bolt, and Van Zanden did not consider some important socialist specificities.⁵

⁴ Compared to the year 2002, however, the disparities are getting smaller. The mean spending in 2002 was equal to 22 Euros (15.56 median) with the standard deviation equal to 23.12 Euros.

⁵ It is hard to believe that the GDP *per capita* in Poland was higher in 1978 than in 1996. It is virtually impossible, however, to construct a measure that will quantify shortage, time spent

Similar problems arise when a long-run measure of the stock of knowledge is considered. Different systems have generated different needs and priorities, ranging from heavy industry in the early socialist era to digital technologies in recent times. Continuity is also an important factor. Therefore, the only available measure is the number of patents. The continuity condition is satisfied. One may also argue that patents depict the fluctuating needs and priorities.

The yearly information on patents granted provides useful insight into the stock of knowledge but a measure should also focus on the accumulation path of knowledge. Therefore, I decided to apply a similar method as presented by Streb, Wallusch, and Yin [2007]⁶, and I calculated the accumulated stock of knowledge assuming a 10% yearly depreciation rate. I used the data presented by GUS and *Wiadomości Urzędu Patentowego* (a journal issued by the Polish Patent Office). For the period 2005–2012 I combined foreign and domestic patents granted with the European patents validated in Poland.

The solid line in Figure 2 presents the results. The accumulated stock of knowledge obtained is smoother than the original series (bold line, left axis). The peaks in patenting activities are slightly shifted. For instance the largest number of patents granted occurred in 1975, whilst the accumulated stock of knowledge reached its maximum in 2012. The dynamics of the Polish stock of knowledge is surprisingly similar to those reported for Germany, France, and the UK [Diebolt and Pellier 2009]. In the long run the number of patents in these countries returned to the level observed in the 1920s. The peak also occurred in the early 1970s.

3. Long term structure of the accumulated stock of knowledge

The impact of technology shocks on economic fluctuations remains an unsolved puzzle. For the early RBC theorists [e.g. Kydland and Prescott 1982], the business cycle was a technology-driven phenomenon. Their opponents [for an overview see Gali and Rabanal 2005] claim that the demand factors are in fact of vastly more importance to movements in output and labour input. Whatever the conclusion regarding the role that technological changes play in economic activity, it is beyond any doubt that the stock of knowledge should be integrated. In other words, a shock in technology should generate a permanent response of other variables. Even if this feature is rooted in the RBC literature [Nelson and Plosser 1982], the unit root is a universal characteristic of the innovation series, which might be traced back to Kalecki or

in queues, and the poor quality of consumer products in terms of GDP *per capita*. Therefore, the updated Maddison database [Bolt and Van Zanden 2013] is the best available approximation of long-term economic activity in Central Europe.

⁶ Streb, Wallusch, and Yin [2007] followed the approach stating that technological knowledge should be accumulated over time like real capital (see the discussion on page 212).

Marx. Changes in technology increase productivity, reduce costs, and increase consumption. Unlike nominal shocks producing transitory effects, technology shocks elevate the system to the new equilibrium level. Thus, the stock of knowledge should be integrated.

What if the economy suffers from unfinished social reforms? What if the economy is enslaved? What if the economic system is unanimously evaluated as ineffective? What if the politicians replicate the same errors that their political ancestors had committed? Is it possible to observe any permanent effects if there is very little economic continuity even within the same political system? In an environment like this the series might be non-stationary but the case of infinite memory cannot be taken for granted. Testing for long memory in a historical time series analysis is not a novelty. In a study addressing similar problems, Diebolt, Guiraud, and Monteils [2003] performed a detailed long memory analysis on education and economic growth series in France and Germany. Interestingly, the investigated time series showed a particular slowness of adaptation to a shock.

To test for long memory I used the Geweke and Porter-Hudak [1983] estimator as well as the Robinson and Henry [1999] estimator. Since the estimation results depend on the chosen number of periodogram points it is reasonable to present the results obtained for various assumptions concerning the chosen bandwidth. Figure 4 depicts the estimated values of d -coefficient (bold solid lines) for different numbers of the periodogram points along with the \pm standard error confidence bands (dotted lines). Additionally, I marked the 0.5 and 1 levels to show the regions of long memory $0 < d < 0.5$, non-stationarity with mean reversion $0.5 < d < 1$ and unit root $1 < d$. The majority of the estimated coefficients fall within the interval between 0.6 and 0.8, suggesting that the stock of knowledge has indeed been non-stationary. The process, however, is found to be mean reverting.

This result is by no means surprising and is consistent with the visual inspection of both the original and accumulated stock of knowledge series. A mean reverting process exhibits shock dissipation and may be symptomatic of long-swing dynamics [Cheung and Lai 2001]. A short look at the series reveals four phases of different length but with a similar characteristic: after a take-off the system tends towards its very-long-run average. The latter term is non-technical but I believe it depicts, at best, the nature of technological changes in Poland. The first technological take-off was stopped by the Great Depression. The Second World War marked a turning point producing a disastrous drop in the inventory activity. Notice, however, that the early year of Nazi occupation resulted in an increase of patents granted. Łuczak [1976] stressed that the relatively high level of production in some branches in occupied Poland had resulted from new investments and from modernisation of technological process. The prolonged recovery eventually gave birth to the true industrial revolution in Poland. Symptomatically enough, communist industrialisation did not give

rise to technological expansion. The second take-off, this time of a much more spectacular dimension, was observed in the early 1970s. A global maximum was reached in the mid-1970s (original series) or early 1980s (accumulated series). Yet another stagnant period followed the take-off almost completely negating the effects of the early 1970s speed-up. Perhaps this phase is of a particular importance to economists and historians.⁷ As the socialist 1980s transformed into capitalist 1990s nothing has happened to the stock of knowledge. For almost a quarter of century the number of patents granted has decreased. The negative tendency was reversed by the accession to the European Union. The next few years will decide whether the economic systems in Poland (and in Europe as a whole) will be able to sustain the growth of stock of knowledge or it would validate Gordon Sumner's thoughts about history teaching (us) nothing.

4. There and back again. Distinguishing the growth phases of the stock of knowledge

The application of long memory models to the macroeconomic time series is rather limited. For the macroeconomic time series it is difficult to distinguish between $I(1)$ and long memory [Baillie 1996]. Interestingly, the $I(d)$ -like behaviour of a time series might be accounted for by the occasional breaks in mean [Bisaglia and Garolimetto 2008]. A look at the plotted series may raise suspicions that the estimations of the long memory coefficient are in fact biased. The non-stationary mean reverting properties of the accumulated stock of knowledge, however, are consistent with many qualitative observations described in the previous section.

Another fact behind Figure 1 is connected to the most intriguing problem in economic history, namely to the stages of economic growth. The ups and downs do not fully coincide with the phases of economic growth in Poland. In particular, technology fails to explain the GDP dynamics during the early stages of transition. Figure 5 presents the real GDP growth rate and the growth of the stock of knowledge after the year 1992. The bold line depicts the growth rate (left axis), whilst the dotted line shows the growth rate of the accumulated stock of knowledge (right axis). Prior to the accession to the EU a steady decline in the latter variable has been met by two episodes of economic growth and one recession. The transition boom of mid-1990s has originated from capital and labour force skills but has not been driven by changes in the stock of knowledge.

⁷ I am fully aware of the qualitative aspects of patents granted before and after 1990. As Winiecki [1988] "wrote what was new in an enterprise or even in a given STE [Soviet-type economies] is rarely new on the world market". I aim to elucidate, however, the quantitative side of technological progress. I therefore do not distinguish between patents required to produce – in words of Wojciech Charemza – red banners, tanks and barbed wire from those stimulating growth in market economy.

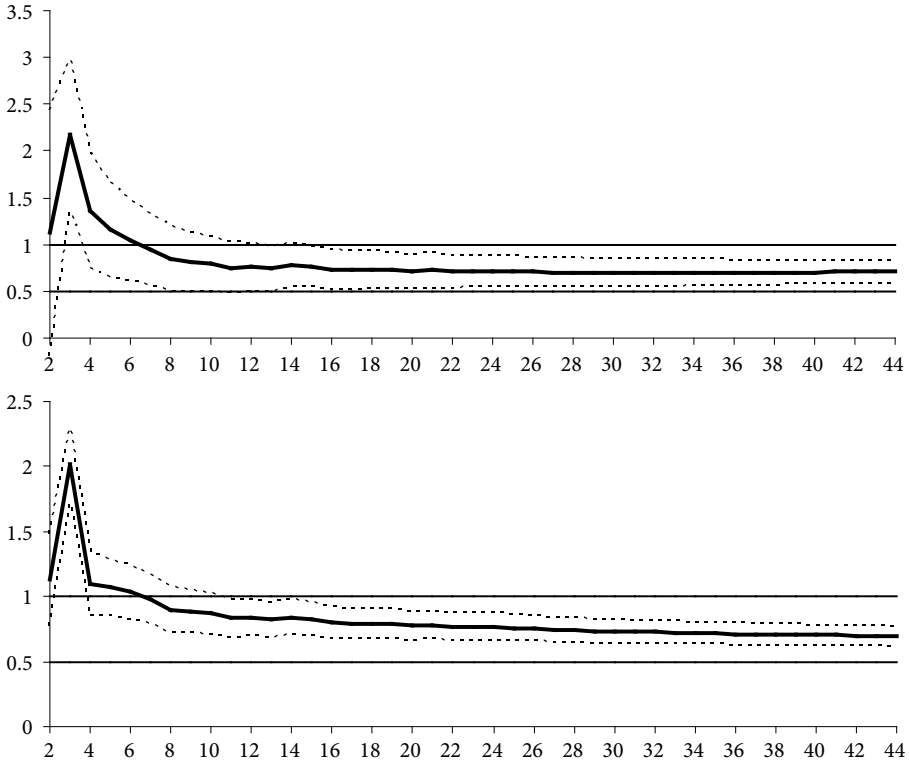


Figure 4. *d*-coefficients and number of periodogram points

Source: Own estimations

Since the link between the stock of knowledge and GDP growth was weak, I decided to focus on the dynamic properties of the growth of the stock of knowledge. To detect possible changes in its behaviour I applied the Markov-switching AR(1) allowing for regime switches in both autoregressive and the residual variance coefficients. I expected both parameters to vary considerably revealing phases of vigorous and slow changes characterised by higher and lower variances coinciding with smaller and larger autoregression. Table 2 summarises the estimation results⁸.

Indeed, I discovered two well-separated regimes with the following transition probability matrix \mathbf{P} :

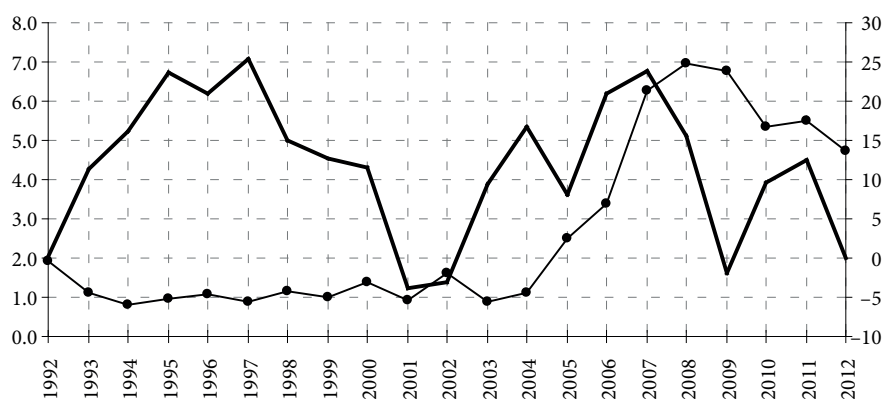
$$\mathbf{P} = \begin{bmatrix} 0.863 & 0.093 \\ 0.137 & 0.907 \end{bmatrix}. \quad (1)$$

⁸ I applied the feasible sequential quadratic programming algorithm. The recursions were started with the estimated probabilities. Robust standard errors were estimated. Strong convergence was achieved.

Table 2. MS AR(1) estimation results

Coefficient	Regime	Value	Robust std. error
AR(1)	1	0.559	0.066
	2	0.895	0.072
σ	1	0.107	0.020
	2	0.027	0.005
$P(r = 1 r = 1)$	–	0.863	0.117
$P(r = 1 r = 1)$	–	0.093	0.051

Source: Own estimations.

**Figure 5. Real GDP growth and growth of stock of knowledge, 1992–2012**

Source: GUS and own calculations

With a smaller autoregressive coefficient accompanied by a larger volatility of the residuals the first regime represents faster changes in the accumulated stock of knowledge. Figure 6 depicts the (smoothed) estimated probabilities of regime 1. The second regime is characterised by slower changes in the stock of knowledge. There are three periods corresponding to the regime 2: Great Depression and the slow recovery of late 1930s, a period between late 1950s and early 1970s, and almost 30 years between the wild 1970s and the moderate 21st century. The first and second periods are consistent with expectations and so is the fact that Poland has entered the transition period in regime 2. The surprisingly stubborn persistence of this regime between 1990 and 2005, however, is not.

The persistence originated in the socialist economy and can be traced back further than the 1980s. Old customs and habits die hard and technological development in Poland could not be regarded as an exception to this rule. An overregulated market created insufficient incentives for technological devel-

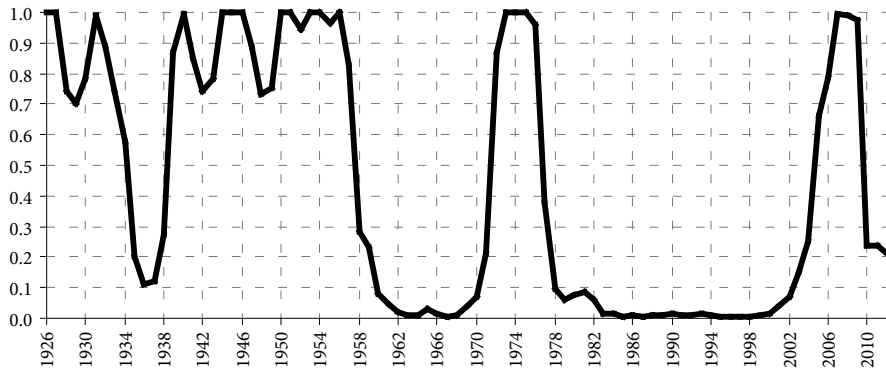


Figure 6. Estimated regime probabilities (regime 1)

Source: Own estimations

opment. Emigration deteriorated human capital. The university system was still more oriented on education than on research (let alone on co-operation with business) which completed the structural barriers for a faster growth of the stock of knowledge.

Despite many critical remarks and scepticism towards the European Union, the stock of knowledge in Poland has been growing faster than ever. Although the probability of staying in regime 2 decreases, there is a huge chance for a permanent upward shift in the long-run mean of the stock of knowledge.

Conclusions

Industrial expansion in countries with smaller, more rural manufacturers with less fixed capital requires technological efficiency [Inwood and Keay 2012]. Efficiency at both macroeconomic and microeconomic level, as the productivity growth depends on adaptation, improvement, and refinement [Nuvolari and Tartari 2011].⁹ Unfortunately, the Great Depression, the Second World War, and central planning have significantly diminished technological efficiency in Poland.

The search for long memory showed that the accumulated stock of knowledge in Poland is non-stationary and mean reverting. Temporary take-offs are possible and, in fact, observed, but in the end the stock of knowledge returns to its long-run average. Even if the number of patents in France, Germany, and the UK follow a similar pattern history matters again: a look at Table 1 and Figure 1 shows the considerable difference between the starting points for

⁹ Nuvolari and Tartari [2011] refer to the macro 'prototypes' and 'microinventions' but their conclusions may as well be applied to macroeconomics and microeconomics.

Germany and Poland in the interwar period. In other words, in Germany the level of the number of registered patents is almost 10 times larger than in Poland.

Since the accession to the EU Poland has enjoyed a rapid increase in the stock of knowledge. Capital shortage is slowly being overcome, new technologies are transferred. The probability of staying in a regime of fast increase in patents decreases but there is a huge opportunity for a permanent upward shift in the long-run mean of the stock of knowledge. A smart move, especially for economic and education policy, would be not to repeat the mistakes made in the past. History matters again.

References

- Baillie, R.T., 1996, *Long Memory Process and Fractional Integration in Econometrics*, Journal of Econometrics, vol. 73: 5–59.
- Baten, J., Labuske, K., 2004, *Technological Component of Human Capital and Its Determinants, in 51 Countries, 1880–1914*, mimeo.
- Bisaglia, L., Gerolimetto, L., 2008, *An Empirical Strategy to Detect Spurious Effects in Long Memory and Occasional-Break Processes*, Communications in Statistics – Simulation and Computation, vol. 38, no. 1: 172–189.
- Bolt, J., Van Zanden, J.L., 2013, *The First Update of the Maddison Project; Re-Estimating Growth Before 1820*, Maddison Project Working Paper, no. 4.
- Cheung, Y.-W., Lai, K.S., 2001, *Long Memory and Nonlinear Mean Reversion in Japanese Yen-Based Real Exchange Rates*, Journal of International Money and Finance, vol. 20: 115–132.
- Diebolt, C., Guiraud, V., Monteils, M., 2003, *Education, Knowledge, and Economic Growth. France and Germany in the 19th and 20th Centuries*, Peter Lang GmbH, Frankfurt am Main.
- Diebolt, C., Pellier, K., 2009, *Analyse Spectrale de l'Evolution de Longue Periode des Brevets en France, en Allemagne, en Grande-Bretagne, aux Etats-Unis et au Japon (17^{eme}-20^{eme} siecles)*, Brussels Economic Review, vol. 52, no. 3/4: 341–354.
- Galí, J., Rabanal, P., 2005, *Technology Shocks and Aggregate Fluctuations: How Well Does the Real Business Cycle Model Fit Postwar U.S. Data?*, in: Gertler, M., Rogoff, K. (eds.), NBER Macroeconomics Annual 2004, vol. 19: 225–288.
- Geweke, J., Porter-Hudak, S., 1983, *The Estimation and Application of Long Memory Time Series Models*, Journal of Time Series Analysis, vol. 4, no. 4: 221–238.
- Inwood, K., Keay, I., 2012, *Diverse Paths to Industrial Development: Evidence from Late-Nineteenth-Century Canada*, European Review of Economic History, vol. 16: 311–333.
- Jezierski, A., Petz, B., 1980, *Historia gospodarcza Polski Ludowej 1944–1975*, PWN, Warszawa.
- Kochajkiewicz, A., 2012, *Działania służb specjalnych Polski Ludowej wobec inżyniera Jacka Karpińskiego w latach 1950–1990*, Przegląd Archiwalny Instytutu Pamięci Narodowej, vol. 5: 247–295.
- Kydland, F.E., Prescott E.C., 1982, *Time to Build and Aggregate Fluctuations*, Econometrica, vol. 50, no. 6: 1345–1370.

- Łuczak, Cz., 1976, *Basic Assumptions of the Economic Policies of Nazi Germany and Their Implementation in the Occupied Poland*, *Studia Historiae Oeconomicae*, vol. 11: 193–213.
- Minc, H., 1950, *Sześćoletni Plan Rozwoju Gospodarczego i Budowy Podstaw Socjalizmu w Polsce*, referat wygłoszony na V Plenum Komitetu Centralnego, 15 VII 1950 r., *Nowe Drogi*, no. 4: 8.
- Nelson, C.R., Plosser, C.I., 1982, *Trends and Random Walks in Macroeconomic Time Series. Some Evidence and Implications*, *Journal of Monetary Economics*, vol. 10: 139–162.
- Nuvolari, A., Tartari, V., 2011, *Bennet Woodcroft and the Value of English Patents, 1617–1841*, *Explorations in Economic History*, vol. 48: 97–115.
- Przewodniczący Państwowej Komisji Planowania, 1952, Zarządzenie Przewodniczącego Państwowej Komisji Planowania Gospodarczego, nr 168 z dnia 26 maja 1952 r. w sprawie opracowania planu w zakresie rozwoju techniki na rok 1953, *Wiadomości Urzędu Patentowego*, vol. 3–4: 353–366.
- Robinson, P.M., Henry, M., 1999, *Long and Short Memory Conditional Heteroskedasticity in Estimating the Memory Parameter of Levels*, *Econometric Theory*, vol. 15, no. 3: 299–336.
- Roszkowski, W., 1989, *Rolnictwo i leśnictwo*, in: *Problemy gospodarcze Drugiej Rzeczypospolitej*, PWE, Warszawa.
- Roszkowski, W., 1995, *Polityka przemysłowa*, in: Landau, Z., Roszkowski, W., *Polityka gospodarcza II RP i PRL*, Wydawnictwo Naukowe PWN, Warszawa.
- Statistisches Reichsamt, *Statistisches Jahrbuch für das Deutsche Reich*, various years, Berlin.
- Streb, J., Wallusch, J., Yin, S., 2007, *Knowledge Spill-Over From New to Old Industries: The Case of German Synthetic Dyes and Textiles (1878–1913)*, *Explorations in Economic History*, vol. 44: 203–223.
- Wiadomości Urzędu Patentowego, various years, Warszawa.
- Winiecki, J., 1988, *The Distorted World of Soviet-Type Economies*, Routledge, London.
- Wolf, N., 2007, *Endowments vs. Market Potential: What Explains the Relocation of Industry after the Polish Reunification in 1918?*, *Explorations in Economic History*, vol. 44: 22–42.

Aims and Scope

Economics and Business Review is the successor to the Poznań University of Economics Review which was published by the Poznań University of Economics Press in 2001–2014. The Economics and Business Review is a quarterly journal focusing on theoretical and applied research work in the fields of economics, management and finance. The Review welcomes the submission of articles for publication dealing with micro, mezzo and macro issues. All texts are double-blind assessed by independent reviewers prior to acceptance.

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