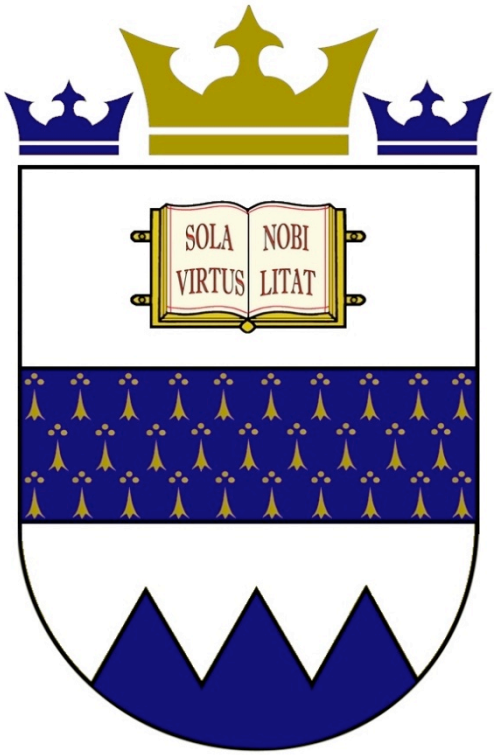

UGSM-Monarch Business School

Doctoral Dissertation Proposal

Cyclical Fluctuations Of Aggregate Economic Activity In The EMU Context: An Empirical Approach

PROGRAM:	D.Phil. / Ph.D. in Economics
SUBMISSION DATE:	June 12, 2012
CANDIDATE:	Mr. Dionysios K. Solomos, B.A., M.Sc.
PROPOSAL SUPERVISOR:	Dr. Dimitrios Koumparoulis, Ph.D., D.Phil.
THESIS SUPERVISOR:	Dr. Dimitrios Koumparoulis, Ph.D., D.Phil.

Final Submission For Authorization

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1.0 INTRODUCTION

All modern economies experience significant movements in aggregate economic activity. There are boom periods where output is rising strongly and unemployment is low while there are economic periods where the economy is operating significantly below capacity and employment is falling. The former indicates a period of prosperity and the latter a period of economic decline. The term “Business cycle” is widely understood as the combination of phases of growth and decline in an economy. Specifically, the business cycle refers to the periodic but irregular up-and-down swings in economic performance measured and determined by fluctuations in macroeconomic aggregates (Bade & Parkin, 2003). Measuring business cycles is considered to be a crucial matter in order to disclose the main and abiding features of economic activity and to expose the driving forces behind business cycle fluctuations.

Within a review of the empirical literature, the analysis of business cycles in the EMU context appears to be lacking research with respect to the determinants of business cycle fluctuations and their causes, the nature of integration concerning the degree of synchronization among counterparts and the effects of globalization on business cycles. The contemplated research sets out to develop a deep understanding of the cyclical fluctuations of aggregate economic activity in the Eurozone.

2.0 THE RESEARCH QUESTION

The aim of the research is to bring increased attention to the nature of business cycles from the perspective of the combination of business cycle theory and empirical evidence in the EMU context. Thus, the main research question has been developed and defined as:

Main Research Question:

> "What are the driving forces behind the cyclical fluctuations found in aggregate economic activity of EMU countries with respect to the factors that drive changes in the determinants of business cycle?"

3.0 THE RESEARCH RELEVANCE

Research on how economic aggregates behave, what causes a business cycle and the determination as to what are the sources that drive business cycle fluctuations, is crucial in order to give an insight into how economies work and to some extent to be able to make reliable predictions concerning economic performance. Also, as reflected within the academic literature it is deemed that further research in the field of empirical evidence on business cycle theory should prove to be critical in the development of the business cycle literature.

Even though there has been significant research carried out by economists in business cycle theory, the significance of the contemplated research is to fill the gap within the literature and to attempt to provide contemporary insight into the following interesting topics. Thus, the significance of the research is to determine four main objectives:

1. To examine the determinants of business cycle fluctuations in the EMU context and to investigate their role in driving business cycle fluctuations;
2. To evaluate the degree of business cycle synchronization among European Monetary Union member states and to test for Optimum Currency Area endogeneity;
3. To explore the underlying factors behind business cycle synchronization in the Eurozone, and;
4. To investigate whether there is an international business cycle.

The scope of the research provides opportunity in contributing original knowledge within the existing literature from the perspective that the contemplated research will trace the aspects and the developments of the ongoing economic crisis and will examine a series of both quantitative and qualitative indicators and factors using modern sophisticated econometric methods. The research will integrate the theoretical work of the different schools of economic thought along with the empirical evidence on the business cycle in an effort to fill the existing gaps and expand the domain of scholarly and scientific literature.

4.0 CONTRIBUTION TO EXISTING KNOWLEDGE

The nature of the present research is to contribute significantly to the knowledge of the topics mentioned above. On a larger scale, the contemplated research should aid in compiling the existing literature, discovering the gaps within the existing literature and attempting to answer new questions that arise as a result of the developments of the ongoing economic crisis and performance presently being experienced. The contemplated research should thus contribute to knowledge through the development of the following four main topics:

- The Determinants of the Business Cycle
- Business Cycle Synchronization
- The Determinants of Business Cycle Synchronization
- The International Business Cycle

4.1 THE DETERMINANTS OF THE BUSINESS CYCLE

Business cycle volatility is generally considered an important factor of a wide range of economic outcomes. As a result, it is of great interest to focus scholarly attention on business cycle determinants. In that framework, the present research will investigate whether variables from the following four categories are related to business cycle volatility: i) macroeconomic policy in regards of fiscal policy indicators; ii) trade and financial integration; iii) financial sector, and; iv) the quality of institutions. Also, a matter of importance is the relation of the procedure of elections to the volatility and the procedure

of integration (European case). The research will provide evidence in favor or against the existence of political business cycles. The potential determinants under investigation will be checked for their robustness in a wide time period.

4.2 BUSINESS CYCLE SYNCHRONIZATION

The research will investigate the synchronization of the Eurozone and European Union member states business cycles. Second, the research will validate whether the introduction of the euro has created imbalances within the Eurozone. In addition, a concern is to trace the development of business cycles in the EMU context aiming to find out whether there is a division between core and periphery. Third, several variables will be used to check for synchronization instead of limiting the analysis to GDP or industrial production. Finally, we will widen the time series data set in order to take into account the impacts of the ongoing systemic crisis of the Eurozone.

4.3 DETERMINANTS OF BUSINESS CYCLE SYNCHRONIZATION

An attempt to explore the underlying factors behind business cycle synchronization in Europe will be made, extending inter alias the vector of potential determinants in the models under estimation including both quantitative and qualitative high-frequency indicators.

4.4 INTERNATIONAL BUSINESS CYCLE

The primary objective of the analysis will be to investigate the sources of both international business cycle fluctuations and the time path of volatility using a significant number of both quantitative and qualitative high-frequency indicators in order (also including institutional variables and aspects of the so-called political business cycle) to explain the fluctuations of the business cycle. The aim is to decompose the variance of both economic activity and aggregates into common global factor (terminology, not in plural) and domestic components so as to discover the extent of both common global and domestic features in driving the fluctuations of the business cycle. The research will be updated capturing a great number of countries and time periods tracing inter alias the evolution of the current crisis.

5.0 RESEARCH METHODOLOGY

The employed research methodology will be quantitative by way of an empirical analysis on business cycle theory. The research methodology will have the following structure:

1. Literature Research: a literature research review of surveys, journal articles, books, working papers and dissertations relevant to the particular issue will be concluded. The development of the literature

research requires four stages: problem formulation, literature search, data evaluation and analysis-interpretation;

2. Data Collection: data will be collected from various sources of economic and financial indicators constituted from official databases such as AMECO, World Economic Outlook, Eurostat, CEIC data, etc;
3. Econometric Tools: Panel Regressions, VAR Analysis, Granger Causalities, Clustering and Dynamic Factor Models will be used, and;
4. Statistical Packages: E-VIEWS, STATA, SPSS will be employed.

6.0 THE LITERATURE REVIEW

6.1 DEFINITION OF BUSINESS CYCLE

The standard definition of business cycles is provided by the seminal work of Burns and Mitchell (1946):

> *"Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; in duration, business cycles vary from more than one year to ten or twelve years; they are not divisible*

into shorter cycles of similar characteristics with amplitudes approximating their own."

Also another popular approach is that of Lucas (1977), which regards business cycles as repeated deviations or fluctuations in aggregate output around a trend which are also associated with co-movements in prices and other variables time series.

The above views of business cycles led to the definition adopted by the National Bureau of Economic Research (NBER). According to its approach, the expansion is considered the period between a trough and a peak and the recession as the period that starts at the peak of business cycle and ends at the trough. Concisely, the NBER define a recession as, "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales."

Attempts at modeling business cycles have focused on the recurrent nature of fluctuations in aggregate economic activity. The objective of business cycle theorists is to develop a theoretical model which can determine the causes that drive business cycles fluctuations. The analysis of the sources of

business cycles is organized into different schools of thought which share different views concerning the explanation of business cycle fluctuations.

6.2 REAL BUSINESS CYCLE THEORY – SUPPLY SIDE

The main intuition of real business cycle theory is that business cycle fluctuations can be accounted for by real shocks. Recessions and expansions are considered as responses to exogenous shocks of the real economic environment where cyclically volatile technology and productivity shocks are the central driver of business cycle fluctuations. This theory has its foundations on the seminal works of Kydland and Prescott (1982) and Long and Plosser (1983) who were the first to build a business cycle model that included market clearing without monetary factors and economic policy. Kydland and Prescott (1982) underpinned the role of technological shocks in driving the fluctuations of business cycles, i.e.: the supply side explanations. Their contribution on business cycle theory was significant since they introduced three revolutionary ideas: i) the use of dynamic equilibrium models to estimate business cycles; ii) the utilization of calibration procedure where the parameters of the theoretical model are adjusted so as to replicate the observed economic facts, and; iii) the notion that business cycles must be consistent with growth theory. Overall, understanding the basic real business cycle model, we can notice that the behavior of aggregate variables depends on the disturbances of technology. Particularly, a productivity disturbance

results in a dynamic response of the individual agent who seeks to maximize his utility subject to certain constraints such as technology and information parameters and involves variations in economic aggregates over many periods. Also, since agents maximize utility and welfare, there are no market failures. All in all, the real business cycle framework is a dynamic optimization problem subject to certain constraints including current and future exogenous shocks (Plosser 1989).

6.3 KEYNESIAN BUSINESS CYCLE THEORY – DEMAND SIDE

According to the Keynesian school, the sources of business cycle fluctuations are shocks in aggregate demand which cause short run equilibriums in the economy which are different from the level of full employment. The aggregate demand shocks can be described as shocks to the IS and LM curves caused by discretionary fiscal policy, changes in investment, saving decisions and money demand or supply. Keynesian business cycle theory can be divided into two broad categories: the multiplier-accelerator cycle models (Keynesians) (Samuelson, 1939; Metzler, 1941; Hicks, 1949; Duesenberry, 1949; Duesenberry, 1958;) and the endogenous cycle models (Post-Keynesians) (Kaldor, 1940; Kalecki, 1954; Goodwin, 1951; Goodwin 1967). On the one hand, the basic principal of the multiplier is that investment increases output due to a “multiplier” which determines the relationship between the equilibrium output and the component of spending while the

intuition of “acceleration” is that investment decisions in part depend on the expectations of future spending which affect the level of aggregate output. Keynesian economists examined the dynamic properties of investment and output and their interdependence developing inter alias business cycles. The multiplier-accelerator approach implies that cycles are generated by exogenous shocks or exogenous explosive dynamics (Hicks, 1949). On the other hand, Post-Keynesians disapprove of the linear dynamic structure used by Keynesians in multiplier-accelerator cycles. They support the view that non-linear dynamics are capable of dealing with endogenous fluctuations which are considered to arise endogenously as the outcome of a working economy. Recently, New-Keynesian economists (Danthine & Donaldson, 1990; Kiyotaki, 1985; Burnside, Eichenboum & Rebelo, 1990) attempted to expand the RBC techniques incorporating Keynesian features such as the importance of market power, market failure, and real and nominal rigidities in the business cycle. New-Keynesian approaches indicate that the reason why the economy cannot reach full employment is that there are nominal rigidities such as on the labor market. The role of both fiscal and monetary policy is also stressed in driving the fluctuations of business cycle.

6.4 AUSTRIAN BUSINESS CYCLE THEORY

Austrian business cycle theory has its roots in capital-based Austrian macroeconomic theory where Eugen von Böhm-Bawerk’s work on capital is

considered a landmark for the Austrian School. Austrian business cycle theory, whose main proponents are Ludwig von Mises (1912) and F.A. Hayek (1933) considers that business cycles are caused by the interference of monetary authorities who set interest rates in such a way as to result in excessive credit creation. Specifically, during upturns central banks grant liquidity which shifts investment demand beyond aggregate society's willingness to save. This excessive credit creation generates a mismatch between the economy's productive capacity and society's intertemporal spending intentions (Oppers, 2002). A period of low interest rates will cause a recession which would not recover unless this mismatch is fixed. Also, Austrian economists state that countercyclical discretionary monetary policy with further interest rates cuts would not correct the imbalance between investment and saving (Steele, 2008) but would only postpone the structural adjustment that is deemed necessary. The Austrian School methods have been criticized by mainstream economists such as Friedman and Krugman due to the fact that there has been little quantitative research which supports the theory and that the limited econometric work existing supports rival explanation (Wainhouse, 1984; Yaeger, 1986).

6.5 MEASUREMENT OF THE BUSINESS CYCLE

A crucial issue in business cycle theory is the measurement of business cycles. This procedure requires the isolation of the cyclical component or the

business cycle component of the fluctuations in economic variables. There are several methods for identifying the cyclical component of a time series; however, there is an open methodological issue and disagreement over the appropriate definition of “business cycle” (Massman & Mitchell, 2003). The methods of business cycle identification can be divided into growth cycle models and classical cycles. Growth cycle models include the parametric methods (Beveridge-Nelson decomposition, unobserved component models, linear regression models) and non-parametric methods (a centered moving average, Hodrick-Prescott filter, Baxter-King ideal band pass filter, the phase average trend). Classical cycles refer to cycles defined in terms of turning points based on original series.

6.6 BUSINESS CYCLE SYNCHRONIZATION

In many regards, the phenomenon of globalization has tied countries more closely together. Capital markets have become more integrated, cross-border capital flows and international trade has augmented significantly. Trade openness and financial integration have brought about extensive interdependence and linkages among the economies of countries. These developments have changed the nature of business cycles and have raised the matter of whether enhanced financial, trade and macroeconomic interconnections have increased the degree of synchronization of business cycles.

Business cycle synchronization has been a widely investigated topic in business cycle theory and has indeed attracted increasing attention among economists in the last twenty years. In the framework of business cycle synchronization, the analysis of currency areas' functions and properties is common place and is widely investigated (Artis ad Zhung, 1995; Darvas & Szapary, 2005; Massmann & Mitchell, 2003; Papageorgiou et al., 2010; Levasseur, 2008; Kapler, 2008; Lehwald, 2012; Kose et al., 2003). Business cycle synchronization is closely associated with the theory of the so-called Optimal Currency Areas (OCA) where optimality is defined in terms of criteria which country-members must comply, the OCA properties, such as: price and wage flexibility, mobility of production factors, similarities in macroeconomic indices and in general synchronized business cycles (Mundell, 1961; Mc Kinnon, 1963; Kenen, 1969; Tavlas, 1993; Bayoumi & Eichengreen, 1997).

In this context, there is the view that participation in a monetary union may itself lead to greater business cycle synchronization. Frankel and Rose (1998) argue that more trade openness and trade integration will lead to more synchronized business cycles. Rose (2000) finds that common currencies are positively correlated with trade (Rose, 2000). Also, Darvas and Szapary (2005) support the hypothesis of the OCA endogeneity arguing that common monetary policy reduces the asymmetricity of policy responses since

monetary policy is administered by the ECB while fiscal policy is constrained by the Stability and Growth Pact.

Conversely, Krugman (1991) states that increasing integration and openness will lead to specialization of industrial activities while the likelihood of industry specific shocks (asymmetric shocks) will be augmented. Moreover, new arguments support the view that the introduction of the euro has promoted growing imbalances among Eurozone countries concerning their current accounts, private capital flows and competitiveness (Sinn et al., 2011; Breuss, 2011).

6.6.1 *Measures of Synchronization*

In order to assess synchronization we can calculate various measures which constitute indicators of business cycle synchronization. These measures include: correlations, leads or lags, volatility, persistence and impulse-response (Darvas & Szapary, 2005). The simplest way to examine business cycle synchronization is to compute contemporaneous pairwise correlations or cross correlations of the defined business cycles of countries under investigation in different time periods. The above method discloses changing patterns of synchronization. The leads or lags analysis enables us to see whether there is a contemporaneous correlation or whether some countries are considered as leaders. Notably, for an optimal currency area, a zero or

small lead or lag would be optimal. Similar volatility and persistence of time series indicate an increased degree of synchronized business cycles. Finally, impulse-response analysis shows the accumulated impact of a common shock in individual countries.

6.6.2 Literature

The literature of business cycle synchronization may be divided into three broad groups: the examination of time series properties of business cycles; the investigation of factors and sources (determinants) that drive the fluctuations in business cycle synchronization, and; the identification of structural shocks that affect synchronization.

6.6.3 Examination of Time Series Properties

The extent of synchronization can be easily examined by measuring the different indicators of synchronization. To this aim the research identifies the business cycle which is a process that entangles the detrending[1] of an indicator of economic activity, such as: GDP, industrial production, output gap etc., on a time series frame so that we may define the business cycle and discover its properties (Artis ad Zhung, 1995; Darvas & Szapary, 2005; Massmann &Mitchell, 2003; Papageorgiou et al., 2010; Levasseur, 2008). The

[1] Detrending is the statistical operation of time series data in order to remove long-term trends and isolate cyclical components.

great majority of work by economists is with bivariate correlations that measure the relationship between business cycles or other economic indicators of two countries (Darvas & Szapary, 2005; Kapler, 2008; Levasseur, 2008). Dynamic factor models are gaining in popularity among researchers (Lehwald, 2012; Kose et al., 2003). Aguiar-Conraria and Soares (2009) study business cycle synchronization with wavelets and Dueker and Wesche (1999) derive business cycles via probit models[2] in order to trace the development of synchronization. The majority of empirical evidence shows that the degree of synchronization among the business cycles of Eurozone countries has increased significantly (Darvas & Szapary, 2005; Massmann & Mitchell, 2003; Duecker & Wesche, 1999). However, there are others who do not approve of the above findings. Lehwald (2012) and Gogas and Kothroulas (2009) propose that the introduction of the euro has caused different developments in business cycle comovement in the core and the periphery.

Measures of time-varying international co-movements of economic activity can be computed via the use of VAR (Vector Auto-Regression) methods. VAR is a statistical method used to compute the linear interdependence among multiple time series of cross-sections. There exist the equation:

[2] Probit models: a type of regression where the dependent variable (binary variable) can take two values (0 or 1) for example man or woman (Pr (Y=1) = F (xb)). In the context of business cycle synchronization, probit models yield latent business cycle index.

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \ldots\ldots\ldots + A_p y_{t-p} + e_t$$

where, the variables are collected in a k × 1 vector $y_{i,t}$ for each variable explaining its evolution based on its own past values, the lags of all other variables in the model (endogenous) and a serially uncorrelated error term. The variables used must be in the same order of integration I(1), I(0). VARs come in three varieties: reduced, recursive and structural form. Structural VAR makes it possible to evaluate and quantify the direct effect of common international shocks and their indirect effect of spillovers. In general, the VAR method captures most of the business cycle co-movements of the series and it is utilized to capture aspects of synchronization.

Advances in econometric methods and technology have allowed the utilization of sophisticated methods such as the dynamic factor models. Dynamic factor models are capable of capturing common fluctuations in multiple time series of a large number of cross-sections (Kose et al., 2003; Chauvet & Yu, 2006; Aruoba et al., 2011). Also, these models allow for decomposition of the volatility of business cycles with the use of factors (world, regional, country-specific and idiosyncratic component) in order to investigate the sources of volatility. The results of decomposition can yield clear results demonstrating to what extent the world factor is an important source of volatility in economic activity, providing evidence for a world business cycle.

6.6.4 Determinants of Business Cycle Synchronization

The purpose of this analysis is to focus on the factors that drive business cycle differentials among countries in order to discover the reasons why business cycles tend to be more synchronous or less synchronous over time. Also, investigating the sources behind business cycle differentials enables researchers to analyze growth developments in a currency area (Bower & Guillemineau, 2006). This procedure involves the attempt to interpret the correlation of economic indicators via the incorporation of potential explanatory variables in the model where the dependent variable is usually a correlation coefficient (Levasseur, 2008; Bower & Guillemineau, 2006; Darvas et al., 2005). And explanatory variables can be a series of potential determinants such as: bilateral trade, external trade, financial links, indicators of fiscal indicators, indicators of labor policy, institutional efficiency, etc. Extreme bounds analysis is highly suggested in order to identify the key determinants of business cycle synchronization (Leamer & Leonard, 1981; Baxter & Kourapitsas, 2004). The subject method is based on OLS estimates where a variable is considered as “robust” when its significance is not conditional on whether or not other economic variables are included in the model equation. Particularly, a series of regressions is run adding successively additive explanatory variables and then the research identifies the extreme bounds by constructing the highest and lowest of confidence intervals of the estimated coefficients. Notably, a variable is regarded as

robust if and only if the extreme bounds share the same sign and the estimate's coefficients are statistically significant. All in all, the investigation of the determinants is considered to be a useful theoretical tool in the debate of OCA endogeneity.

6.6.5 Identification of Structural Shocks

Structural shocks may be identified by estimating demand and supply shocks identified by long term multipliers in the context of a structural VAR model and then correlating the shocks of individual countries (Bayoumi & Eichengreen, 1993; Stock & Watson, 2003). Also, structural shocks can be identified via a vector autoregression for the GDP growth rate or for the output gap (Kappler et al., 2008; Bencik 2011). The contribution of structural shocks identification is that it enables the calculation of both common and country-specific shocks determining inter alias their contribution on both business cycle development and the development of business cycle synchronization in the context of a monetary union.

6.6.6 Methodological Issues

There are some open methodological issues concerning the analysis of convergence and synchronization among business cycles. Specifically, there is a disagreement over the appropriate definition of "business cycle", how the trend should be identified and how convergence should be gauged (Massman

& Mitchell, 2003). Classical cycles refer to cycles defined in terms of turning points based on original series. Regarding synchronization of time series convergence is identified by increasing bivariate correlation, by the emergence of a common factor that drives the fluctuation of individual business cycles (reduction of the significance of country-specific factors) and by decreased cyclical disparity. Conova (1998) and Massman and Mitchell (2003) find that the properties of the business cycle depend on the method and model used to measure business cycle.

6.7 INTERNATIONAL BUSINESS CYCLE

In the modern environment of globalization and of enhanced global macroeconomic and financial interconnections and interdependences, the assessment of the state of real activity requires multi-country analysis in order to monitor the sources of business cycle fluctuations. Increasing globalization, trade openness and financial integration indicate the extensive interdependence and the linkages among countries. This fact has attracted the interest of many economists since the early 1990s in investigating the existence of an international business cycle (Kehoe & Kydland, 1993; Riezeman & Whiteman, 1992; Baxter, 1995; Kose, 2002; Kose et al., 2003; Gregory et al., 1997; Chauvet & Yu, 2006, etc).

Comprehending the sources of international business cycle fluctuations seems very crucial for firstly developing business cycle models which can approach accurately the nature of the business cycle enabling economists to make reliable predictions or to implement real-time monitoring, and/or secondly for the process of policy making. In the case that there is evidence for a global business cycle this lends support to models which concentrate their interest on the common aspects in the operation of markets and on the linkages between the countries.

The existence of an international business cycle implies that fluctuations in economic activity are common to the majority of countries because of the interconnections and interdependence among them. Consequently, the focus shifts from the analysis of country-specific characteristics such as the differences in economic policies and the institutional environment to aspects of increasing globalization, trade openness, financial integration and technology spillovers.

However, even if there is evidence for the existence of an international business cycle, further investigation is required in order to examine the extent to which common global factors affect economic activity and to determine their origin. Additionally, it is deemed necessary not to underestimate the features of the discrete domestic economic environment which continue

possibly to play an important role in explaining the fluctuations of the business cycle.

6.7.1 Theoretical Models

Globalization and trade openness is considered to be associated with higher degrees of business cycle co-movement and synchronization among countries since trade extends the magnitude of the transmission of shocks and the volume of spillovers. Recent empirical research confirms the validity of the above statement as empirical evidence indicates that increased trade and linkages among countries are linked to more synchronized business cycles. In an international setting with trade openness, financial integration and extensive interconnections among countries the increasing synchronization of business cycles implies the existence of a global business cycle.

Apart from the empirical research which attempts to identify whether there is an international business cycle, it seems crucial to try to interpret the above hypothesis from the perspective of theoretical framework. The international real business cycle (RBC) framework can be considered a useful framework regarding international macroeconomics (Gregory et al., 1997; Stock & Watson, 2003; Kose et al., 2003; Chauvet & Yu, 2006; Kose et al., 2008; Mandelman et al., 2010; Aruola et al., 2011). This is why it seems possible to

determine the effects of extensive trade on co-movements and fluctuations of the business cycle. Also, the contemplated research will examine the approaches from other economic schools of thought, such as Keynesian and Marxist business cycle theory, considering both supply-side and demand-side explanations. The primary goal of theoretical models is to investigate the determinants of business cycle fluctuations in an international setting by constructing models which can replicate findings of empirical research in business cycles.

Fundamental work on international business cycle theory is provided by Backus, Kehoe and Kydland (1993). Their research constitutes an extension of Kydland and Prescott's (1982) closed economy model (classical real business cycle model) to an international setting examining cross-country[3] co-movements of aggregate macroeconomic variables. The objective of their work is to develop a theoretical model which can determine the fluctuations of business cycles in an international setting of free trade including relative prices. Given that the model is an expansion of those of Kydland and Prescott, it retains the main features of real business cycle models, such as: the time-to-build technology and the assumption that fluctuations are caused by exogenous disturbances in productivity and technology; and, supply side explanation of fluctuations (fundamental assumption in real business cycle

[3] Cross country analysis: the extension of analysis in a large set of countries in order to identify the co-movments and the trends of the explanatory variables under investigation.

theory). Backus et al. compare the findings of the model after the simulation procedure with empirical evidence. Even if the model has an appealing interpretive capacity, there are two discrepancies between theory and data. The first is the so-called consumption/output/productivity anomaly where in the data for correlation across countries of output correlations is larger than the analogous consumption and productivity correlations. The second concerns the relative prices whereby the standard deviation (volatility) of the terms of trade is considerably larger in the data than in the model. Even though the model could not replicate 100% of the empirical findings it is considered the cornerstone of the international business cycle theory.

Since then, many extensions and new models have been produced based on the pattern of this model (Kose and Yi, 2006; Heathcote and Perri (2002); Kehoe and Perry, 2002; Canova and Marrinan, 1998). Refinements were considered necessary in order to eliminate the existing gap between theory and evidence. Some of the refinements and amendments that were deemed valuable in order to capture the nature of an international business cycle are the incorporation and investigation of traded and non-traded goods, asset goods, money (monetary dimension) and market failures.

The methodology used can be described as a maximization problem where functions of utility must be maximized subject to restrictions, such as:

technology, preferences, production function, resource constraints, etc. and setting specific parameter values and implementing a simulation procedure.

6.7.2 Empirical Research

Researchers rely on country-specific data (OECD, G7 etc.) in order to examine the fluctuations of the business cycle and to capture the phases of economic activity. Empirical research aims to response to a great number of questions concerning the determinants of business cycle volatility, the evolution (time path) of volatility (measure of variation) in time, the sources of volatility, the degree of synchronization of business cycles and the probabilities of recessions and expansions. However, its foremost objective is to give an answer to the question as to whether or not an international business cycle exists and to what extent common sources explain the variation of domestic economic activity.

Empirical research in the existing literature shows that it is crucial to choose the necessary set of macroeconomic aggregates in order to analyze the nature of the business cycle as the indicators determine the sources of the driving forces behind the fluctuations. The construction of the model requires the incorporation of macroeconomic aggregates which can approach the sources of variation and are of high-frequency. Both quantitative (economic indicators such as: trade, retail sales, production, etc.) and qualitative

indicators (institutional efficiency, economic specialization, fiscal rules, etc.) can be used as well as leading and coincident indicators that seem essential in evaluating the state of economic activity.

Economists analyze the various statistical properties of cycles and investigate the evolution of business cycles. The procedure followed in order to find out whether there is an international business cycle and to what extent common components affect national business cycles includes the investigation of how cross-country business cycle synchronization has evolved, the examination of variation of volatility and the relation of certain cyclical episodes in countries with a common global macroeconomic factor that indicates the dimension of a global business cycle.

Empirical evidence indicates the validity of the hypothesis of whether there is an international business cycle. Kose (2002) argues that business cycles of developing countries share similar characteristics to those of developed countries. Chauvet and Yu (2006) find that most of the recessions and expansions were common to the majority of OECD countries. Kose et al., (2003) state that the world factor accounts for almost 15% of the variation in output growth and it plays a significant role in explaining economic activity especially in advanced countries. Country specific components play a larger role in accounting for investment dynamics. Aruoba et al., (2011) suggest that the estimation of the common factor (multi-country analysis) with various

activity indicators enhances its ability to capture common macroeconomic fluctuations in G7 economies. Also, they find that the G7 factor picks up a substantial amount of co-movement across countries. Finally, Stock and Watson (2003) support that the volatility of economic activity in most G7 countries has moderated over 40 years and that the moderation is associated with a reduction in the magnitude of the common international shocks, indicating the important role of common international components in driving the fluctuations of national business cycles.

7.0 RESEARCH PLAN

For each of the four defined objectives, the research will be conducted as follows: the literature investigation will take place over a 8 month period; the data collection from official databases will take approximately 15 days; the econometric analysis, which is the most crucial section of the research, will cover a 2 month period and the writing up of the research will constitute the remainder of time. The manuscripts will be submitted to well known journals of economic studies for publication. In summary, the duration of the research will be approximately 36 months.

8.0 RESEARCH TIMELINE

In Table 1 below, the overview of the estimated time frame for the completion of the proposed research is presented along with the identified milestones.

TABLE 1
Research Timeline

Date	Stage
March 2012 – July 2012	Doctoral Research Start / Proposal Phase
September 2013 - March 2013	Literature Review Stage Business Cycle Theory Review: Real Business Cycle Theory, Keynesian Business Cycle Theory and Austrian Business Cycle Theory General Leadership history and modern day theories
April 2013 - July 2014	Empirical Research on the determinants of business cycle fluctuations
August 2014 – December 2014	Empirical Research on the topic of business cycle synchronization in the EMU context
January 2015 – May 2015	Empirical Research on international business cycles
June 2015 – September 2015	Writing of Manuscript and Completion of Study
October 2015	Dissertation Completion, Submission & Defense

9.0 RESEARCH BUDGET

The research will be funded privately thus no scholarship or grants will be requested in carrying out the contemplated research. The total cost of the research is estimated to be approximately 5,900 EUR, as shown in Table 2. No extra supervisory costs or other costs are being requested from UGSM-Monarch Business School Switzerland. The present research is fully funded and may commence immediately.

TABLE 2
Dissertation Research Budget

Item	Cost EUR €
Conferences	€750
Books and Article Purchases	€1000
Potential Publications	€400
Long Distance Charges	€300
Photocopies	€250
Statistical Packages	€2,500
Miscellaneous Supplies & Other Costs	€700
Total Approximate Costs	€5900

The above cost represents a general estimate of the cost to be incurred to successfully complete the research. Costs may vary. Additional cost to be funded by the researcher.

10.0 RESEARCH PROPOSAL APPROVAL

The contemplated research proposed herein has been approved by the University and the student may commence the research immediately. The student is not to deviate from the proposed research unless expressly confirmed by both the Supervisor and the University in written form.

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Approved By The University On
25-June-2012 in Zug-Switzerland
By: Dr. Jeffrey Henderson, Ph.D.

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