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THE CASE OF EU WITHDRAW: THE CASE OF GREENLAND, LESSONS FOR BREXIT UNDER BUSINESS CYCLES SPECTRAL ANALYSIS

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ABSTRACT

The recent choice (2016) of UK withdraw from EU is not the first loss of the international organization. In a 1985 referendum, Greenland decided to secede the European Community even though remained constituted to its motherland Denmark. Comparisons with the present situation where a state member quails are obvious. The question arises has to do with the economic efficiency of this disintegration. Business cycles length can be a reliable answer to the raised question. If it grows then the effect is positive and vise versa. We deploy as reference time series checking out country's GNP growth in an annual frequency for sixty-six years (1950-2016) split to parts where breaking point is the year of changing its participation decision (1981 for Greenland respectively). The results show that Greenland did not manage to get the level of economic stability in lower frequency cycle trends compared to pre 1981 period. Similar behavior is expected for the UK.

Key Words: Business cycles, economic growth, disintegration, trading partners

1. INTRODUCTION

Greenland joined EU in 1973 as a part of Denmark despite a vast majority of 70% opposed to this integration in 1972 referendum. Focus was on other fisheries nations (Iceland, Norway and Faroes islands respectively) had chosen not to follow an EU join path leaving the overseas countries and territories (OCT) agreement. The amendment of establishing a tax-free zone to the European community (EC) did not seem to decline Eurosceptic parties on their parliament decision to propose a new referendum for 1981. The result favored of leaving the EC under an established agreement (1982) of keeping the EC's fishing rights. Greenland has left EC on February 1st 1985. The country used Denmark as a kind of bridge with the EU but simultaneously it enchased its national identity.

Under a political decision, former UK prime minister D. Cameron held a referendum on the possibility of EU article 50 process where a state member leaves the union. The results were in favor of leaving. For the very first time a full member has initiated the exit process. UK will probably have stronger economic relationship with countries such as Tonga and Vanuatu rather than its former counterparts. It is obvious that country has to be prepared for major international trade and monetary turbulences. The major question that arises has to do with the type of UK/EU relations and when the economy will rebound to its pre-brexit level. A possible answer could be given under the business cycles length analysis.

The significance of the business cycles length examination is huge for the entire economic process. A country will join an economic union or affiliation centered on a possible strength raise related, political and social favorable position. The longer business cycles offer strength against overall financial turbulence, for instance, occurred on the 2008 to exhibit European crisis and its size, incorporate political conviction and raise social and budgetary achievement and welfare in the participating country.

Early spectral examination analysis explore was especially in view of Kondratieff cycles centered around Van Ewijk (1982) where long time cycles (50 years or more) for the created countries have been dismembered. The econometric signification, which got the opportunity to be ordinary, made through Kydland and Prescott (1991) where creative staggers and the improvement models were assessed because of the econometrics impact in the midst of this period.

The advancement of international trade among the countries helped the financial relations betwixt them in the 90s and 00's until the overall crisis on the end of the decade. Reyes (2003) considered on customary philosophy manufactured a commonplace start for standing out outcomes from various countries. Notwithstanding extraordinary outcomes, he assumed that the inward impacts were to an incredible degree high in the midst of the 1980's. Their patterned effect must be broke down and chosen. Kose, Meredith and Towe (2004) surrender that budgetary linkages have larger synchronization of both creation and monetary yield. They additionally have shown these assumptions and the business cycles seem to synchronize. They declared that the connections get only the contemporaneous co-movements of macroeconomic factors and not changes associated with leads and lags. To stand up to these issues they pick latent factor dynamic model. Their specimen began in 1980 and end in 2002 (22 years). The outcomes face that Mexico confronted real competition from the others taking possible market share from counterpartyed countries and it expected to adjust its creation presentation whether the augmentation in tariffs inside zone. In this way, Mexico needs to change remembering the ultimate objective to confront the intra-business trade improvement, the authoritative pattern checks and the possible security issues inside the country.

Cruz (2005) proposed an adjusted variation of Minsky's model consolidated with the three states plan of activity of switch organization demonstrate proposed by Clements M. and Krolzig (2001), money related liberation affects the business cycle robustness. Thusly when the finance related deregulation dispatches the business cycle length changes as in the economy is inclined to last more in the augmentation stage, recessions might be shorter, crises or upstages more grounded, and more keen. The years 1980-2000 for Mexico were more uncertain than the past

and the economy have all the earmarks of being more powerless. The length of the business cycle is shorter than the countries of NAFTA and it has been changed to shorter cycles.

Relative manuscripts were furthermore appropriated for the EU. The case of EMU countries examination has been destitute around Altavilla (2004). Using an arrangement of econometric techniques for union examination and a Hamilton – Markov switching model is used to analyze Eurozone economies business cycle. The outcomes recommend that there are differentiates in the EMU countries cycles size and timing despite the similar case and the essential recessionary period

In a latter work (Benalal et. all 2006) have researched the relationship between the change of the GDP structure and its development and the synchronization of the European nation's business cycles. They assumed that there is no upward or descending pattern in the 1970-2004 period. They have contemplated this soundness to distinctive patterns to demographics and to structural changes that occurred previously. The pattern of synchronizing among the nations has climbed over the 1990's. The level of connection in yearly and quarterly inform.

On a similar subject, Bergman (2004) has analyzed the way that economic unification has affected the synchronization and the significance of business cycles among the interested countries. In perspective of band pass filtered data, they induce that they get the chance to be relative over the long term. They found that cycles are fundamentally synchronized especially on high versatile exchange rates periods. More synchronization as showed by Bergman has greater relative significance.

In an array of studies (Evangelopoulos and Dapontas 2013 and Dapontas and Evangelopoulos 2013) for the EU and NAFTA business cycles, they pondered the business cycles for 9 EU countries and every one of the 3 NAFTA countries contrasted with 4 non EU parts for quite a while (1950-2012). The outcomes show that the countries the early years of increment tend to have smaller cycles than they used to have changing from 15 to 24 years. On the second stage, the cycles had a similar traverse with the ones in the current past. The cycle length following a measure of years increase organizing a J shape curve as international trade theory suggests. The J development bend curve suggests EU got to countries in a manner it is an effect of their decision to get access to an international economic organization. They compared the results with the cycles lengths of four non-EU part countries. The results exhibit that the cycle on a similar period for these countries did not change. The countries landed at their past cycles length in a 20-25 years' time span. Earlier got to countries were less disposed to the 2008 overall financial crush than their devotees or nonparticipant country is from every angle at an historic high.

Latter (Dapontas 2016) argued that possible dissolution of the EU or the under examination on his manuscript EAC (East African Community) can also have a production variety extension effect for the abandoning country. The imports face extended discount effecting the disintegration and former counterparts' tariffs and duties or even embargos imposed. Weak economies effects are more significant compared to the strong ones adding obstacles to an economic union concession.

2. Materials and methods Title and authors

Spectral analysis is linked to the investigation of periodicity; the reason for the examination is to disintegrate a complex time series with cyclical components into a few of fundamental sinusoidal (sine and cosine) functions of particular wavelengths. By recognizing cyclical parts, we could explain the trend. Because of effective examination, one may reveal simply a set of repeating cycles of diverse lengths in the time series of interest, which at first looked pretty much like random walk.

The wavelength of a sine or cosine function is typically expressed in terms of the number of cycles per unit time (frequency), denoted with f. The frequency in time terms for example yearly, may be monthly (N=12), annual (N=1) or even daily (N=365). The period T of a sine or cosine function is the length of time required for one full cycle. Thus, it is the reciprocal of the frequency, or: T = 1/f. The monthly cycle expressed in yearly terms, would be equal to 1/12 = 0.083. There is a period length of 0.083 years.

The decomposing issue is casted as a linear multiple regression problem where the dependent variable is the observed time series and the independent variables are sine functions of all possible discrete frequencies. Such a linear multiple regression model may be written as:

$$x_t = a_0 + \sum [a_k * \cos(\lambda_k * t) + b_k * sin(\lambda_k * t)] \ \ (for\ k = 1\ to\ q)$$

From classical harmonic analysis ==2*π*F (k), where the constant π = π = 3.1$\overline{4}$ and$f_k = \frac{k}{q}$. Cosine and sine parameters are regression coefficients that tell us the degree to which the respective functions are correlated with the data. There are q different cosine and sine functions. The number of functions cannot exceed the number of the data points. There are N data points in the series, there will be (N/2) +1 cosine functions and (N/2)-1 sine functions. If there is a large correlation (cosine or sine coefficient) is identified, we can conclude that there is a high periodicity of the denoted frequency or period in the data.

The sine and cosine functions are mutually independent, thus we sum that the squared coefficients for each frequency obtain the periodogram. It can calculated as:

$$P_k = (sine\ coeff_k^2 + cosine\ coeff_k^2) * \frac{N}{2}$$

Where P_k the period gram value at frequency f and N is the overall length of the series. The periodogram values are noted as the variance of the data at the respective frequency or period. The period gram values are generally plotted against the frequencies or periods.

The periodogram values are subject to substantial random fluctuation, and they have many chaotic spikes. Spectral density is a smoothed version of the periodogram presented. It eliminates the noise from a periodogram, allowing the underlying structure to be more clearly isolated.

In practice, when analyzing actual data, it is crucial to identify exactly the frequencies for its particular sine or cosine functions. The smoothing is accomplished through weighted moving

average transformation. The moving average window is of width m (which must be an odd number).

The most popular is the Tukey – Hanning window. Its weights are:

$$W_k = 0.54D_p(2\pi f_k) + 0.25D_p(2\pi f_k + \frac{\pi}{p}) + 0.23D_p(2\pi f_k - \frac{\pi}{p}) \text{ where } k=0...p.$$

P is the integer part of number of the spans divided by 2, W_k is Diriclet kernel of order p.

We have also checked whether the series are normally distributed. We used the Jarque-Bera test for normality that measures the difference of the skewness (S) and Kurtosis (K) of the series with those from the normal distribution. The statistic is computed as:

$$jarque - Bera = \frac{N}{6}(S^2 + \frac{(K-3)^2}{4})$$

Additionally, we have checked for autocorrelation that is critical because the only variable we have is autocorrelated GDP per capita. We use the ADF test to control null hypothesis H_0 that in our case is the random walk of the series. Consider a simple AR (1) process:

$$Y_t = \rho Y_{t-1} + e_t$$

If ρ is equal larger than 1 then the series is non-stationary and the variance of Y increases with time and approaches infinity, otherwise Y acts as a trend- stationary series. Thus, the null hypothesis is rejected if ρ is less than one. Under the ADF test:

$$Y_t = \rho Y_{t-1} + e_t$$

Where α = ρ- 1 two hypotheses can be written as:

H_0: α = 0

H_1: α < 0

Moreover, estimated using the conventional t-ratio for α:

$$t_a = \frac{\hat{a}}{se(\hat{a})}$$

Where (a)ˆthe estimation of α and se ((a)) is the coefficient standard error. Under the null hypothesis, the statistic does not follow the student's t distribution and they derive asymptotic results and simulate critical values for various samples and results. The hypothesis is tested under the t- ratio.

3. Results

The under examination sample consists of a sixty-six (1950-2016) for Greenland cut in two pieces from (1950-1981) and (1981-2016) respectively. We used the Conference Board and Groningen Growth and Development Centre, Total Economy Database, as it was on March 2017

report. We used the statistic software SPSS™ for this analysis and its tool of spectral analysis with weight Tukey – Hanning and span 3 the closer odd integer higher than the smallest period (One year for this sample). We plotted spectrograms comparing the changing periodicity. The spectrograms results are given to the table below:

Table 1: Model Results

Period	1950-1981	1982-2016
Years	20	11

As the results show, Greenland did not still managed to reach the initial cycle length 35 years after EU leaving. The OTC agreement as presented on the second part did not seem to lower the cycle frequency. Economic consequences after the short EC membership period and benefits of integration where also not shown. We expected that the periodicity would rise as happened in the cases of both EAC and EU countries. The major difference is that in the long term and after the needed adjustments that lasted from 15 to 24 years in the cases of EU countries, the expected result was the periodicity regain or even rising. In the present case however, the effects are surprisingly different. Country's economic stability seem to be still lower than the pre-referendum period delaying from its "motherland" Denmark which pioneered in economic stability restoration process after 1973 integration. The production base of the country did not change due to its balance of payments structure (based on fishery) and the platform that Denmark provided being its major trading partner.

On EC expansion it had taken UK 19 years (until 1992) to raise its periodicity. A possible expansion of the UK production that will be needed after the brexit will take even more time. During this period, UK will have to find new trading allies to enchase international trade fairly long from its well-known continent where trade will be imposed. In the case of UK, there would be no possible kind of platform making the economic restabilisation process even longer. Major business and capital flight despite UK's importance to the world economy has already begun. On the other hand, an expected fact is that a country of UK size could easier recoup from the EU leaving turbulence but the real effects of the withdrawing will be remedied in the long term.

4. Discussion

In the present work, we are presenting the facts under the periodicity of business cycles of Greenland the first withdrawn country before the 2016 Brexit. Even though the size of this run along decision cannot be comparable to any economic or political historical fact the consequences and the similarities can be more or less predicted. The immediate effect of this quail will be the economic activity decline due to destabilization in a similar way that presented in the case of primary EAC dissolution. The UK should find new trade partners beyond the current situation of its balance of payments and its major coadjutor the EU. The remaining members will impose tariffs and duties to reduce the trade volume. UK also should change its

production base as long as the country cannot import all needed goods or specialize on some markets in order to enchase its exports.

After a short presence in the EC Greenland has chosen to keep a platform relationship with the economic union. However, this option will not be available for a full member such as UK. The EU policy is to minimize any economic relation between participants and the UK. The country has to limit the reforming time in order to regain its economic stability. Although the results of the spectral analysis for Greenland show that country has not reached its pre-referendum economic stability yet. Larger countries will have a time advantage on remedy process but it will take long time for UK to return. Long-term consequences are not known yet and someone should examine the structure of the future economy and its policies in order to predict this phenomenon. On a further research, someone could count the possible long-term cost of this vote for the country and its citizens. However, this work targets to open a discussion over this recede and its ramification.

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