A Global View of Economic Growth

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Abstract

This paper provides an interpretation of the global pattern of economic growth in the period following 1950. It uses a model in which growth in an individual country depends on a number of different so-called common trends that are representative of the global economy. Although such trends are common (i.e., shared between countries), the model allows for a differential impact of each trend in each separate country. The general inspiration for this approach lies in the debate on globalization, in which it has been argued that countries are getting more and more integrated, i.e., share more and more common features that determine their growth performance.

The results indicate that a model with just three common trends provides an adequate representation of global growth. But rather than leading to convergence of living standards, these common trends lead to divergence, because there are large differences between countries in terms of the local impact of the common trends. Sopecifically, it is found that divergence of living standards is driven by very long-run differences in growth rates between countries, rather than by specific episodes of catching-up in a limited time span that is more limited than the full 1950-2006 period.

1 Introduction

Globalization is a highly controversial economic trend. Some argue that it brings prosperity to the world, providing an opportunity for relatively poor countries to catch up with the richer part of the world. Others argue that globalization provides unequal opportunities, mainly benefitting those that are already included in the top-level of the global economic hierarchy. The debate is clouded not only by the mixing of ideology and scholarship, but also by a lack of a clear definition of the notion of globalization, and by the inadequacy of economic growth models, which do not seem to be able to really address globalization as a theoretical phenomenon.

The aim of this paper is to have a fresh look at the evidence about economic growth, in light of some ideas about the impact of globalization on global economic growth. The paper does not present new theory, no matter how useful that could be. Instead, it proposes a new empirical methodology that can be used to describe and broadly interpret the global growth pattern(s), thus providing a sense of direction fior future work in the area.

Globalization is usually defined as increased economic interaction between the nations of the world, facilitated by technological advances that lower the costs of transportation and communication, and by institutional change, such as the lowering of barriers to trade and capital movements. This is not a new process, it is generally acknowledged that the seeds of globalization can be traced back at least a century, to the late 19th century, when global trade and capital movements flourished (e.g., Obstfeld and Taylor, 2004). With the outburst of the first World War in 1914, globalization was on the decline, as the international system of fixed exchange rates based on the gold standard collapsed. The Great Depression of the 1930s added to the decline of globalization, when many countries retreated in protectionist measures.

The period after the second World War is generally seen as one in which globalization is on the rise again. But until 1973, this was based on an economic world order (the so-called Bretton Woods system) in which international capital movements were strongly regulated, and hence limited (Obstfeld and Taylor, 2004). Despite this, technological spillovers led to a strong convergence of living standards in at least a part of the world (e.g., Abramovitz, 1979). Indeed, technological innovations such as cheaper air travel and telecommunications were among the main drivers of this process of globalization and convergence (Nelson and Wright, 1992).

With the collapse of the Bretton Woods system in the early 1970s, globalization attained a new face, in which the free international flow of capital became an important mantra. While the logic of the Bretton Woods system of fixed exchange rates (with most currencies around the world pegged to the US$, which in turn was subject to the gold standard) did not allow free international capital movements, the new economic world order put capital movements centre stage. Among the benefits of international capital movements that are presented in the textbooks are the ability to smooth consumption (by international borrowing and lending), the ability for investments to seek out the most productive opportunities, and the technology spillovers that come with foreign direct investment (FDI) (Obstfeld and Taylor, 2004).

What does all this this imply for global economic growth and the distribution of wealth around the globe? The *optimistic* globalization scenario is that

with increased economic interaction between nations, living standards around the world will converge as knowledge becomes universally accessible as a result of spillovers related to trade and investment flows. While the theoretical mechanisms behind such a scenario are multifold and complicated to test, the mere hypothesis of convergence is much easier to analyze empirically, and in fact has been subject of a large literature already. The *pessimistic* globalization scenario is that globalization will lead to divergence of living standards, as a result of unequal access to knowledge implied by the setup of the global economic order. Again, the causal factors underlying such an hypothesis are complex, beyond the scope the analysis here, and difficult to test empirically, but the prediction in terms of divergence is easy to analyze.

The topic of convergence or divergence of living standards (GDP per capita) has already received much attention. It has been addressed by different types of methodologies, e.g., regression models (e.g., Verspagen, 1991, Barro and Sala-i-Martin, 1991), the estimation of distributions of living standards by means of kernel density techniques and Markov transition dynamics (Quah, 1996), regression trees (Durlauf and Johnson, 1995), and historical analysis (Abramovitz, 1979). This paper adds a new methodology to this list: the estimation and interpretation of common trends in economic growth patterns. This methodology is much inspired by the idea of globalization, as it emerged in the field of business cycles research, where it was used to test the hypothesis that globalization has led to a synchronization of the business cycle as a result of increased interaction.

The basic idea behind the methodology is that growth in an individual nation can be explained at least partly by one or more global or semi-global trends in growth. One possible form of this hypothesis is the idea of a single global steady-state growth rate, as it was put, for example in the neo-classical growth models of the 1950s (e.g., Solow, 1956). While the methodological model specifies one or more of such global trends (which do necessarily need to be steady states, however), it also allows such global trends to have different impacts in different countries (which is, of course, different from the Solow prediction, and much more in line with the idea of conditional convergence as in, e.g., Barro and Sala-i-Martin, 1991). Thus, there may be a set of countries that are very "integrated" to each other in which the global trend(s) explain a large fraction of national growth, and there may be a different group of countries in which the global trend(s) explain much less, and a domestic idiosyncratic part of the growth trend plays a larger role.

The rest of this paper is organized as follows. The next section starts with a short and formal description of the methodology. The most important element of this is the econometric model that specifies the dynamics of the common factors in economic growth, and their impact on individual countries. Section 3 looks at the empirical evidence on global economic growth. It starts with a brief review of the empirical trends, after which the econometric model is aplied. This takes the form of a "narrative" about economic growth. The narratrive is a story about how the three common trends that are identified are related to individual country's growth paths, and how they influence the trends in global convergence and divergence of living standards. The paper concludes with a brief discussion of the implications of the empirical findings, including the issue of how globalization relates to economic growth.

2 Methodology

2.1 Estimating common trends

The methodology for estimating common trends in global economic growth is based on Zuur et al. (2003). Let y_t denote a vector of GDP per capita values, where the elements of the vector correspond to observations for different countries. Although the methodology allows for exogenous explanatory variables, these are not included in the current application. I.e., in the current approach, y_t is modeled purely as a data generation process, without a specific economic theoretical interpretation of the causal links underlying economic growth. The time series process that generates the observations for y_t is as follows:

$y_t = \gamma\Lambda_t + \mu + \varepsilon_t$

$\Lambda_t = \Lambda_{t-1} + \eta_t$

Λ_t is a vector of so-called common factors (or common trends). They are called common trends because each of the country-wise elements of the GDP per capita vector y_t depends on them, as a linear combination with coefficient matrix γ. With the number of countries equal to N and the number of common trends equal to M ($\ll N$), γ is an NxM matrix, with time-independent elements. In an analogy to factor analysis, the elements of y are referred to as factor loadings. The common trends Λ_t themselves are random walks, as η_t is a normally distributed disturbance term with zero mean and fixed positive variance. ε_t is also a random variable, again with assumed zero mean and fixed positive variance. Finally, μ is a vector of time-invariant level effects, which correspond to the mean of the time series for individual countries.

The estimation procedure, which is described in detail in Zuur et al. (2003), estimates the parameter vector γ, and the common trends Λ_t (as well as various variances). The number of common trends M is pre-determined in the estimations (values $M = 1..4$ are tried).

2.2 Convergence and divergence

As GDP per capita (y_t) is expressed in natural logs, the standard deviation over countries within a given year is an approximation for the average percentual deviation from the mean value in the sample (without taking logs, one would have to calculate the coefficient of variation, i.e., the standard deviation divided by the mean, to obtain the average percentual deviation). As the percentual deviation is, in principle, not sensitive for changes in the mean over time, this is generally used as an indicator of convergence (a falling standard deviation) or divergence (rising standard deviation).

If it is assumed that the covariance of the country-specific residual in the estimations with the deviation of the country-specific predicted value and the average predicted value is zero, the standard deviation of the predicted values is an unbiased and efficient estimator of the actual standard deviation in the sample.

3 Global economic growth

3.1 An empirical overview

The data used in this paper is taken from the website of Angus Maddison, and covers the period 1950 - 2006 for 129 countries that together cover the large majority of world population. Although for some countries data go back further in time than 1950, global coverage is only available from 1950 onwards. The dataset covers GDP per capita, with GDP expressed in purchasing power parities (see Maddison, 2007 for more details on the data). Figure 1 displays the kernel density estimation for the distribution of ln(GDP per capita).[1] As is well-known from Quah (1996), initially (1950s), the distribution was essentially single-peaked. The peak corresponds to a large number of countries at relatively low levels of GDP per capita. Gradually, a second peak begins to emerge at the high-income side of the distribution, indicating a number of countries at intermediate income levels that are growing more rapidly than the rest. At the end of the period, the distribution is clearly multi-peaked. Arguably, three peaks can be discerned, corresponding with high, intermediate and low income levels.

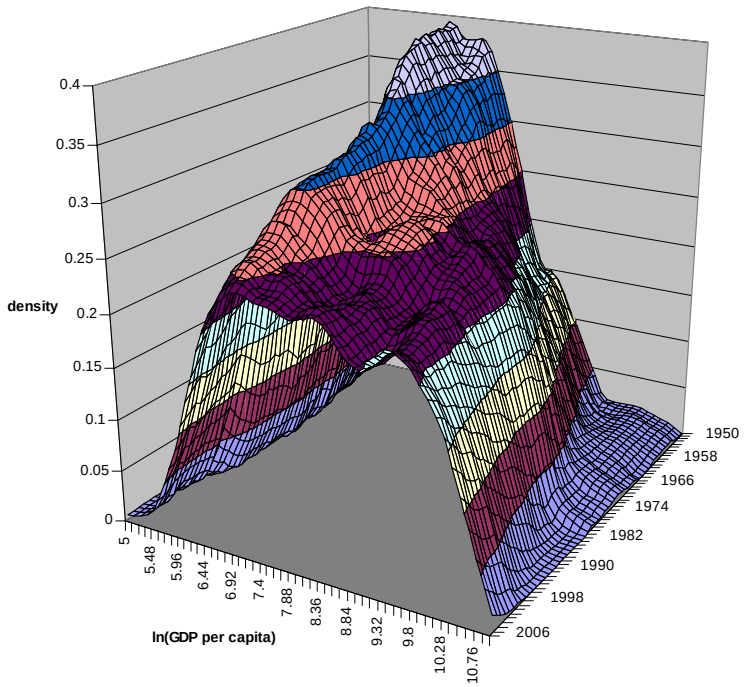

Figure 1: The global distribution of living standards

[1] All analysis in the paper is conducted for unweighted data, i.e., countries of different size are weighted equally. Weighting by population would obviously make a difference, especially for the later periods, when growth in several large countries is high (e.g., China, India). However, as we do not have any specific theoretical priors on the relationship between country size and growth, using unweighted data is more appropriate.

The multi-peaked nature of the distribution also implies that the distribution has become flatter, i.e., the standard deviation has become larger. It has already been noted that the standard deviation of the distribution can be seen as a measure of convergence or divergence. Figure 2 displays the standard deviation of GDP per capita for the same global dataset. Clearly, the indicator goes up for the entire period, with only a brief interruption in the 1980s, when the trend is essentially flat. Thus, in line with Figure 1, Figure 2 suggests that divergence is the rule in the global economy after the Second World War. However, as is well-known from previous work in the area, convergence is observed for a smaller group of countries. This is indicated for the trend in Figure 2 for the European countries and the so-called Western offshoots (this is Maddison's terminology, referring to the USA, Canada, Australia and new Zealand). For this group of countries, the standard deviation of GDP per capita is already at a low level (around 0.5) in 1950, and keeps falling over the entire period. Outside this group of countries, however, divergence is again what is observed.

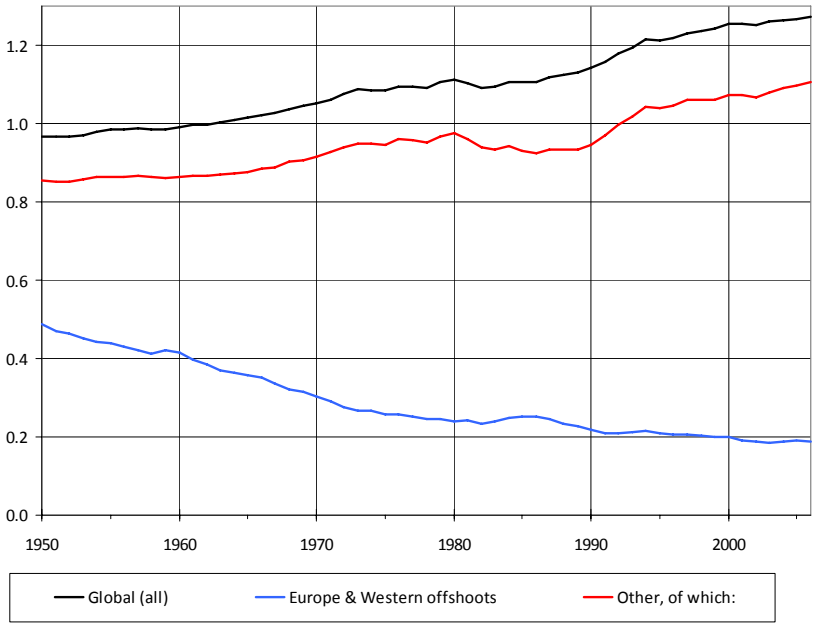

Figure 2: Convergence and divergence in the global economy (broad groups)

Figure 3 displays the same indicator for subgroups of countries outside Europe and the Western offshoots. The groups are based on a geographical criterion, broadly covering continents (Asia, Latin America, Africa) or subcontinents (Middle East). In each of those groups of countries, except the Middle East, divergence is the rule, as the standard deviation is rising over time. Convergence in the Middle East seems mostly associated with the availability of oil resources, and halts from the mid-1980s onwards. Outside the Middle East,

only in Asia from the early 1990s onwards do we see a flat trend. Thus, it seems to be the case that a major task of the econometric model that will be applied below is to account for global divergence of living standards, while still allowing convergence in a smaller group.

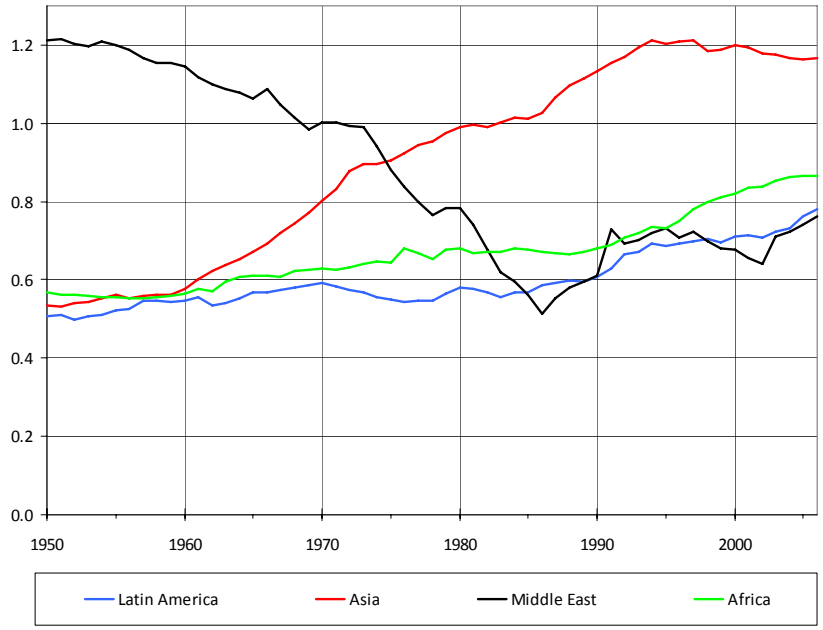

Figure 3: Convergence and divergence in the global economy (outside Europe and Western offshoots)

3.2 A narrative of three growth paths

The econometric model explained above was estimated for the complete dataset of 129 countries and 57 years. This means that it was assumed that there are a number of common trends Λ for this complete period, with the loading matrix γ constant over time.[2] Models with 1..4 trends were estimated, from which the version with 3 trends was chosen for presentation. Zuur et al. (2003) suggest to use an information criterion like AIC or BIC for the selection of the number of trends. In the present case, BIC suggests 3 trends, while AIC suggests 4 (or more) trends. However, the main reason to present the model with 4 trends is the average predictive power of this model, relative to a model with a different number of trends. This is documented in the appendix, where it is it is concluded

[2] Another approach would have been to split the period up and estimate separate trends for each subperiod. Because the number of countries is large relative to the number of years, this approach was not adopted (as it would imply a large number of parameters γ compared to the number of observations).

that the model with 3 trends provides the best overall approximation of global growth patterns.

Figure 4 provides a graphical representation of the three common trends.[3] The first of these trends, which is labeled "steady state" in the graph, corresponds to a more or less fixed exponential growth rate over the complete period (remember that y is specified in natural logs, so that a linear trend in the graph actually corresponds to exponential growth). A slight decline in slope (i.e., the exponential growth rate) is observed after 1980 (roughly), but this is not a very strong effect. Overall, this first trend clearly represents the idea of a steady state growth rate. However, because the individual countries have different values for the loading coefficient γ (something that will be illustrated in detail below), this steady state trend is actually highly country specific. Depending on how large the differences in the loading coefficients between countries will be, the steady state growth trend presents a large potential for divergence (as observed in Figure 2 and 3), because it points to a growth rate differential that accumulates over the entire 1950-2006 period.

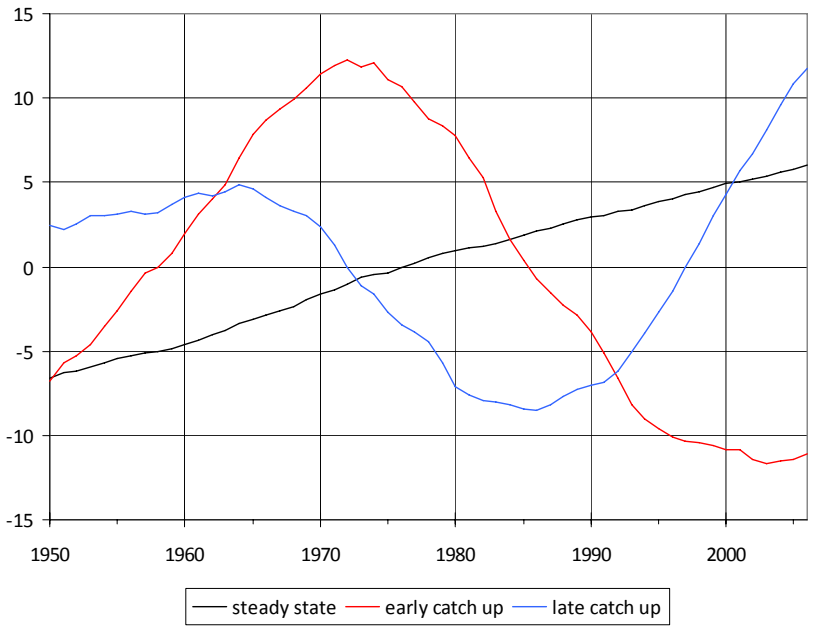

Figure 4: The 3 estimated common trends of global economic growth, 1950 - 2006

The other two trends are not monotonically increasing over time.[4] The first of these, labeled "early catch up" in the graph, shows a steep linear incline roughly until the early 1970s. This corresponds to the Bretton Woods period, and is associated with rapid growth in a broad set of countries during this

[3] The estimation results also contain stanedard errors for the estimated trends. These are very small and therefore not documented.

[4] It must be kept in mind that the loading coefficients γ can be negative, in which case the effect of the trend reverses relative to the inclination in the figure.

period (this is investigated closer when the loading coefficients γ are discussed). After the early 1970s, this trends shows first a more or less linear decline, and afterwards it flattens off, possibly leading to a new turning point outside the window of observation. The last trend ("late catching-up") show an almost inverted pattern. It first has a flat segment, roughly until the mid-1960s, after which it declines until the mid-1980s. From this point onwards, this trend is firmly upward, indicating a late phase of catching-up for the countries that load high and positive on this trend.

Although the trends are common across countries, the loading matrix γ determines the actual "impact" of the trend on a country's growth path. It is therefore important to look at the distribution of the loading coefficients γ. Figure 5 provides the kernel density estimation for the loading coefficients associated with the first trend (the "steady state"). The figure distinguishes between the country groups that have been used before. It shows that there are clear geographical differences in the distribution of the loading coefficients. The highest modal value is observed for Europe and Western offshoots. The distribution for this group is also relatively (compared to the other groups) narrow, i.e., the variation within this group is small. It is this narrow shape of the distribution that explains the tendency for convergence in this group that was observed in Figure 2. Also, the relatively high value for the loadings of this trend in Europe and Western offshoots point to a long-run growth rate advantage of these countries over the rest of the sample, which is an important factor behind the global divergence trends that were observed above. The slope of the "steady state" trend is ≈ 0.23, and the median value of the loading coefficient in the Europe and Western offshoots group is ≈ 0.12, which yields a contribution of the "steady state" trend to growth in this group of countries $\approx 2.8\%$.

Africa shows the lowest modal value for the loadings associated with the "steady state", although the African distribution appears to be multi-peaked, with a small peak to the right (at approximately the value of the peak for Europe and Western offshoots). The median value of the loading coefficients on the "steady state" trend in Africa is ≈ 0.04, which implies a "steady state" contribution of $\approx 1\%$ growth per year. Compared to Europe and Western offshoots, this puts Africa at a backlog of 1.8% growth per year, only as the result of a difference in the contribution of the "steady state" trend.

Latin America shows an intermediate value for the loadings. Its median loading implies a a backlog of 1.5% growth per year compared to Europe and Western offshoots. The distributions for Asia and the Middle East are very wide and flat, indicating that there is a relatively large amount of variation in the loadings for these country groups. There is again some evidence for a multi-peaked distribution for Asia, with the right-most peak at a very high loading value (above 0.2), higher than any value observed for Europe and Western offshoots. Countries associated with this right-most peak in the Asian distribution are Japan, South Korea, Taiwan, Hong Kong and Singapore. These are the countries that are usually referred to as the "Asian Tigers", for their remarkable growth performance in the postwar period. The estimation results suggest that an important explanation for this remarkable growth performance is the contribution of the "steady state" trend, i.e., a sustained growth rate differential over the entire period.

Finally, observe that the distributions for all country groups except Europe

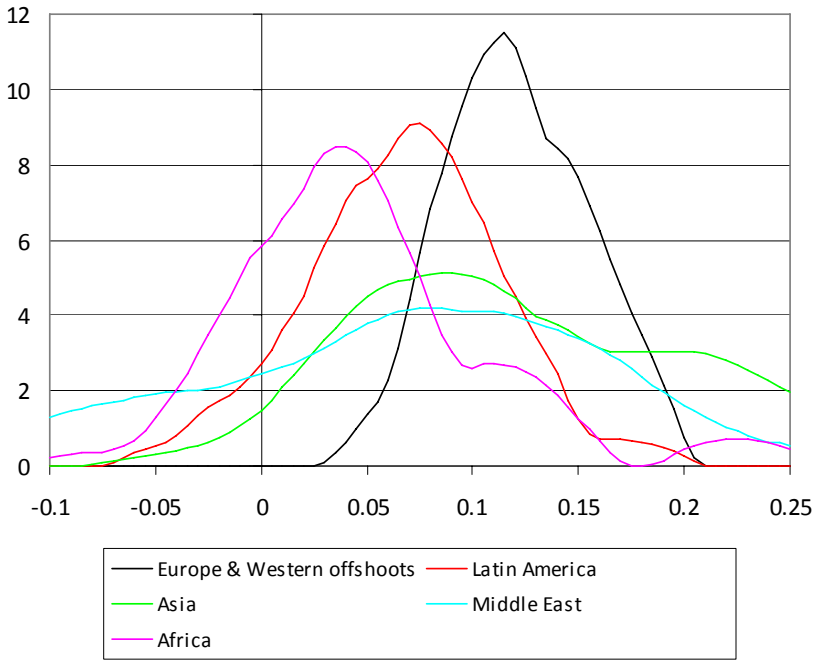

Figure 5: Kernel density estimations for the loading coefficients associated with the first trend ("steady state")

and Western offshoots stretch into the negative domain. This implies that there are a number of countries that show a negative "steady state" trend growth rate.

The mean values for the distributions for the loading coefficients associated with the other two trends are much lower, as is clear from the following two figures. For the second trend ("early catching-up", Figure 6), the observed loading coefficient vary roughly between -0.05 and 0.05, with the exception of some countries in the Middle East, which show higher values. This implies that the contribution of the "early catching-up" trend is generally low. Interestingly, the Asian distribution shows a peak for a slightly negative loading value. This is surprising because it suggests that the "early catching-up trend" does not contribute to high Asian growth in the period before the 1970s. In fact, this holds true for the "Asian Tigers", as they are generally characterized by negative loadings on the "early catching-up" trend. On the other hand, the negative loadings for many Asian countries, compared to other countries with positive loadings, imply a positive effect on growth after the early 1970s, when the "early catching-up" trend reverses. This is in fact when the "Asian Tigers" experience a high-growth phase.

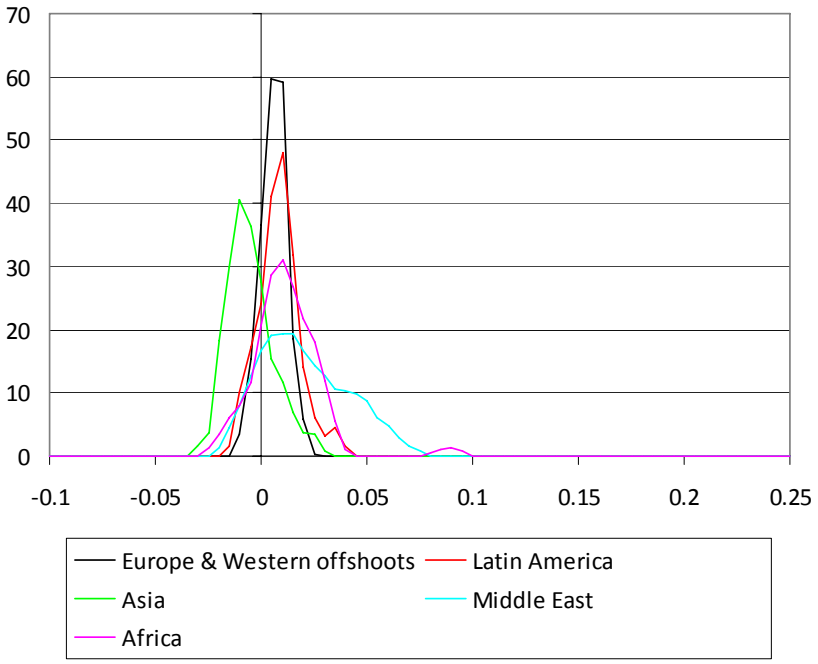

Figure 6: Kernel density estimations for the loading coefficients associated with the second trend ("early catching-up")

Finally, the distributions for the last trend ("late catching-up", Figure 7) are also in the narrow range -0.05 - 0.05. All modal values are observed at values very close to zero, which seems to make this a truly "neutral" trend in the broad cross-country domain. The distribution for Europe and Western offshoots is very

narrow (around zero), while that for other country groups is broader. Referring back to the "Asian Tigers", these countries are usually (again) on the negative side of the Asian distribution, which means that from the mid-1960s to the mid-1980s, they have a (relatively) positive influence from this trend. Other Asian countries that are experiencing fast growth more recently, like China, show positive loadings on this trend.

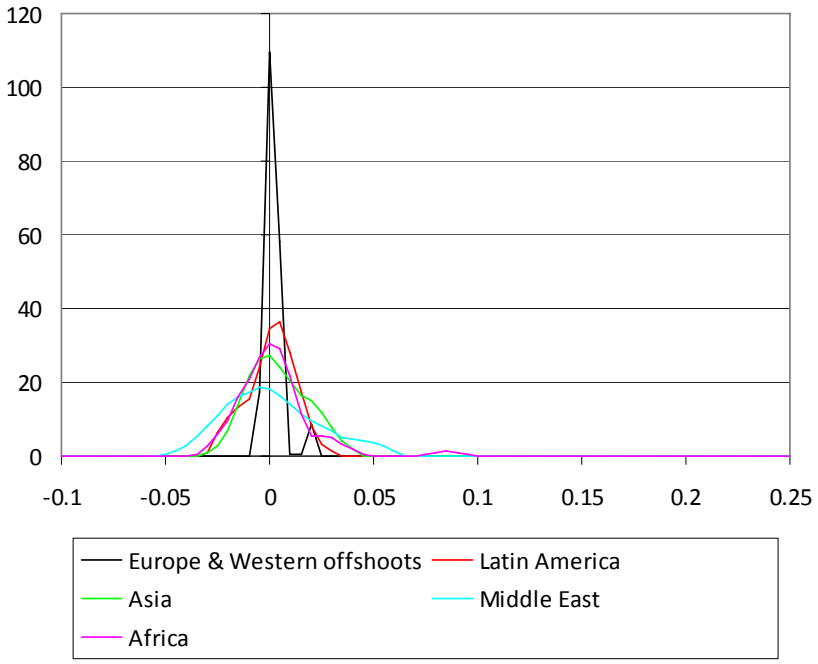

Figure 7: Kernel density estimations for the loading coefficients associated with the third trend ("late catching-up")

The particular loading patterns that are observed at the country level or the country group level lead to rather smooth growth patterns, in which the strong non-monotonicity of the two last trends are not immediately recognized. This is shown in Figure 8, which uses the median values of loading coefficients within the country groups to construct "representative" trends. These representative trends also include the average levels of GDP per capita within the country groups, which, as indicated above, the empirical model treats as exogenous shift factors. The figure shows a decline in the growth rate after the mid-1970s for most of the country groups, except for Asia. In Asia, the combination of the three trends produces a smooth steady state growth path that shows no major slowdown after 1970 (but which is, however, subject to relatively large within-group variation).

To illustrate how the separate growth trends combine at the level of an individual country, Figure 9 shows the predicted trend growth paths for four individual countries. The two Latin American countries, Argentina and Brazil, show

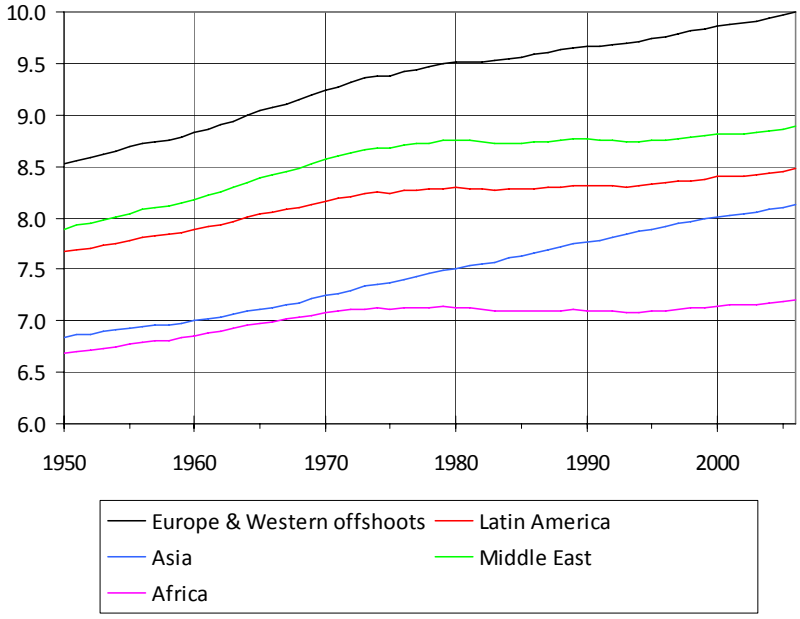

Figure 8: Predicted growth paths using median values of the trend loadings for country groups

moderate growth until the mid-1970s, and stagnate afterwards. The stronger initial growth performance of Brazil is associated to a higher loading on the first trend ("steady state"): ≈ 0.1 for Brazil vs. ≈ 0.05 for Argentina. The two Latin-American countries show similar loadings on the second trend (≈ 0.01), but they diverge again on the last trend (≈ 0.05 for Argentina, ≈ -0.1 for Brazil). China and South Korea both load much higher on the first trend (≈ 0.24 for South Korea, ≈ 0.16 for China), which, as observed before, gives them a strong "basis" for rapid growth over the complete period. They also both load negative on the second trend (≈ -0.02), but diverge from each other on the third trend (≈ 0.02 for China, ≈ -0.005 for South Korea).

In the final part of the review of the quantitative results, the attention turns to convergence and divergence again. How well do the predicted values from the three-trends model fit the convergence and divergence trends that were observed in Figure 2 and 3? This is explored in the final three figures. These show how the standard deviation of the fitted values from the three-trends model tracks the actual standard deviation of per capita GDP levels in the sample reasonably well. Following the observation that the "steady state" trend seems to be rather important for long-run growth rate differentials, the figures also include a line that presents the fitted values on the basis of this trend only. Thus, the lines in the graphs that are labeled "steady state" represent standard deviations of the GDP per capita values that are fitted using the "steady state" trend only.

Figure 10 shows the results for the complete sample of 129 countries. The fit for the predicted growth patterns using all three trends (labeled "fitted" in

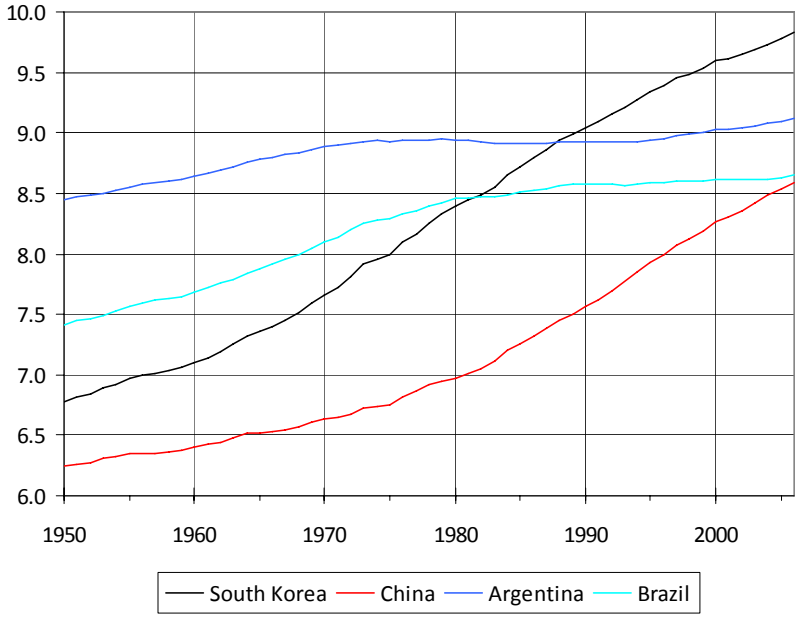

Figure 9: Predicted growth paths using the trend loadings for Argentina, Brazil, China and South Korea

the figures) is rather tight until 1970, after which the standard deviation of the fitted values begins to under-estimate the actual level of divergence a bit. This is reversed in the 1980s, when the actual level of the standard deviation falls below the fitted one. The pattern is again reversed in the early 1990s, and again in the early 2000s. But all these deviations between the fitted and actual level of divergence are small.

Looking at the standard deviation of the "steady state"-only predictions, these show a consistently lower standard deviation than the fitted values based on the full set of three trends. Thus, it can be concluded that the "steady state" growth rate differentials do not account for all heterogeneity observed in the sample. The two non-monotonic trends contribute positively to observed heterogeneity. Still, the "steady state" predictions account for the largest part of the increase in heterogeneity of living standards, i.e., for the observed divergence in the total sample. The observed increase in the standard deviation from 1950 to 2006 is approximately 0.3, as is the increase in the standard deviation of the "steady state" predictions.

The results for Europe and the Western offshoots are presented in Figure 11. This fit is also tight, although convergence is slightly under-estimated during the 1970s, and a short spike of divergence in the 1980s is not tracked. From the 1990s onwards, the fit is again very tight. It can be concluded that the three-trends model emulates convergence in the developed part of the world rather well. In this case, the "steady state" predictions overestimate the level of heterogeneity in the period from the mid-1960s to 1980, and underestimate it

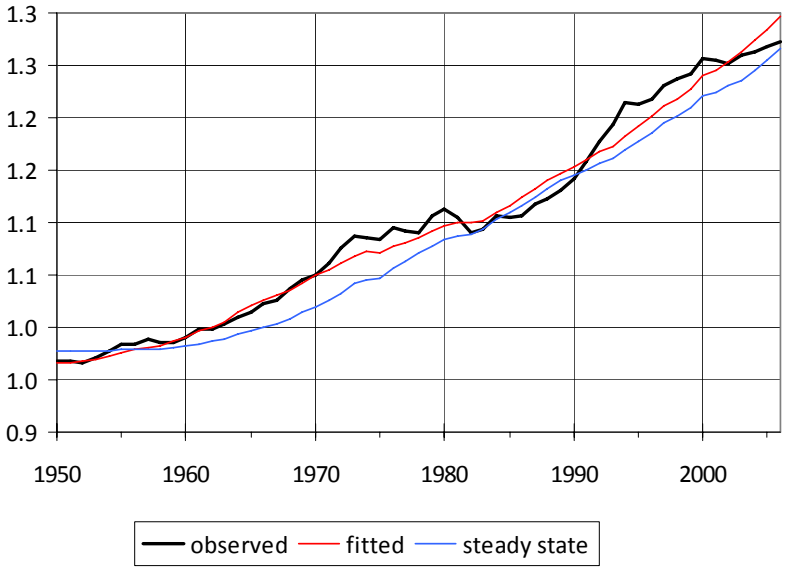

Figure 10: Observed and fitted global divergence

from the mid-1980s onwards. The countries in this group first converged more than predicted by their "steady state" behaviour, then less. But again, the "steady state" predictions are able to track the convergence trend in this group relatively well, as they cover the largest part of the fall of the standard deviation in the complete period.

Finally, the results for the non-"Europe and Western offshoots" group are produced separately in Figure 12. This picture looks a lot like Figure 10, indicating the large weight of this group in the global results. But the underestimation of heterogeneity is more severe for most of the period (except in the 1980s), indicating that the notion of "steady state" growth patterns is slightly more problematic in this group of countries than in the sample as a whole. But again, the general trend of divergence in this group is captured relatively well even by just the "steady state" predictions.

4 Conclusions

Despite, or perhaps due to, globalization, the world economy has shown a broad pattern of divergence of living standards since 1950. This paper has investigated the nature of the factors that underlie this divergence trend. Specifically, an econometric model was estimated that aims to describe growth performance of nations in terms of so-called common trends. Each country's growth path (in terms of GDP per capita) is described as a function of a linear combination of three such common trends, plus an idiosyncratic country component. The theoretical inspiration for this approach is drawn from the discussion on

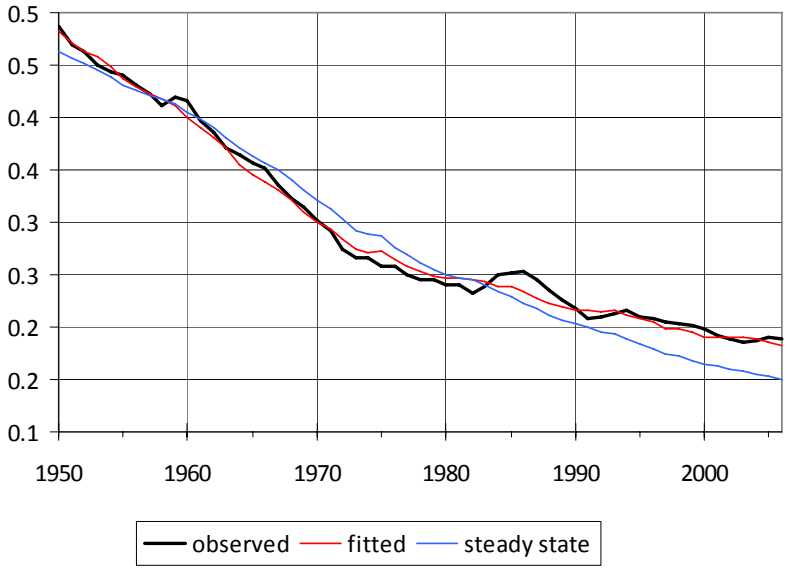

Figure 11: Observed and fitted convergence, Europe and Western offshoots

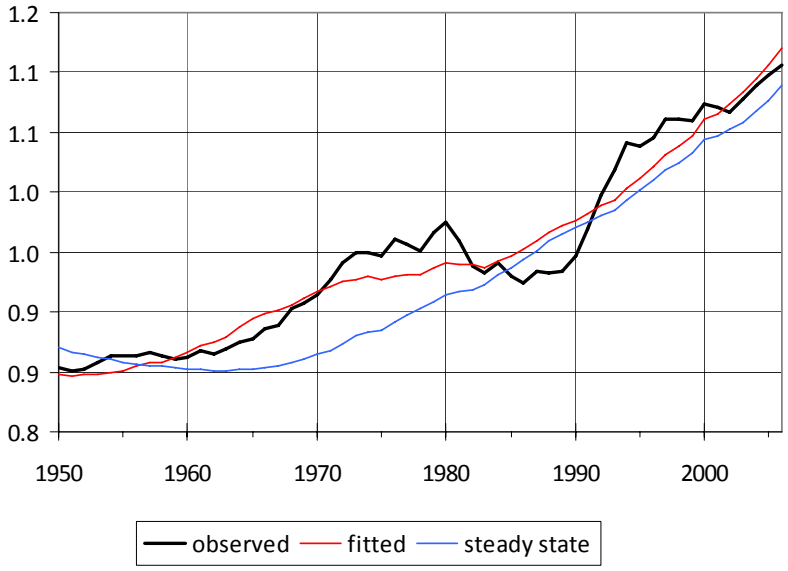

Figure 12: Observed and fitted divergence outside Europe and Western offshoots

globalization, in which it is sometimes argued that, due to increased interaction between countries, patterns of growth (both in the long run and in the shorter business cycle domain) are more and more synchronized.

The empirical analysis that was conducted does not aim to identify any causal mechanisms underlying economic growth. Instead, it is inherently descriptive in nature, and aims to investigate whether the idea of common growth trends has any relevance at all in describing the global empirical growth record in the post-1950 period. The results show that a model with just three common trends explains growth trends in a cross-country sample of 129 countries (largely covering the globe) reasonably well. The individual country's growth trends that are fitted on the basis of these three trends provide a good description of what happens at the country level, although a relatively small idiosyncratic component of growth remains for all countries.

The nature of the three common trends provides with a useful, although perhaps somewhat surprising, interpretation of the economic growth record. One of the three trends takes the form of a smooth, "steady state"-like growth path, with a more or less constant exponential growth rate of GDP per capita over the complete period 1950-2006. The econometric model allows this "steady state" to have a differential impact in each individual country, through the loading coefficients that link growth at the individual country level to the common trends. It was shown that there are substantial differences between those loading coefficients both between and within broad groups of countries that are defined on geographical criteria. These differences imply that the countries in the sample are characterized by different long-run growth rates. Thus, although they share a "common" growth characteristic in terms of a more or less constant long-run growth rate, this rate is highly country(-group) specific. This feature of the empirical growth record was shown to be the major source of divergence of living standards in the global economy.

The other two common trends are of a different nature: they show a non-monotonic pattern, and hence are related to specific phases of high and low growth that are shared between countries. Although these trends are important for fitting the exact growth patterns at the country level, they were shown to be relatively unimportant for explaining global divergence. Although the different "steady state" growth patterns between countries under-estimate the level of heterogeneity of living standards in the large sample for specific periods, they do cover the general increase of this heterogeneity over time. Similarly, within a smaller group of countries in Europe and the so-called Western offshoots (USA, Canada, Australia and New Zealand), long-run "steady state" growth rates have led to convergence, because these countries have experienced much more homogenous growth rates.

The implications of this finding are possibly far-reaching. First, it seems that specific episodes of rapid catch-up based growth, although obviously important for individual countries, do not drive the global dynamics in income distribution. The catching-up process that took place in a number of specific Asian countries (the "Tigers", like South Korea, Taiwan, Singapore and Hong Kong) is embodied in the 56-year long "steady state" growth rates of these countries, rather than in a specific trend that unfolds itself in a more limited time frame. Differences in growth performance that manifest themselves in such a long run, are truly rooted in "deep" causal factors. Policies for growth are truly long-run in nature.

Second, with respect to globalization, it can be concluded that the empiri-

cal growth record suggests that a view of a single global growth trend is a too simplistic description of reality. Countries do share common growth characteristics, but this does not imply that they all converge to the same growth path. Instead, the extent to which countries relate to common growth trends varies significantly between them, leading to the long-run growth rate differentials that were already discussed extensively. Such an empirical stylized fact is more consistent with the view that different countries benefit to different extent from globalization than a view in which one globalization size fits all. Also, to the extent that post-WW2 globalization may comprise two distinct phases (Bretton Woods and post-Bretton Woods), this does not show up in the empirical results obtained here. Divergence of living standards is a phenomenon that takes place over the entire time span, and there is no sign at all that the speed of divergence slows down in the recent era of financial globalization. Thus, the notion of international capital mobility leading to increased international spillovers and thereby convergence of living standards is not supported by the results obtained here. Over the entire post-1950 period, catching-up is a phenomenon that characterizes some countries, but not the world as a whole, not even the world before the recent economic turmoil.

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6 Appendix. Prediction error of the model with varying number of trends

For every observation i, the prediction error e_i was calculated as $e_i = y_i - \widehat{y}_i$, where the hat indicates a predicted value. For every year, the sum of e_i^2 is documented in the figures below, either for the complete sample ("global") or for the country groups "Europe & Western offshoots" or "other". It is observed that the average squared prediction error is smallest is Europe and Western offshoots. For the model with 1 and 2 trends, the squared prediction error observed in the other countries is reasonably large. For the model with 3 trends, it is below 0.01 for most of the time. Thus, the model with 3 trends provides a better fit, especially for the "other" group of countries. The model with 4 trends provides an even better overall fit, but this comes at the expense of a large prediction error for Europe and Western offshoots at the end of the period.

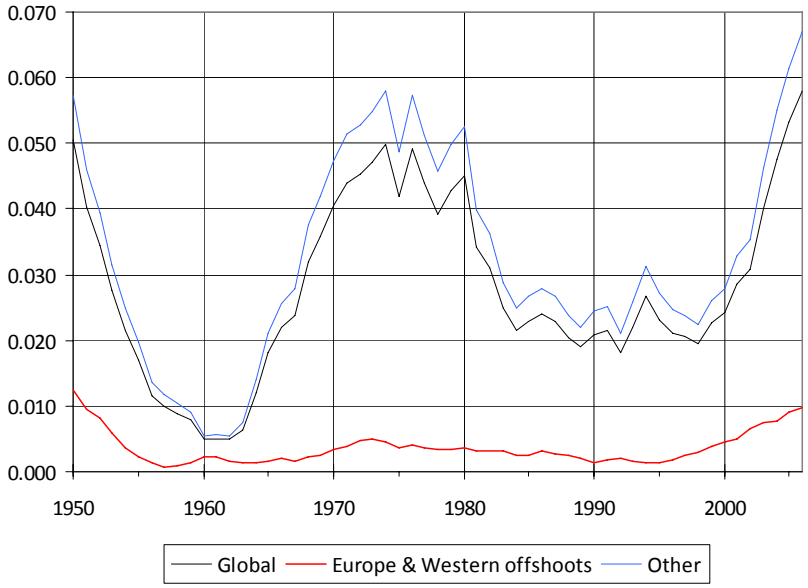

Figure 13: 1 Trend ($M = 1$)

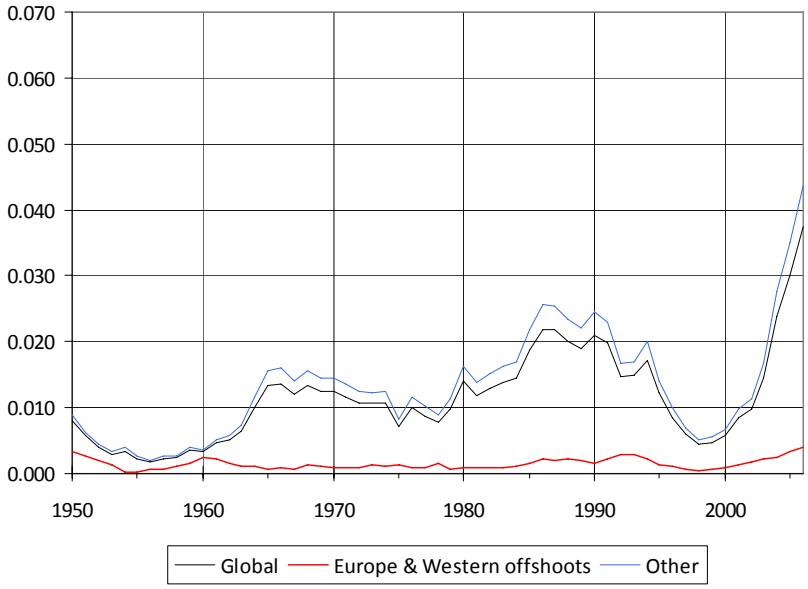

Figure 14: 2 Trends ($M = 2$)

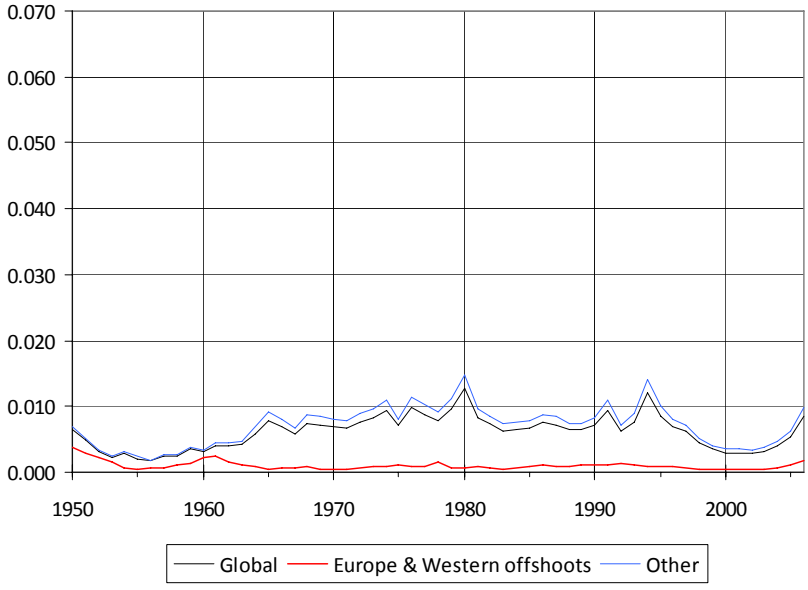

Figure 15: 3 Trends ($M = 3$)

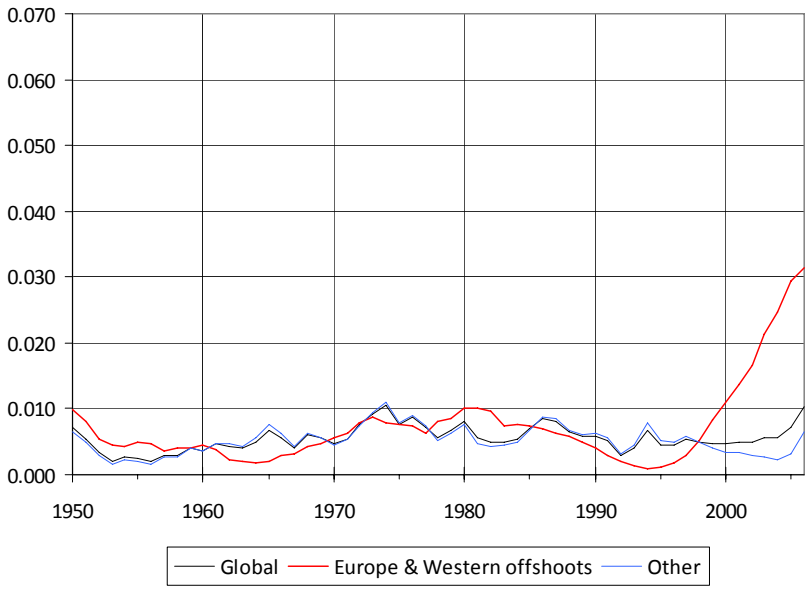

Figure 16: 4 Trends ($M = 4$)