ECONOMIC CONVERGENCE, POLITICAL INTEGRATION AND PROSPECTS OF A MONETARY UNION IN THE EAST AFRICAN COMMUNITY

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DECLARATION

This thesis is my original work and has not been presented for award of a degree in any University or for any other award.

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DEDICATION

This work is dedicated to my wife Irene Kawira and mother Angelina Nyokabi for their prayers, encouragement and unwavering support.

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OPERATIONAL DEFINITION OF TERMS

Real economic convergence: It has two aspects, income and cyclical convergence. Income convergence occurs when there is a tendency towards the equalization of income and development. Cyclical convergence refers to the tendency of national business cycles to conform to similar pattern in East African countries.

Political integration: Refers to the growth in collective decision making ability of the EAC Secretariat.

Synchronization of business cycles: A business cycle refers to a predictable long-term pattern of alternating same trends in economic variables in periods of economic growth (recovery) and decline (recession). Synchronization of business cycles refers to the positive correlation between economies.

Trade integration index: It is an index that measures whether trade value between two countries is greater or smaller relative to trade with the world.

Unconditional convergence: Refers to a situation where countries or regions are converging to a common steady state.

Conditional convergence: It states that if the economies are further away from their long-run levels, they will tend to grow at a faster rate

ABBREVIATIONS AND ACRONYMS

AEC	African Economic Community.
ARDL	Autoregressive distributed lag
BK	Baxter-King
CEE	Central and Eastern European
CEEPI	*Collectif Europóeénd'équipes de pédagogieinstitutionnelle*
CF	Christiano-Fitzgerald
CFA	Communauté Financière d'Afrique
CMA	Common monetary Area
COMESA	Common Market for East and Southern Africa
CU	Customs Union
EAA	East African Airways
EACB	East African Currency Board
EACSO	East African Common Service Organization
EAHC	East African High Commission
EAITB	East African Income Tax Board
EAMU	EAC Monetary Union
EAPT	East African Posts and Telegraph
EBA	Extreme-bounds analysis
EC	Economic Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EMU	European and Monetary Union

EU	European Union
FDI	Foreign direct investments
FE	Fixed effects
FGLS	Feasible generalized least squares
FTA	Free trade area
GDP	Gross domestic product
GMM	Generalized methods of moments
GPP	Generalized-Purchasing Power Parity
HP	Hodrick-Prescott
IGAD	Intergovernmental Authority on Development
IPS	Im-Pesaran-Shin
LEGCO	Legislative Council
LLC	Levin-Lin-Chu
LPA	Lagos Plan of Action
MG	Mean group
OCA	Optimum currency areas
OLS	Ordinary least squares
PMG	Pooled mean group (estimator)
RE	Random effects
RECs	Regional economic communities
RPC	Relative political capacity
RTA	Regional trade agreements
SADC	Southern African Development Community

SUR	Seemingly unrelated regressions
UK	United Kingdom
UMA	Arab Maghreb Union
VAR	Vector auto-regression
WAMZ	West African Monetary Zone
WDI	World Development Indicators
WTO	World Trade Organization

ABSTRACT

The East African Community partner states are in the process of forming a monetary union and it is expected to be complete by the year 2023. The idea of a monetary union is not new in East Africa, this is because, Kenya, Uganda and Tanzania already had a monetary union during the British colonial administration under East African Currency Board. These countries had the East African shilling as a common currency. However, the East African countries have been unable to form a monetary union in the absence of a political federation. The main objective of this study was to determine the levels of real economic convergence and political integration necessary for the establishment of a monetary in the East African Community. This overall objective was achieved by assessing income convergence, business cycle synchronization, political integration and its influencing factors in the East African Community. In the case of income convergence, panel unit root tests of variables was undertaken to determine the order of integration. Variables indicated that they were integrated of order zero I (0) and one I (1) suggesting that autoregressive distributed model had to be applied in regression analysis. Empirical findings supported the presence of conditional convergence and that per capita gross domestic product growth was positively influenced by physical capital and nominal exchange rate depreciation and negatively affected by human capital and inflation rate. Business cycle synchronization was examined using three stage least square regressions and revealed that it is positively affected by trade integration and negatively affected by sectoral specialization. Graphical and correlation matrix was used to analyze political integration and factors influencing it. Study findings indicated that the level of political integration was low and was weakly related to institutional distance, social integration and economic interconnectedness. From the foregoing, it can be concluded that reduction of income differences among the partner states can be fostered through increased investments in physical capital, maintenance of a competitive exchange rate regime and a low inflation rate regime. Increased trade among partner states and promotion of sectoral homogeneity of the partner states should promote synchronization of business cycles among the partner states. Finally, low political integration can be enhanced through reduction of institutional distance, increased social integration and increased intra-EAC trade as captured by economic interconnectedness variable.

CHAPTER ONE

INTRODUCTION

1.1 Background

There has been increased regionalization of world trade partly due to frustrations occasioned by the sluggish nature of trade negotiations under the World Trade Organization (WTO) (Zahrnt, 2005). Many governments have opted for trade liberalization on a preferential basis through bilateral and regional trade agreements (RTAs). Expectations are that there will be increased regionalization of the international monetary system over the next decades (Cohen, 2008). This is because of globalization of financial markets where promotion of capital mobility enhances market agents' authority at the expense of independent governments.

Africa has not been left behind in terms of regionalization of trade. There are about 14 RTAs in Africa. The proliferation of RTAs in Africa can be traced to the Lagos Plan of Action (LPA) of 1980 and the Abuja Treaty of 1990 which called for increased regional cooperation and integration in Africa (Ng'eno, 2007). The LPA recommended that Africa should be divided into four sub-regional blocs: Southern Africa, West Africa, North Africa, Central and Eastern Africa (Ng'eno, 2008). These RTAs were to progressively evolve through three distinct stages: free trade area (FTA), customs union (CU) and finally economic community (EC), after which they will merge to form the African Economic Community (AEC).

The formation of a monetary union for the whole of Africa is one of the objectives of the African Union (AU). The Treaty establishing the AEC recognizes that all Africa's regional economic communities (RECs) are important pillars and building blocs towards the formation of an "African Monetary Union, a single African Central Bank and the creation of a single African currency" (AU, 2013: 11). According to Masson and Pattillo (2004), there are two main reasons that can explain the enthusiasm for an Africa-wide monetary union: the successful inauguration of the Euro and the need to overcome perceived economic and political weaknesses.

The AU strategy for establishing a Monetary Union in African is dependent upon the formation of monetary unions in the RECs. Even though there are many RECs that exist on the African continent such as the East African Community (EAC), five of the RECs are regarded as the main building blocs for the establishment of the envisaged African Monetary Union. They include the Common Market for East and Southern Africa (COMESA), the Economic Community of Central African States (ECCAS), the Southern African Development Community (SADC), the Arab Maghreb Union (UMA) and the Economic Community of West African States (ECOWAS). These RECs are at varying stages of implementing the Abuja Treaty and monetary cooperation programs.

Just like the European Union (EU), Africa has adopted a linear model of market integration where goods, labour and capital markets are integrated in a step like manner which climaxes with monetary and fiscal integration (Hartzenberg, 2011). The starting point is usually FTA, followed by a customs union, a common market, monetary union and eventually a political union. McCarthy (2008) argues that the linear model of market integration is likely to be trade creating if partner states have production structures that are competitive, suggesting an overlap of a larger range of producers. Questions about the appropriateness of this linear model of market integration in Africa have been raised (Economic commission for Africa, 2010; Hartzenberg, 2011). Kingsolver (2011) found that social integration as opposed to economic interconnectedness as the main factor driving political integration in Europe. This was taken to mean that the spill-over theory guiding European integration, that is economic interconnectedness will naturally lead to political integration, had largely failed. Section 1.1.1 provides a historical background of the EAC which dates back from the colonial period and describe how EAC integration process has evolved over time.

1.1.1 Historical Background of the current East African Community

Regional economic integration initiative in the East African region is not new and dates back to the colonial period where the then Kenya, Uganda and Tanzania (Tanganyika) were part of the British colonial administration. Regional economic integration in EAC has evolved over five phases. Construction and completion of the Kenya Uganda Railway by the colonial administration (1895-1903) marked the beginning of the 1st phase (1903-1947) of socio-economic and political cooperation in the region (Finizio, Levi and Vallinito, 2011). Kenya and Uganda had a customs union in 1917, which Tanganyika joined in 1927. The 2nd phase of economic cooperation can be traced from 1948 when the East African High Commission (EAHC) was formed with the colonial office for the three Governors and the Legislative Council (LEGCO) as the main decision making organs.

In 1961, the East African Common Service Organization (EACSO) succeeded the EAHC and this marked the 3rd phase (1961-1967) of regional integration in East Africa. During this time, the scope of administration and common services were broadened. Most of the EACSO operations were headquartered in Nairobi, this coupled with persistent inequality among the three territories created a centre-periphery relations in the region. Newlyn (1971) notes that uneven distribution of common market gains and clustering of industries in Kenya created disaffection among the other two countries. However, these challenges did not dampen interest in regional economic integration and in 1967; the 1st East African Community (EAC) was established by sovereign states after re-conceptualization and restructuring of EACSO.

The period 1967-1977 marked the 4th phase of regional cooperation in East Africa. The EAC community collapsed in 1977 due to lack of steering function, perceived unequal distribution of benefits and ideological differences. In addition, there was lack of political will to confront and solve the problems bedeviling the community and the continued perception of unequal distribution of benefits (Ng'eno, 2008). At the time of collapse, the EAC was the most advanced regional economic bloc in the world because it was already a fully-fledged customs union and common market.

Heads of states of the three EAC partner states continued to make effort to revitalize regional cooperation. For instance, on 30th November, 1993, Heads of States signed an agreement for the establishment of the Permanent Tripartite Commission for East African Cooperation. Regional cooperation was further enhanced on 14th March, 1996 when the

Secretariat of the Permanent Tripartite Commission was launched at the headquarters, Arusha Tanzania. The main achievement of the Commission was developing Treaty for the establishment of the current EAC which was signed in Arusha on 30th November, 1999. The Treaty establishing the EAC came into force on 7th July, 2001. The period 1999 up-to-date is the 5th phase of regional cooperation in EAC.

The new EAC has five partner states after accession by Rwanda and Burundi in 2007. According to the AU (2013), the EAC is the most advanced REC on the African continent. The EAC Treaty envisions the setting up of a customs union and a common market, both as transitional stages towards a monetary union and political union (Durevall, 2011). The Customs Union protocol of EAC was signed in April 2004 and became effective in January 2005 while the signing of the common market protocol by partner states was in November 2009 and ratified in 2010 (EAC, 2011).

The definitive aim of the EAC is the formation of a political union (Durevall, 2011). Article 123 (6) of the EAC treaty states that “the Summit shall initiate the process towards the establishment of a Political Federation of the Partner States by directing the Council to undertake the process” (EAC, 2007: 98). It is important to note that before independence, Julius Nyerere of Tanzania was enthusiastic about the creation of East African Federation. However, there was less enthusiasm about this idea from Kenya soon after independence.

To explore possibilities of a political union in EAC, political dialogue sessions have been held by the partner states. The 1st political dialogue was held in Kampala, Uganda, 17th-

18th November, 2011. The objective of the dialogue was to discuss, encourage and advocate inclusiveness and involvement of people of EAC to augment political resolve towards political integration. Researchers were encouraged to identify research topics to enhance debate in line with the integration agenda.

The 2nd dialogue session was held in Dar es Salaam, Tanzania on 18th-19th April, 2012. The discussions were based on the rationale that for economic integration to occur there is need for a political authority that is strong to enforce implementation of regional-wide policies. One of the observations of this political dialogue was that political integration should not just be viewed as the last stage of integration but that the other stages of integration are likely to flourish when supranationalism is espoused. The 3rd dialogue was held on 3rd-4th June, 2013 in Kigali, Rwanda.

However, since 2013, enthusiasm about these political dialogues appears to have declined and political differences increased among the partner states. For instance, in 2013, Kenya, Uganda and Rwanda started an arrangement called "coalition of the willing" mainly to fast rack infrastructure development along the Northern Corridor. This variant of trade arrangement where some partner states move faster than others in some matters, is referred to as variable geometry. Such an arrangement can create a sense of being sidelined. For example, this was the view held by Tanzania and Burundi, which are not part of the coalition of the willing. Kenya and Tanzania have been strategizing on how to dominate transport artery into the interior of the East African region. This has occasioned moments of disharmony among the partner states, especially between Kenya and

Tanzania. Such instances highlight difficulties of moving towards political integration. The formation of a political union in the EAC will be the last and the most important stage of regional economic integration. A complete or total political integration will mean that the EAC countries are ready to cede their sovereignty to a supranational institution. It will be as if the EAC countries will cease to be independent states but one country with common foreign, fiscal and social policies such as health and education including a single army. The long-run success of any monetary union will be dependent upon continued process of political integration. Political integration is useful in dealing with asymmetric shocks especially those that are political in nature (De Grauwe, 2009). Section 1.1.2 provides a detailed account of monetary cooperation in EAC, which is not new and started during the colonial period.

1.1.2 Origin of monetary cooperation in East Africa

Annexation of Kenya and Uganda by the British in the 19th Century led to the creation of common payment and monetary system of the two territories. During this time, the Indian Rupee was the currency in circulation. In 1919, after the end of the 1st World War, Tanganyika was taken over by the British as a mandate territory under the League of Nations. The East African Currency Board (EACB) was established in 1919 to issue currency for the three territories. The unit of currency that was issued by the EACB was the East African Shilling (Sh). This East African shilling had a parity of 20 East African shilling = one British Sterling Pound.

For a long time, EACB operated under the supervision of the Bank of England in London but each territory made laws to make the East African shilling the only legal tender. In addition, the East African territories were part of the Sterling Area meaning that the East African shilling was tied to the British Pound. Thus, any fiscal or monetary policy by the British Treasury and Bank of England had a bearing on the East African shilling. The three East African territories were passive about monetary policy which was under the determination of the Bank of England. This suggests that EACB was only concerned with issuance of currency through minting of coins, printing of notes, distribution, withdrawal and demonetization in case of need (Mtei, 2005).

As independence of the three East African British Protectorates drew near, there was an assumption that the EACB would evolve and become Federal Bank of East Africa. To this end, EACB moved its headquarters from London to Nairobi in June 1960. Tanganyika (hereinafter Tanzania) was the first East African country to attain independence in December 1961. Nonetheless, monetary cooperation in East Africa continued and the EACB was one of the common services retained under EASCO and the head of the EASCO was the Chairman of the EACB. Other members were Permanent Secretaries of the Ministries of Finance; the Bank of England continued to offer technical advice. During this time, the EACB was regarded as a precursor to the Federal Central Bank of East Africa.

In 1964, Tanzania commissioned a study under a senior official (DR. Erwin Blumenthal) of German Bundesbank to study the operations of the EACB and recommend whether it could be developed into a Central Bank for the three East African countries. One of the main outcomes of the study was that such a Central Bank would operate effectively under a federal government which is able to administer common economic and financial policies for the whole East African region. Thus, the EACB had to cease to exist and in its place replaced by individual Central Banks of the three East African EA countries issuing their own currencies. The decision to wind up the EACB was arrived at in 1965 and in the same year, Bank of Tanzania was established while Central Banks of Kenya and Uganda were set up in 1966. After the formation of these independent Central Banks of the partner states have maintained their individual currencies.

There are possibilities that in future, the EAC partner states might have a common Central Bank. This is because, consultations on the formation of East African Monetary Union (EAMU) started in 2009. Expectations were that the monetary union would be in place by 2012 and have a single currency by 2015. However, the 2012 deadline was not met because of the need to build consensus on the Monetary Union Protocol. The EAMU Protocol was signed by heads of states on 30th November, 2013 in Kampala, Uganda. The process of forming a monetary union is expected to be completed by 2023.

The EAMU Protocol stresses the importance of convergence of macroeconomic variables as important preconditions before forming a monetary union. The benchmark macroeconomic indicators include a headline inflation rate of eight percent, a fiscal deficit (that includes grants) of three per cent of gross domestic product (GDP) on net present value terms, a debt to GDP ratio of 50 per cent and maintenance of a 4.5 months reserves of import cover. This can be taken to mean that partner states consider convergence of macroeconomic variables as important in the pursuit of a monetary union. In addition, Article 82 (1) of the EAC Treaty, partner states will work towards harmonizing their macro-economic policies especially those related to interest and exchange rates, fiscal and monetary policies (EAC, 2007).

Various institutional frameworks have been set up over time to support regional integration. This is referred to us the functional approach. Section 1.1.3 expounds on the institutional set up that the EAC has had since the colonial period up-to-date.

1.1.3 Institutions and Organs of the EAC: 1903-to-date

During the colonial period, there were institutions created by the British administration to promote and institutionalize its project on cooperation (Finizio, Levi and Vallinoto, 2011). Institutions in the 1st phase of integration included the East African Posts and Telegraph (EAPT-1890), the Customs Union (1917), the East African Currency Board (EACB-1919), the East African Income Tax Board (EAITB-1940) and the East African Airways (EAA-1946). Institutions during 2nd phase (1948-1961) of regional cooperation were under the EAHC. The main decision making bodies were the corporate judicial body comprising Governors of the three East African territories and the LEGCO.

The EAHC was transformed into EASCO in 1961 (3rd phase: 1961-1967) to accommodate East African presidents of territories which were gaining independence and had to replace the Governors. Three main organs of EASCO were the East African Authority, the

Central Legislative Assembly and the Triumvirates. The East African Authority was the highest decision making organ of EASCO comprising of the president of Tanganyika and Governors of Kenya and Uganda. One of its responsibilities was to assent bills from the legislative organ. Laws governing EASCO were made by the Central Legislative Assembly. The Triumvirates consisted of five Ministerial committees and was the main policy-making organ of the EASCO. There was also a Secretariat headed by a Secretary General.

The 4th phase of regional integration (1967-1977) was by governments of post-colonial period and the main organs and institutions included the East African Authority, the East African Legislative Assembly, the East African Ministers and five Councils (the Common Market Council, the Communications Council, the Economic Consultative and Planning Council, the Finance Council and the Research and Social Council. Others were the Tribunals, the East African Community Services Commission, the East African Industrial Council and the East African Development Bank. The East African Authority was the main decision making organ of the EAC and comprised heads of governments of the three countries with consensus and the main decision making process.

The signing of the treaty establishing the current EAC on 30th November, 1999 ushered in 5th phase of regional integration efforts. The EAC has seven organs under Article 9 of the treaty that run the affairs of the institutions, namely the Summit, Council of Ministers, Coordinating Committee, Sectoral Committees, and East African Court of Justice, East African Legislative Assembly and the Secretariat. The Summit comprising Heads of

States of the partner states is the highest decision making organ and sign protocols for the EAC. The Council of Ministers is the main policy making organ and is supposed to oversee and promote the implementation of EAC's vision and mission among other responsibilities.

The Secretariat is the Executive Organ of the EAC and is headed by a Secretary General selected from the partner states on a rotational basis after appointment by the Summit for a one non-renewable term of five years. The Secretariat is supposed to ensure that regulations and directives adopted by the Council of Ministers are properly implemented. The EAC partner states contribute equal amounts to run the affairs of the secretariat. This was to ensure that the countries were equal in terms of power at the EAC level and that is why they are referred to as "partner states". Section 1.1.4 provides a comparative analysis of EAC economies to provide indication of whether their economic structures are similar or not.

1.1.4 Comparative analysis of EAC economies

Countries seeking to enter into a monetary union should be as similar as possible to reduce their susceptibility to asymmetric shocks. This is because, in a monetary union, countries lose ability to use independent monetary policy to mitigate shocks but instead, a union-wide monetary policy is implemented. For a monetary policy to be effective in the context of a monetary union, the integrating countries should respond in a similar manner. Three aspects of the EAC economies are highlighted: economic structure, income differences and intra-EAC trade. Table 1.1 provides a breakdown of economic sectors of the EAC partner states including agriculture, manufacturing and services sectors.

Table 1.1: Economic sectors of the EAC partner states for selected years

Economic Sector	County	1990	1995	2000	2005	2010	2012	2015
Agriculture, value added (% of GDP)	Kenya	29.52	31.13	32.36	27.20	26.14	29.12	33.30
	Uganda	56.58	49.39	29.38	26.70	28.23	27.97	25.61
	Rwanda	-	-	-	38.40	30.55	31.00	30.17
	Tanzania	45.96	47.14	33.48	30.46	31.96	33.17	31.08
	Burundi	55.88	48.14	48.06	44.50	40.45	40.58	42.98
Manufacturing, value added (% of GDP)	Kenya	11.72	9.88	11.62	11.82	12.62	12.25	10.33
	Uganda	5.67	6.79	7.58	7.46	9.16	11.06	9.04
	Rwanda	-	-	-	5.63	6.70	6.44	6.35
	Tanzania	9.27	7.17	9.39	7.77	7.37	7.99	5.63
	Burundi	12.94	9.46	11.88	12.95	10.14	9.12	9.57
Services, value added (% of GDP)	Kenya	51.44	52.85	50.72	53.71	51.38	50.19	47.61
	Uganda	32.36	36.32	47.72	48.26	52.24	50.03	54.17
	Rwanda	-	-	-	49.79	53.35	51.20	51.55
	Tanzania	36.39	38.36	47.34	48.51	46.34	43.56	42.87
	Burundi	25.16	32.61	35.01	37.05	42.85	42.53	39.49

Data source: World Development Indicators, World Bank

In 2012, agricultural sector contribution to GDP ranged between 27.97 and 40.58 per cent of the EAC economies. However, the contribution of the agricultural sector to GDP has been on a decline since 1990-2012. In 2012, the contribution of manufacturing sector to GDP ranged between 6.44 and 12.25 per cent in the five countries. Services sector is the main economic sector for all the partner states and its contribution to GDP ranged between 42.53 and 50.19 in 2012. From the foregoing, it is clear that the EAC partner states are diverse in terms of their economic structure.

Figure 1.1 shows per capita GDPs of the EAC partner states. Per capita GDP (US$) can be used as a proxy for the level of economic development.

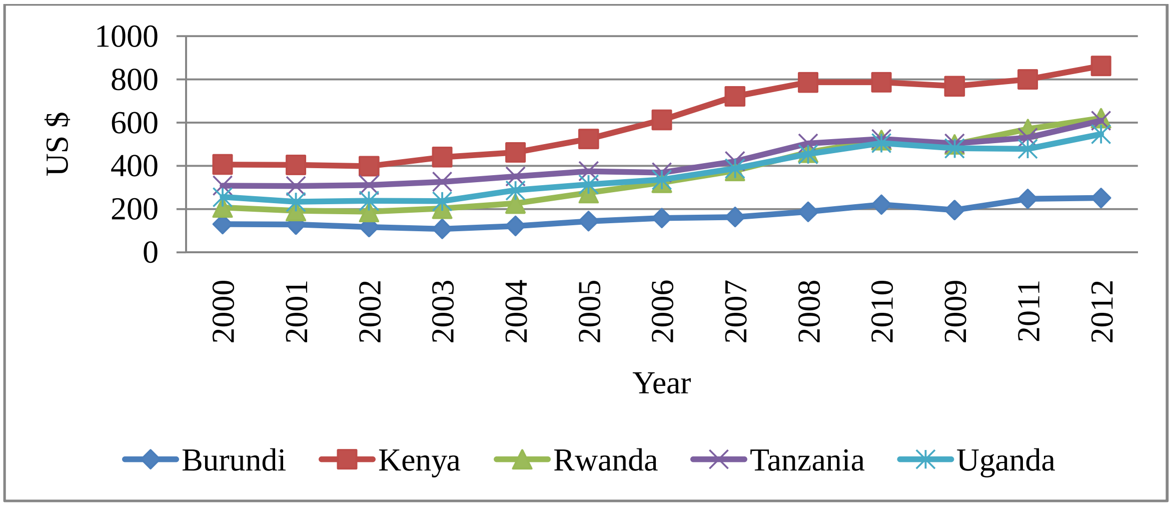

Figure 1.1: Per capita GDP (US$) of the EAC partner states: 2000-2012
Data source: World Development Indicators, World Bank.

According to Figure 1.1, there is a considerable income difference among these countries, especially when comparing Kenya and the other partner states. The EAC partner states do not trend each other in per capita GDP terms, though Rwanda, Tanzania and Uganda trend close to each other. Income difference between Kenya and Burundi is quite pronounced. Figure 1.1 also reveals that between year 2000 and 2004, per capita GDPs of the EAC partner states was treading close to each other but started to diverge from the year 2005.

The main rationale for any economic integration initiative is to enhance trade where participating countries freely export and import from each other. Figure 1.2 and 1.3 show intra-EAC exports and intra-EAC imports, respectively.

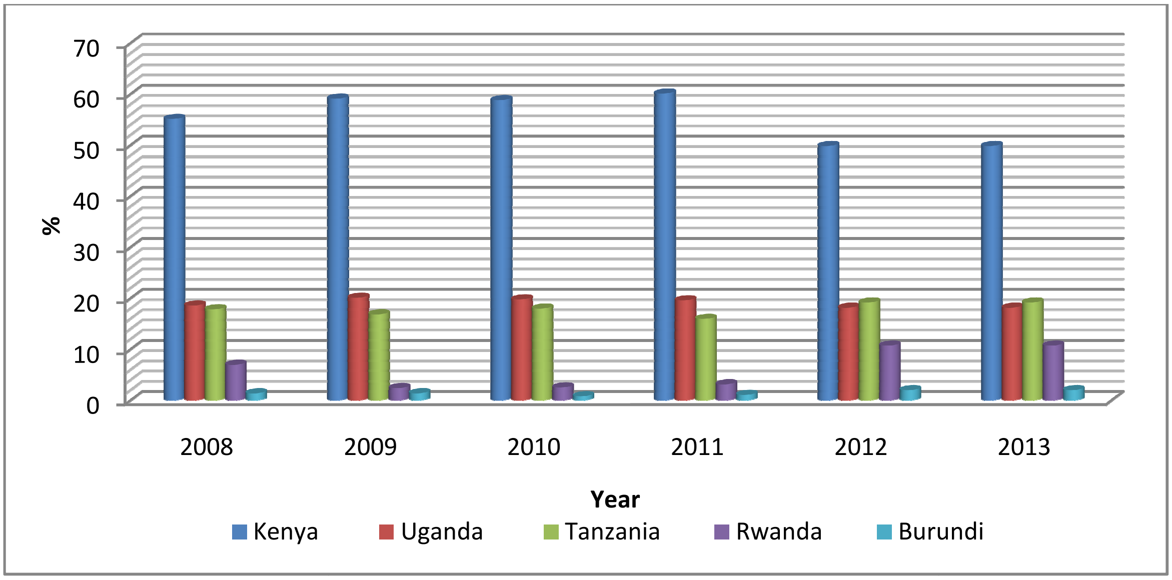

Figure 1.2: Intra-EAC exports: 2008-2013
Data source: EAC open data portal

Figure 1.2 shows that Kenya is by far the main beneficiary of the EAC market and is the leading exporter to the region. Rwanda and Burundi export very little to the other partner states. Figure 1.3 shows per cent of goods and services that the EAC partner states imports from each other.

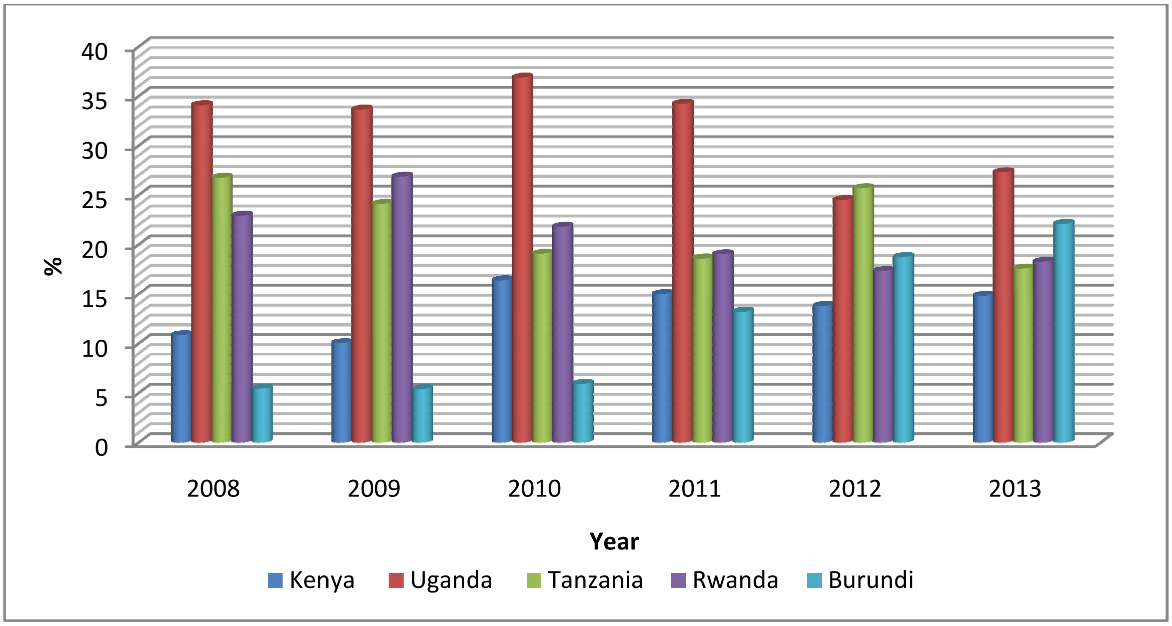

Figure 1.3: Intra-EAC imports: 2008-2013
Data source: EAC open data portal

Even though Kenya is the main exporter of goods and services to the other partner states, it imports the least from EAC. Uganda is the leading importer from the EAC partner states. One of the main factors that led to the collapse of the first EAC in 1977 was the perception of unequal benefits from regional integration and this has continued to persist as indicated in Figure 1.2. Low intra-EAC trade can be attributed to factors such as poor physical infrastructure, low manufacturing capacity, non-tariff barriers such as language and corruption, production of similar products that reduces prospects for trade and political differences among partners states, for example differences between Kenya and Tanzania on trade issues from time to time.

1.1.5 Pre-conditions for forming a monetary union

The theory of optimum currency areas (OCA) which was first put forward by Mundell (1961) points out the criteria which countries aspiring to form a monetary union should meet. The OCA theory provides criteria for judging the pros and cons of a monetary union. These criteria include the degree of capital mobility, economic diversification and openness, incidence of asymmetric shocks, similarity of inflation rate, fiscal and political will. Countries aspiring to form a monetary union should share these properties *ex-ante*. It can be inferred that those countries intending to create a monetary union should be as similar as possible.

One of the major weaknesses of the OCA theory is that it does not consider the extent of real economic convergence as an essential prerequisite for creating a monetary union (Dellas and Tavlas, 2008). However, it is the recognition of the importance of real economic convergence that made the European Central Bank and European Commission to stress its need for the Euro area entrants (Buiter, 2008). Using the OCA criteria, it can be concluded that dissimilar countries, implying different mechanisms of economic functioning should undergo a process of convergence. That is, there should be real economic convergence over time.

According to Zbigniew and Mariusz (2004), real economic convergence includes two aspects: income convergence where there is the tendency towards the equalization of incomes and development and cyclical convergence which involves a tendency towards the conformity of business cycles. These concepts are independent and should therefore be examined separately (Zbigniew and Mariusz, 2004).

Cyclical convergence is particularly important in this era of globalization where world economies are increasingly becoming integrated through various channels especially trade. This was demonstrated by the 2007-2009 global financial crises which started in the United States and led to a synchronized global economic downturn (Zorell and Dees, 2011). There is also a possibility that closer economic ties among EAC countries could have fostered business cycles.

If countries forming a monetary union are markedly dissimilar because of income and cyclical divergence, it becomes virtually impossible to institute a common monetary policy when need arises. This is because countries that enter into a monetary union lose their own national currencies and the capacity to use the exchange rate as a bulwark against internal and external shocks (Ng, 2002). Absence of real economic convergence can lead to pronounced regional differences in unemployment, incomes and growth in the event of an asymmetric shock (Schmidt and Straubhar, 1995).

Countries in the European Monetary Union (EMU) had to meet prescribed macroeconomic convergence benchmarks called Maastricht convergence criteria before hand to be allowed to join the monetary union (Van de Coevering, 2003; De Grauwe, 2009). The macroeconomic convergence criterion stated that a country could join EMU if the budget deficit was less than 3 per cent of GDP, debt to GDP ratio less than 60 per cent, inflation rate not more than 1.5 per cent of the three EU economies with the lowest rate, long-term interest rate of within 2 per cent of the three EU countries which had the lowest rate of interest and exchange rate within normal vacillation limits of the Europe's exchange rate mechanism (De Grauwe, 2009). This Maastricht criterion was devised to realize convergence of fiscal, monetary and structural policies (Warin, Wunnava and Janicki, 2009).

Both the EAMU and EMU have placed particular emphasis on nominal convergence of macroeconomic variables. However, Schmidt and Straubhaar (1995) and Van de Coevering (2003) argue that convergence of nominal variables is neither necessary nor sufficient condition for entering into a monetary union. De Grauwe (2007) for example argues that sustainable budgetary policies and low levels inflation are necessary regardless of whether countries want to establish a monetary union. Nominal convergence alone cannot indicate how well countries will perform once they are in a monetary union and fails to select those countries that constitute an optimal currency area (De Grauwe, 2007). Thus, the macroeconomic convergence can be seen as instilling macroeconomic stability or discipline but cannot tell how a country will perform once it joins a monetary union.

The launch of the Euro currency in January 2002 was seen as a major milestone in terms of monetary unification in the European Union (EU). Hitherto the sovereign debt crises that afflicted the EMU towards the end of 2009, the Eurozone had been considered as a success story and drawn the interest of many regional trade bodies around the world. The anticipation was that the introduction of the Euro as a currency in Europe would facilitate growth, employment and sound budgets in participating nations (Hishow, 2007).

The Eurozone sovereign debt crisis served to demonstrate that monetary unification is a fragile undertaking. The effect of the Eurozone crisis raised doubts about the survival of the EMU (Bergsten and Kirkegaard, 2012). Varied reasons have been advanced in an attempt to explain the Eurozone debt crisis. Feldstein (2012) argued that the predicament facing the Eurozone was caused by imposing a common currency among heterogeneous groups of countries. The EMU has also been criticized on the basis of conception (Mourlon-Druol, 2011) and gaps in initial policy architecture (Buti and Carnot, 2012).

Another line of argument is that EMU is not hinged in a political union. De Grauwe (2009; 2011; 2012) stresses that satisfying the OCA criteria is not enough but that a monetary union must be rooted in a political union to function effectively or for it to endure in the long-term. Eichengreen (2012) observes that EMU underemphasized political economy considerations. De Grauwe (2010) identifies two lines of weakness that have marred the Eurozone's foundation since its inception. Both weaknesses are associated with the fact that EMU is not rooted in a robust political union. First, it lacks a mechanism that can ensure competitive positions of member states convergence to prevent a major trade imbalance. Second, there is no mechanism to resolve crises triggered by these imbalances and deviating competitive positions.

From the foregoing, it is important that the proposed EAMU be hinged in a political union at inception. According to Buiter (2008), those monetary unions that were set up before political unification never survived. Notwithstanding Buiter (2008) assertion, the Common Monetary Area (CMA) composed of the Kingdoms of Lesotho and Swaziland, Namibia and Republic of South Africa and the CFA franc zones composed of French speaking West and Central African States and Equatorial are monetary unions still in existence in Sub-Saharan Africa (SSA) (Debrun, Masson and Patillo, 2010) without political union.

De Grauwe (2006, 2009) observes that a monetary union should be hinged in a political union to be a sustainable undertaking in the long-run. This is because of the following reasons: first, it is possible to organize fiscal transfer to regions experiencing asymmetric shocks. This creates a sense of belonging to the union and strengthens its socio-political base. Second, asymmetric shocks that have political origin can be reduced, for example through spending and taxation policies, wage and social policies. Third, in a political union, it is likely to have a fiscal policy at the level of the union that can complement monetary policy. This would make it easy to create a central budget to stabilize business cycles when they occur.

Before the creation of the EMU and the adoption of the Euro, studies had concluded that the Eurozone was not yet a monetary union (Eichengreen 1991; Van de Coevering, 2003). Guillaume and Stasavage (2000) have also suggested that countries in Africa should not form monetary unions. This is because transaction cost benefits of embracing a common currency is possible to be low for countries that trade less with each other.

1.2 Statement of the problem

The idea of a monetary union is not new in EAC because the partner states had EACB prior to independence and which issued common currency (East African shilling) to Kenya, Uganda and Tanganyika. A few years after attaining independence, each of the EAC partner state established their own separate Central Banks (Tanzania-1965, Kenya and Uganda-1966) and thus maintained different currencies. Since 1971, the EAC partner states have not had a common currency. However, it is anticipated that in 2023, the EAC partner states will have a common currency once the key milestones as contained in the EAMU Protocol are implemented.

Events in the Eurozone triggered by the sovereign debt crisis revealed that a monetary union is a fragile undertaking and should be properly conceptualized from the outset. The architectural design of the EMU was questioned following the experiences of the debt crisis. Just like in the EMU, the EAC is following a similar model of market integration. In this model, a monetary union is a transitional stage towards the formation of a political union.

At the initial stages of establishing the EMU, convergence of macroeconomic variables as exemplified in the Maastricht criteria was considered as an important prerequisite. The EAMU Protocol has set out macroeconomic criteria that must be achieved before setting up the monetary union. However, according to Schmidt and Straubhaar (1995), this nominal convergence criterion is not a sufficient condition for entering into a monetary union. This is because nominal convergence cannot tell how countries will perform once they are in a monetary union (De Grauwe, 2007). In addition, the magnitude of macro variables such as inflation and exchange rates reflect the underlying economic structure.

In the EAC monetary union architecture, real economic convergence (income and cyclical) has largely been ignored. Income convergence will guarantee that there are no major differences in terms of economic structures of the EAC's partner states while cyclical convergence will ensure similarity of business cycles. In the event of an asymmetric shock, lack of real economic convergence can lead to pronounced regional differences in wellbeing that can be destabilizing (Schmidt and Straubhar, 1995). This will render union-wide monetary policy ineffective as it cannot be tailored to address specific country disturbances.

The EAC experience has demonstrated difficulties of establishing a monetary union outside of a political federation. It is instructive to note that the EACB worked for the then partner states because all the three countries were under one British colonial administration. Further, the linear model of market integration that the EAC borrowed from the EMU does not also stress the importance of the monetary union being embedded in a political union. Embedding a monetary union in a political union will ensure long-term sustainability. Therefore, status of political integration in EAC will indicate possibilities of setting a monetary union. A political union will provide a mechanism to ensure convergence of competitive positions and resolve crisis (De Grauwe, 2010).

Empirical studies applying different empirical approaches have explored the viability of EAC as a monetary union. Such studies include Mkenda (2001); Buigut and Valev (2005); Mburu (2006); Kundan and John (2009); Durevall (2011); Rusuhuzwa and Masson (2012); and Mafusire and Brixiova (2012). Most of these studies have stressed convergence of macroeconomic variables and overlooked real economic convergence and political integration in EAC as preconditions for entering into a monetary union. Thus, this study has examined real economic convergence and political integration in EAC as the key determinants for the viability of the EAMU.

1.3 Research questions

i) What is the state of income convergence in EAC?

ii) How have closer economic ties among the EAC countries contributed to business cycle synchronization?

iii) What is the level of political integration in the EAC?

iv) What factors influence political integration in EAC?

1.4 Objectives of the study

The main objective of the study was to determine the levels of real economic convergence and political integration necessary for the establishment of monetary union in the EAC. Specific objectives of the study were to:

i) Assess the state of income convergence in EAC, necessary for the establishment of a monetary union.

ii) Determine how closer economic ties among the EAC, countries have contributed to business cycle synchronization, necessary for the establishment of a monetary union.

iii) Establish the level of political integration in EAC, necessary for the establishment of a monetary union.

iv) Ascertain factors influencing political integration in EAC, necessary for the establishment of a monetary.

1.5 Significance of the study

Establishing the level of real economic convergence and political integration in EAC are useful to partner states and the EAC Secretariat as they pursue EAMU. Income convergence was to give evidence of whether the EAC economies are becoming similar over time. Cyclical convergence was to provide evidence whether closer economic ties in EAC have increased synchronization of business cycles. Political integration considerations were to determine whether its level can promote EAC monetary union owing to the fact that EAMU is a political project.

1.6 Scope of the study

The study period covered for objective one and two is 1990-2012, totaling to 23 years. Five EAC partner states, namely Kenya, Uganda, Tanzania, Rwanda and Burundi are analyzed in the study. However, the objective on political integration and factors influencing it covers the period 2000-2012 because of data non-availability for the period 1990-1999.

1.7. Organization of the study

The rest of the study is organized as follows. Chapter two gives literature review, both theoretical and empirical and an overview of the same concentrating on the gaps in literature. Chapter three constitutes the methodology where various theoretical frameworks of the specific objectives are outlined and empirical models specified. Empirical findings are presented in Chapter four while in Chapter five, a summary of the study, conclusions and policy implications are presented.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter gives both the theoretical and empirical literature review. Theoretical literature relates to OCA theory, its weaknesses and how it has been operationalized to allow for empirical investigation. Other theories concern income convergence and political integration. The empirical literature review focuses on studies dealing with real economic convergence, both income and cyclical and political integration in relation to monetary union. An overview of literature is given at the end of the chapter highlighting gaps in literature and contribution of this study to the body of literature.

2.2 Theoretical literature review

2.2.1 The OCA theory

One of the theoretical literatures underpinning this study is the OCA theory. According to Kenen (2010), the OCA theory is the only analytical framework available for evaluating benefits and costs of a monetary union. It forms the theoretical foundations of a monetary union (Mongelli, 2002). This OCA theory was first put forward by Mundell (1961) in a seminal contribution. The OCA theory affords a broad structure for appraising the economic prospects of a monetary union among integrating countries (Van De Coevering, 2003). This is by weighing the pros and cons of establishing a monetary union (Krugman, 2012). Thus, the OCA theory can be seen as providing answer to the question of which countries can be considered to constitute a monetary union.

There are two broad categories of OCA theories, the classical contributions or the traditional criteria and the new OCA theory. The classical contribution can be traced from the works of Mundell (1961), McKinnon (1963) and Kenen (1969). Traditional OCA theory stresses the importance of real variables as preconditions for those countries considering entering into a monetary union (De Grauwe, 2009). The traditional criteria provide the adjustment mechanisms through which equilibrium can be restored in case of an asymmetric shock (De Grauwe, 2009).

The new OCA theory was advanced at a period when there was a drive towards a flexible exchange rate monetary system in the early 1970s (Mongelli, 2002). It is closely related to the work of Ishiyama (1975), Tower and Willet (1976), Tavlas (1993), and Frankel and Rose (1998). The emphasis is on weighing the specific pros and cons of monetary integration in comparison with other exchange rate arrangements with particular reference to the EU economic integration. The new OCA theory emphasizes nominal convergence of macroeconomic variables.

Mundell (1961), who was the first contributor of the traditional view, defined an optimum currency area as a geographic region where there is internal mobility of factors of production but immobile internationally so as to facilitate the intraregional redistribution of resources in response to demand shifts. To explain this point, Mundell considered two countries, A and B, initially at full employment and balance of payments (BOP) equilibrium. Supposing that there was a shift in demand in favour of products from region B and if wages were not flexible, inflation will rise in region B while region A will experience unemployment. If the two regions have an exchange rate regime that is fixed, an alternative mechanism of adjustment will be required to bring back the economies to equilibrium for instance through currency devaluation. However, devaluation is not an option for countries already in a monetary union.

Mundell (1961) argued that there are two mechanisms that should be able to restore equilibrium when an asymmetric demand shock occurs in a monetary union. The first mechanism is that wages have to be flexible. With flexible wages, workers who are unemployed in B will offer their labour services at lower wages, while wages will rise in A due to excess demand for labour. The second mechanism is labour mobility. If labour is mobile enough, unemployed workers in B can easily relocate to region A which has excess demand for labour. If wages are not flexible and labour is not mobile, then the incidence of asymmetric shocks can be used to judge optimality (Mundell, 1961).

The second contribution to the traditional OCA theory was by McKinnon (1963). McKinnon extended OCA theory by introducing the property of the degree to which an economy is open, trade integration and differing economic sizes. If the degree of openness of an economy is high, the higher the likelihood that movements in prices of tradables in the international markets will be transmitted to the domestic economy. In addition, effects of devaluation will be more rapidly transmitted to the price of tradables and the cost of living, thus, negating the intended effects. This in effect implies that, the nominal exchange rate would be less useful as an adjustment instrument for small open economies (Horváth and Kuâerová, 2005).

Another line of argument by McKinnon is that in an economy which is relatively open, changes in nominal exchange rate might not result to major effect on competitiveness given that such changes would cause fast and large counteracting changes in internal wages and prices. That is, in an economy that is relatively open, differences in exchange-rate might lead to the same or almost the same cost variations. Three conclusions can be drawn from McKinnon (1963) conceptualization of OCA theory. (a) relatively open economies can fix their exchange rates (b) economies that are open trade more with each other and would find it useful to establish a monetary union because such an area would be more closed than any of its autonomous parts thus giving a safeguard against effects arising from exchange rate changes and (c) small or large geographic size might be relatively open or closed so that the size of the area could determine the exchange rate regime to be adopted by countries.

The third traditional OCA theory contribution was by Kenen (1969) who builds on the arguments put forward by Mundell (1961) and McKinnon (1963) with a focus on the effects of shocks to a particular sector or industry. According to Kenen (1969), fiscal integration should be criteria for determining efficacy for taking part in a monetary union. A fiscal integration which is high between two areas will increase the ability of smoothing shocks that are asymmetric by instituting fiscal transfers from a region with low unemployment to one with high unemployment. Second, Kenen observed that with mobility of labour, two countries that have narrow but structures of production that are similar can form a monetary union. This was by extending argument by Mundell that those countries that are predisposed to symmetric shocks should have a fixed exchange rate. This is because terms of trade of the two countries, that is, shocks that are sector specific are likely to affect them in different ways.

According to Kenen (1969), economies that are more diversified are better candidates for monetary union membership than less diversified ones. This is because it is rare for an economy that is well diversified to experience changes in demand for its exports. The significance of shocks that are asymmetric would be of less importance in a diversified economy than it is in a less diversified one. The more open an economy is, the greater the likelihood that defects that are microeconomic in nature in specific sectors of an economy will compensate each other. An economy which has a production structure that is diversified will require a flexible exchange rate regime to guard against external shocks, but an economy that is well diversified can consider entry into a monetary union. A country whose exports are diversified is likely to be less susceptible to sector-specific shocks and may not need exchange rate as an adjustment tool. Therefore, if economies in a monetary union had similar industrial structure, same technology and demand shocks, lack of independent monetary policy and having exchange rates that are different would not matter.

The criteria for determining the eligibility of countries intending to form a monetary union from the three classical authors can be summarized as follows: the degree of mobility of labour, flexibility of wages and prices and frequency of asymmetric shocks (Mundell, 1961); the degree of trade integration and openness and economic size (McKinnon, 1963) and the extent to which economic structures of two countries are similar, the degree of fiscal integration and diversification of products (Kenen, 1969).

The new OCA theory is also called the cost-benefit analysis approach (Tavlas, 1993). The new OCA theory properties include the degree of similarity of inflation rates, financial integration, real exchange rate variability, willingness to sacrifice, OCA criteria endogeneity, and the presence of political will. The Maastricht convergence criteria, experience of the EMU and developments in academic thinking are some of the factors that reawakened academic interest in OCA theory (Van de Coevering, 2003; Dellas and Tavlas, 2009). These contributions are a reflection of international macroeconomics development (Horvath, 2003). The theoretical base of the new OCA theory is hybrid and pairs off contradicting approaches (Priewe, 2007). The new OCA theory properties are discussed next.

Fleming (1971) argues that a monetary union can only be established by those countries experiencing inflation rates that are almost equal. Similar rates of inflation indicate similarity in in the conduct of economic policies and economic structure (Laabas and Limam, 2002). Fleming (1971) noted that terms of trade between countries will continue to be stable when these countries have low and similar rates of inflation over time. This will in turn promote current account and trade balance and therefore reduce the need for adjusting nominal exchange rate. However, it is not always the case that differences in inflation rates are problematic. Balassa-Samuelson theorem (1964) types of effects can arise when catching-up process by countries that are less developed is completed.

The degree of financial integration is a major criterion for determining currency area optimality (Ingram, 1973). Financial integration level which is high would have equilibrating effect of capital movements across partner states even when there are small changes in interest rate. External financing of the imbalance would be eased thereby promoting efficient allocation of resources when long-term interest rates are reduced (Mongelli, 2002). The need for adjusting the exchange rate will be minimized when financial markets are integrated. Domestic economy will be cushioned against short-term disturbances through inflow of capital. Decumulation of net foreign assets or borrowing from regions with surpluses can be made and reimburse the financial resources once the shock is over.

Vaubel (1976) proposed that real exchange rate should be a vital determinant when exploring suitability of countries in entering into a monetary union. The argument is that if the exchange rate between two countries has been stable, it is evidence that shocks were not many in the past requiring adjustment of exchange rate. As such, it can be expected that this will continue to hold even in the future. However, variability of the exchange rate does not give reasons for this movement (Jurek, 2004).

Willingness to sacrifice is also an important consideration for forming a monetary union. Willingness of member countries to accept policy measures taken by common monetary authority and which may not necessarily be of specific interest to them is an important feature in a monetary union. This willingness of countries and public support for common policy which might not be of specific interest of a particular country but for the common good of all partners is a critical element that will determine success and survival in the long-run (Feldstein, 2008).

Frankel and Rose (1998) advanced the concept endogeneity of OCA. According to these authors, there is endogeneity between trade integration and correlations of business cycles. This is given that closer trade links among countries increases synchronicity of business cycles. The intuition of endogeneity hypothesis is that trade costs are reduced with monetary integration beyond what can be achieved when the exchange rate is less volatile (Mongelli, 2002). Thus, if countries seeking to form a monetary union do not satisfy the OCA criteria *ex ante* they meet it *ex post*. Economies can become OCA after adopting a single currency because a common currency will generate forces that will make the countries become an OCA (Janicki, Warin and Wunnava, 2005).

Political will among the integrating countries is considered as a key precondition for forming a monetary union. According to Mintz (1970), the presence of political will to integrate by prospective countries is an important consideration for setting up a monetary union. The logic is that in as much as monetary unification is an economic process, the success in adopting a single currency is largely dependent upon political will of those in position of leadership. Actually, creating a monetary union is a political process and economic considerations though important are usually in the background (Jurek, 2004). Presence of political will enables compliance to joint commitments made jointly and fosters cooperation in economic policies of various aspects (Mongelli, 2008). Nonetheless, measuring of political will is difficult (Jurek, 2004).

2.3 Weaknesses of the OCA theory

The OCA theory has several weaknesses. Robson (1987) observes that most of the OCA criteria are problematic to measure without ambiguity. The OCA theory does not have a unifying framework and one can end up creating different boarders for a monetary union by referring to different OCA criteria. According to Tavlas (1994), this can be termed as a problem of lack of conclusiveness. Van de Coevering (2003) makes a similar observation. This author further note that challenges related to methodology and data makes it difficult to create a criteria that can be easy to interpret especially for variables such as mobility of labour and flexibility of wages and prices.

Tavlas (1994) associates OCA theory with the inconsistency problem. For example small open economies can create a monetary union using the trade openness criteria as a basis. However, unlike large economies, small open economies are more likely have less diversified economic structures. This implies that these small open economies would be better off having their own independent exchange rates considering that they have low levels of diversification in production. Kenen and Meade (2008) identify two shortcoming of the Mundell's model, primarily stemming from its restrictive assumptions. First, Mundell dealt with a two-country world and could not therefore ask how those countries' involvement with the outside world could affect the costs of forming a monetary union. Second, Mundell excluded capital mobility. Goods moved freely between the two countries, but capital and other claims did not.

Beginning mid-1970s up to mid-1980s, OCA theory as a subject was restricted to academic limbo (Tavlas, 1993). This is because intellectuals and policy makers using the OCA theory were not able to get clear answers on whether European countries should go ahead and form a monetary union and which countries were eligible to join. Emerson, Gros and Italianer (1992) make a similar observation and they further observed that there was not ready-to-use theory to evaluate the pros and cons of a monetary union. Dellas and Tavlas (2009) argue that the initial OCA theory could not have anticipated the significance of the service sector, which is more diversified, diffused and fragmented. The OCA theory was unable to predict the important role that institutions play in obstructing flexibility and mobility in the product and labour markets. According to Dellas and Tavlas (2009), collapse of the early OCA theory conceptual framework leading to erosion of its foundation is the most crucial weakness.

Another critical shortcoming of the OCA theory is that it does not consider the suitability of a monetary union for economies that are at different stages of economic development (Dellas and Tavlas, 2009). Assuming a mature economy with a high income per capita and another with a relatively low per capita income, the regional Central Bank would be expected to maintain price stability by adopting a common monetary policy that should produce optimal results for all participating economies. Suppose that an event occurs such that the relatively poor country loses competitiveness, for it to regain competitiveness it has to undergo a prolonged period of deflation. This is because devaluation is not a policy option for the regional Central Bank since it has to adopt a monetary policy that is optimal to all country and not to respond to specific country disturbances.

According to Jurek (2004), political integration is one of most important OCA properties. However, because of difficulties measuring political will, political integration is usually not considered when undertaking OCA analysis. Even with these criticisms about the OCA theory, it is still being used to analyze the crisis that has faced the Eurozone (Krugman, 2012).

2.4 Operationalising the OCA criteria

To allow for empirical investigation, OCA properties have to be operationalized. Researchers have made attempts to operationalize OCA and give it empirical evidence. However, there is no uniform framework which can unambiguously determine the eligibility of countries to form a currency union (Van de Coevering, 2003). Researchers have operationalized the OCA criteria by developing various methodological approaches to test for individual or all the hypotheses postulated in OCA theory literature. This section discusses how the concepts of income convergence, business cycles and political integration have been operationalized to enable empirical investigation.

2.4.1 Concept of income convergence

The theoretical basis of the concept of income convergence is the neoclassical growth models, specifically the Solow (1956) model. Neoclassical growth models hypothesizes that economic growth is a product of technical progress, accumulation of capital and labour. The idea of income convergence is drawn from the hypothesis of decreasing marginal returns to capital. This hypothesis causes economic growth process to reach the long-run level where income per capita, stock of capital and consumption grow at the same constant rate leading to the equalization of the rate of technical progress that is exogenously determined.

There are two notions of convergence that are associated with the Solow (1956) model. First, is the unconditional convergence which asserts that if countries are identical, then they will eventually converge to a steady state level of income that is common. This implies that economies that are poor will grow more rapidly compared to rich ones until their growth rates and standards of living are equalized. Second, it is the concept of conditional convergence which states that if the economies are further away from their long-run levels, they will tend to grow at a faster rate. For conditional convergence to occur, factors determining the long-run level of income like savings and population growth have to be controlled for, after which those countries that are poor will grow at a faster rate than richer ones.

The researchers who first investigated the convergence hypothesis include Barro (1991), Mankiw, Romer and Weil (1992). They sought to understand whether poorer regions that are poor would remain so for many generations or whether they are able to close the income gap with the richer ones. Empirical work of Barro (1991) showed that after the introduction of relevant control variables such as human capital, there was a negative relationship between per capita income and the initial income level and subsequent growth rate for the countries that were sampled. This negative relationship between initial level of per capita income and growth rate is the idea of conditional convergence.

More explicit formulation of conditional convergence was carried out by Barro and Sala-I-Martin (1992) and Mankiw *et al.* (1992). Both studies stress that the Solow model did not infer that all countries will converge to the same level of income per capita. But instead, it inferred that each country will arrive at its own steady state. Conditional convergence has also been confirmed by studies such as Bloom, Canning and Sevilla (2002) and Barro and Sala-i-Martin (2004).

2.4.2 The concept of business cycles

The idea of cyclical convergence has been operationalized by use of various filters that include Christiano-Fitzgerald (CF), Baxter-King (BK) and Hodrick-Prescott (HP). These filters decompose GDP into trend and cycle. Frankel and Rose (1998) computed output disturbances over time by obtaining the standard deviation of the change in the log of relative output of two countries. This was then regressed using a set of independent variables using ordinary least squares (OLS) to gain an understanding of the channels through which business cycles are transmitted. Other than investigating direct channels of business cycle transmissions, simultaneous equations have also been used to obtain both direct and indirect channels of business cycle transmission. Such studies include (Imbs, 2004; 2006) Dees and Zorell (2011) and Akin (2012).

2.4.3 The concept of political integration

De Grauwe (2009) identifies two schools of thought that link monetary and political union. The first school of thought holds that if there is no strong political union among partner states, it will be difficult for a monetary union to last in the long-term. The second school of thought argues that the prevailing level of political integration in Europe is adequate to enable the monetary union to survive in the long-run. According to this school of thought, the EMU can continue to exist even if the EU does not reach the level of political integration such as that of the United States of America (USA).

The concept of political union is not as clear as that of monetary union. According to De Grauwe (2009), a monetary union can be viewed as a merger of countries using a single currency managed by the same Central Bank, but such a neat description is not possible in case of a political union. It is therefore difficult to indicate with precision the level of political union that has been attained. De Grauwe (2006; 2009), identifies two dimensions of political unification: institutional and functional dimensions. Institutional dimension is where sovereignty of individual member states is surrendered to some set of supranational institutions. Functional dimension of political integration arises when there is transfer of sovereignty for example in the areas of agriculture, foreign trade, government spending and taxation, social policies just to mention a few to a supranational institution. This also happens to be the most difficult aspect in political integration.

It is the functional dimension and not the institutional one that is most difficult to attain. De Grauwe (2006) note that it is the functional dimension of political integration that can guarantee a lasting monetary union. It will create a sense of embodiment of a super state. To guarantee long-term sustainability of the EAMU and indeed the EAC as a trading bloc, partner states must appreciate that membership is in their national interest and create a sense of belonging to the same nation.

The concept of political integration has several schools of thought including: Neofunctionalism, intergovernmentalism, and supranationalism (Feng and Genna, 2003; Kingsolver, 2011; Ruszkowski, 2006; 2009). Neofunctionalism approach has a wider definition of political integration including political, social and economic elements. Hass (1961) asserts that political integration can be said to exist when political actors in different national settings get convinced to transfer their political allegiances, beliefs, and activities towards a central institution which has jurisdiction above that of individual country.

Three ingredients of political integration were identified by Hass (1961): functional, institutional and environmental integration. Another Neofunctionalist Lindberg (1970) observes that political integration at the international scene happens when a group of countries habitually come together, make and execute binding public decisions through a supranational institution rather than by formally independent state means. With political integration, countries begin to create and use resources that are common to achieve some universal goals and this is achieved by foregoing state sovereignty and autonomy decision making. This goes beyond international modes of cooperation such as through organizations or alliances.

Intergovernmentalists argue that political integration is both encouraged and tempered when countries out of their own free will surrender sovereignty, power and authority to a supranational institution. According to Nye (1971), attainment of such integration efforts will be contingent on the capacity of partner states to take up and respond to cooperation agreements that characterize integration. This according to Feng and Genna (2003) forms the basis of regarding integration as a product of negotiations among countries to create cooperative agreements that grow into further integration. There is the argument that integration is a product of negotiations among members (Moravcsik, 1995). Through the process of negotiation, member states can obtain domestic policy preferences (Taylor, 1983; Keohane, 1984). Such negotiations can lead to convergence of economic policies and thus reduce negative externalities emanating from economic interdependence while ensuring retention of national sovereignty (Feng and Genna, 2003). According to Ruszkowski (2009), intergovernmentalism results from cooperation or participation of the national governments. It has no power beyond those permitted by the government. A good example is the United Nations.

With intergovernmentalism, member states remain sovereign and each member preserves a veto on regional agreement application. Intergovernmentalism requires coordination of national policies and bodies that are intergovernmental in nature and a secretariat which does not have independent power. But a major weakness of intergovernmentalism is that the pace of integration is determined by the slowest member. Another weakness of intergovernmentalism is the absence of a system to make sure that partner states observe common set of laws. This has been one of the weaknesses of the European integration but it can be overcome by including some dispute resolution mechanisms in agreements.

Integration is a challenge especially in situations where there is a large and heterogeneous group of countries. To cope with this challenge, the EU adopted two concepts: variable speed and variable geometry. Variable speed is a situation where all partner countries agree to abide by common goals but allow some member countries more time to achieve the set objectives. Thus, slow and reluctant members are allowed to lag behind and catch-up when ready instead of dragging integration. With variable geometry, some member countries undertake deep and intense integration and cooperation in some specific aspects while other members may opt out of the initiative. These two concepts are relevant to EAC given overlapping membership problem and differing integration objectives.

Intergovernmentalism has been criticized for underestimating the importance of transnational actors and supranational institutions in the integration process (Garret and Tsebelis, 1996). Ruszkowski (2006; 2009) define supernationalism as entailing having power above or influence beyond that permitted to national government. They argue that the process of establishing supranational cooperation comprises of the following phases: establishment of international organization, delegation of national powers, powers that are delegated get emancipated and supranational institutions that have exclusive powers.

The concept of supranationalism has been mainly associated with European integration process. Supranationalism occurs when nation states lose their sovereignty, become more integrated and eventually form a political federation. According to Ruszkowski (2009), supranationalism is something that happens above or beyond nation-state. However, Watts and Pilkington (2009) view supranationalism in terms of transfer of decision-making powers to a higher authority in specific areas and the power can be returned to individual state. That is, individual state power is ceded to a common entity.

Taylor (1979) considers supranationalism as a case where partner states cede some of their decision-making power to a higher authority in specified areas such as trade and economic policy. However, this power can be withdrawn. Similarly, Kahler and Lake (2003) note that with supranationalism, political authority is shifted from individual states to states acting as one body. From the foregoing, supranationalism emphasizes loss or transfer of sovereignty to a common institution for it to be exercised jointly.

The concept of political integration which should occur when integrating partner states lose their sovereignty in favour of a supranational institution is a difficult concept to operationalize or measure. Kingsolver (2011) made an attempt to measure political integration in the United States and the EU. Political integration was gauged by the relative budget revenues of a supranational institution and that of partner states governments. Supranational institution in the case of the EAC is the Secretariat. Thus, political integration can be measured by determining average percentage share contribution out of total national revenues made by each partner states to run the affairs of the Secretariat. If partner states contribute an increasing share of their national revenue to run the affairs of the Secretariat, this can be interpreted as a sign of their willingness to cede some of their sovereignty. Two of the three factors hypothesized to influence political integration, that is, social integration and political interconnectedness were also borrowed from Kingsolver (2011).

2.5 Empirical literature review

2.5.1 Income convergence and monetary union

Kowalski (2003) analyzed nominal and real convergence in different regimes of exchange rate in Central and Eastern European (CEE) countries and their EMU accession implication. The study estimated a GDP growth regression which had been augmented with dummies of different exchange rate regimes. To explain growth, initial per capita GDP level, gross capital formation to GDP, inflows of foreign direct investments (FDI) to capture the role of international capital and transfer of technology and the share government consumption to GDP to take into account the stage of disinflation process were included in the regression. Feasible generalized least squares (FGLS) estimator to control for heteroskedasticity across panels and autocorrelation within panels, fixed effects (FE) estimator with robust standard errors and random effects (RE) estimator were used in estimating the growth equation. The results showed relative to the floating exchange rate system, fixed exchange rate appeared to be more effective in fighting inflation. Fixed exchange rate regime was associated with a higher GDP growth rates indicating that there was no nominal and real convergence trade-off.

Zbigniew and Mariusz (2004) aimed to determine the real economic convergence amongst eight CEE countries that joined the EU and how they converged with the EU. Both income and cyclical convergence were investigated in this study. Income convergence was analyzed using conditional and sigma coefficients where GDP per capita was regressed against growth rates of GDP. Industrial production and confidence indicators were used to analyze cyclical convergence. The findings showed that income levels of

CEE countries were converging among themselves and towards the EU. The results revealed that there was synchronization of business cycles among the CEE countries and the EU. Both types of convergence were strongly influenced by the EU markets dependence particularly trade and capital flows.

Liew and Ahmad, (2006) set out to explore the linearity test and nonlinear unit root test results in detecting the two stages of income convergence in the Nordic countries (Sweden, Denmark, Finland and Norway). According to the results, income gaps of Sweden, Norway and Finland compared to that of Denmark were not linear but stationary and without significant effect of trend. This implies that the Nordic countries had already achieved income convergence which was beyond the stage of catching-up.

Szeles and Marinescu (2010) studied unconditional and conditional convergence in the CEE countries with emphasis on Romania. The study applied panel data approaches to elucidate the result of the changes in per capita GDP and other determinants of economic growth rate over a period of time. Panel data model applied was based on the OLS, two-stage least squares (2SLS), first differenced and system generalized methods of moments (GMM) estimator. To examine the presence or absence of conditional convergence, control variables applied included gross fixed capital formation, inflation, final consumption by private households, population growth, openness of the economy, labour productivity per person employed, and debt to GDP ratio. The study found evidence on both unconditional and conditional convergence in CEE countries. In spite the economic gap that Romania had relative to the other CEE countries; its presence enhanced the regional economic convergence.

Drastichova and Ostrava (2012) analyzed the relationship between development of GDP per capita as an economic convergence indicator and price level which was taken as a proxy for macroeconomic convergence in the EU. The study aimed at detecting the relationship between the real and macroeconomic convergence through a set indicators in the EU economies. Both sigma and conditional convergence were evaluated. The analysis revealed that economies with lower per capita GDP levels also had lower prices and as a result, real and nominal convergence was probable to happen in these countries.

Dramani (2010) applied the endogenous growth theory to analyze convergence of Franc Zone countries in Africa. The study improved on the analysis of absolute and conditional convergence by taking into account spatial phenomenon which had been ignored in the previous studies. A number of hypotheses in the study were tested using both cross-sectional and panel data techniques. The main hypothesis tested was convergence of the economies of the Economic and Monetary Community of Central Africa (CEMAC) and West African Economic and Monetary Union (UEMOA) zones. The results indicated that the process of convergence and therefore integration was not uniform in the Franc zone. More emphasis was in UEMOA than in CEMAC zones.

Asongu (2012) set out to evaluate the disequilibria within the Communauté Financière d'Afrique (CFA) zones, UEMOA and CEMAC. The study utilized the standard approaches in literature to investigate conditional convergence. The variables considered included GDP growth indicators, population growth, inflation, openness and public investment. The study found strong support for unconditional convergence in spite of homogenous monetary policies. The absence of absolute convergence was explained by lack of comparable primary circumstances of financial development and execution of monetary policies by partner states that was poor. Notwithstanding initial fundamental circumstances, differences in institutional and structural characteristics held up real and monetary policy convergence. The study recommended that partner states should work towards the harmonization of structural and institutional characteristics.

Gaspar (2012) applied an indicator called omega to calculate convergence or divergence. Omega is a modified weighted standard deviation of economic development generated from GDP per capita values. On the basis of a Monte Carlo simulation, the indicator differed from other types of convergence indicators. This could be interpreted to mean that some characteristics could exist in the data which might include important information for the convergence process.

2.7.2 Cyclical convergence and monetary union

Barrios, Brülhart, Elliott and Sensier, (2001) examined the pattern and drivers of business cycle synchronization between the United Kingdom (UK) and six in the Eurozone countries over 1966-1997using GMM approach for estimation. The UK's business cycle and that of Eurozone economies were found not to be moving together. Sectoral specialization differences and volatility of exchange rate caused some GDP fluctuations asymmetry, but they were not important in explaining the observed decrease in UK-EU co-movement business cycles over time. There remained large and unexplained component in the idiosyncratic component of the business cycles in the UK.

Imbs (2004) applied simultaneous equation approach to determine factors underlying business cycle synchronization across regions and over time. The BK and band pass filter were used to extract cyclical component of the GDP. Three-stage least squares (3SLS) approach was applied to control for endogeneity problem of the dependent variables. Simultaneity was found to be significant, because both trade and financial openness had direct and an indirect effect on synchronization of business cycles. Countries, whose capital accounts were liberalized, were more synchronized and specialized. Trade-induced specialization had no effect on synchronization of business cycles.

Baxter and Kouparitsas (2005) investigated the determinants of business cycle co-movement of over 100 countries which were developing or developed. To realize their objective, the study determined robustness of variables in explaining co-movement using Leamer robustness approach. Variables considered in the study included bilateral trade, export and import basket similarity, each country total trade, sectoral similarity, gravity variables and endowment factors. Bilateral trade was found to be robust but structure of industry and currency unions were not robust contrary to theoretical expectations.

Tondl and Siedschlag (2006) investigated the pattern and factors influencing economic activity co-movement in the Eurozone. The study used panel data for 15 EU countries for period 1989 to 2002 to estimate simultaneous equations to analyze the effect of regional trade integration, sectoral specialization and volatility of exchange rate on correlations of regional business cycles with the Eurozone. Some of the variables considered were business cycle co-movement, sectoral similarity, trade integration, volatility of exchange rate and regional and Euro area interest rate changes and the ratio of region's and Euro area gross value added per capita and log of product of regional and euro area gross value added per capita. The study established that strong trade integration with the Eurozone had a robust direct positive effect on business cycle synchronization. Sectoral specialization and volatility of exchange rate had a direct negative effect on business cycles.

Bower and Guillemineau (2006) investigated key factors underlying synchronization of business cycles in the Euro area using extreme-bounds analysis (EBA) for robustness check of the results. The BK filter was used to obtain cyclical component. The study examined both traditional and new factors affecting synchronization of business cycles. In addition, the study considered gravity variables (geographical distance and relative size) to account for exogenous aspects. The main study finding was that trade had been a major cause of integration between euro area countries. This is because of two reasons, first is the intensification of bilateral trade relations before economic and monetary union, and secondly an increase in intra-industry trade after economic and monetary integration. Among the policy variables, fiscal deficit differentials appeared to have driven differences between national business cycles until the preparation of the economic and monetary union. Interest rate convergence appeared to be closely related to synchronization of business cycles.

Nguyen (2007) investigated factors influencing synchronization of business cycle in East Asia by using EBA in an OLS regression to test the robustness of the potential candidates. To obtain cyclical components of GDP, the study employed HP filter method with dampening parameter of 100 and de-trended GDP by taking log of GDP and taking first-difference. The variables included in the study were bilateral and intra-industry trade, stability of exchange rate, trade openness, fiscal policy, similarity of export, monetary policy, a gravity dummy, and capital account openness. Results of the study revealed that intra-industry trade and trade openness as the main channels of synchronization of business cycles. Monetary policy similarity was statistically significant and correlated with synchronization of business cycles. However, the study could not determine the direction of causality.

Xing (2007) investigated the link between trade intensity and co-movement of business cycles for 24 countries over the 1965 to 2003 period. The panel estimation technique was applied to account for the likelihood that co-movement of business cycles could be influenced by country pair specific effects that were unobservable. Both random and fixed effects results suggested that an increase in bilateral trade intensity had a strong influence on economic convergence. The relationship was robust. Sensitivity analysis proved that.

Xing and Abbot (2007) investigated the determinants of business cycles co-movement for 15 countries in OECD for the 1984 to 2003. The 3SLS estimation procedure was used in estimating simultaneous equations between bilateral trade intensity, sectoral specialization, financial integration and synchronization of business cycles. The study findings revealed a rise in bilateral trade strong effect on economic convergence. Similarly, industrial specialization resulted in closer business cycle co-movement and regions which had strong financial linkages were less synchronized.

Inklaar, Jong-A-Pin and Haan (2008) re-examined the relationship between co-movement of business cycles and trade intensity and for 21 OECD member countries for the period 1970-2003. The study applied multivariate modeling technique by including variables to capture specialization and resemblance of economic policies and not using instrumental variables approach. The EBA method was used for robustness check. The results indicated that trade intensity affected co-movement of business cycles but the effect was lesser than was reported previously. Specialization and fiscal policies had similar results. The effect of trade intensity on synchronization of business cycles was not strong across deciles.

Grigoli (2008) evaluated the effect of reduction barriers to trade and increased trade on co-movement of business cycles. The study drew its methodological approach from Frankel and Rose (1998). In addition to trade integration, the study included macroeconomic policy fiscal and monetary variables in the analysis. The results indicated a positive association between intra-industry trade and business cycle correlation.

Cerqueira and Martins (2009) investigated determinants GDP synchronization applying a new index for panel data that captures variability effects of time. Explanatory variables assessed in the study were bilateral trade intensity, specialization and financial openness. Membership in the EU and bilateral trade had positive influence while similarity of industry was not statistically significant. Siedschlag (2010) analyzed direct and indirect effects of the economic structure similarity and trade intensity on the co-movement of business cycles in eight accession states in the EU. Apart from bilateral correlation of business cycles, other variables of interest included bilateral industrial specialization and trade intensity. The study estimated a system of simultaneous equations using 3SLS estimator in order to deal with the possibility of endogeneity problem. The findings of the study showed that similarity of economic structures and bilateral trade intensity had a positively and statistically significant effect on business cycles co-movement.

Dees and Zorell (2011) explored whether closer economic relations among countries enhanced co-movement of business cycle and separated the role of a variety of channels. The study followed Imbs (2004 and 2006) and estimated simultaneous equations relating bilateral output correlations with trade and financial integration and industrial structure similarity. The results confirmed that trade integration fostered business cycle synchronization. Similar patterns of sectoral specialization had the same results. However, a direct relationship between financial integration and correlation outputs could not be found. The results suggested that financial integration affected co-movement of business cycle indirectly by increasing similarity in industrial specialization. Financial integration tended to raise co-movement of business cycles between countries via indirect link.

Antonakakis and Tondl (2011) examined whether economic integration in Europe was manifesting itself through increased FDI linkages and trade, new specializations and coordination of economic policies led business cycle synchronization in the enlarged EU. The study used simultaneous equations to analyze the effects on bilateral output correlations in the 1995-2008 periods to allow modeling of relationships that are endogenous and reveal direct and indirect effects. Trade and FDI proved to have a robust effect on synchronization of business cycles. Increased manufacturing specialization was not counteracting synchronization of business cycles.

Akin (2012) sought to examine the main economic linkages explaining business cycle synchronization for the period 1970-2008 and included 51 countries and 27 of them were from emerging markets. A simultaneous equations approach was used in the study and estimated using 3SLS and GMM-IV methods. Results showed that trade integration as the most important determinant of business cycle synchronization. Global financial integration had no important influence on co-movement of business cycles. Among the pairs of developed and emerging markets, financial integration reduced synchronization of business cycles, but financial integration increased co-movement of business cycles for the emerging markets. There was a robust indirect effect emanating from openness of finances to trade integration and structural similarity.

Goggin and Siedschlag (2013) examined the patterns and determinants of international business cycle transmission between Ireland and its partners of trade for a period of thirty years. Specifically, the effects of trade, financial and monetary integration, fiscal policy industrial specialization, and competitiveness on bilateral output correlations were analyzed in the study. A simultaneous equations model was estimated using panel data approach. In this study, variables that were regarded as endogenous included trade intensity, industrial specialization and financial integration. The simultaneous equations were estimated using 3SLS estimator and instrumental variable methods were applied in order to address with endogeneity problem. Trade and financial integration had a robust direct positive effect on the business cycles synchronization of Ireland and its trading partners. Industrial specialization and differences in national competitiveness made business cycles to be asynchronous. Industrial specialization had an indirect effect on synchronization of business cycles through its positive effect on financial and trade integration.

2.7.3 Political integration and monetary union

In tackling literature about political and monetary union in this section of study, political science discipline has been relied upon. Kingsolver (2011) examined the American post-constitutional and post-civil-war eras and the EU since 1950 to determine the factors that affected levels of political integration. Factors that were hypothesized to influence political integration were social integration, constitutionalism and economic interconnectedness. Social integration and not economic interconnectedness was a more crucial determining factor of the level of political integration. This was interpreted to mean that the results undermined the theory underpinning EU economic integration: that economic links between countries would necessarily lead to political integration.

Guillaume and Stasavage (2000) analyzed Africa's monetary policy experience with a focus on countries which had rule-based regional monetary agreements such as East African Currency Board, CFA Zone and Common Monetary Area (CMA). In analyzing the credibility of monetary policies, factors that were considered included those that undermine credibility, and mechanisms that enhance credibility. The study also considered political institutions existing in these countries and how monetary rules evolved in each union. Two variables, that is, the degree fractionalization of political parties and an index on executive constraints were used as proxies for the degree of checks and balances. The development of rules for the three monetary unions was also considered. The study revealed that countries in Africa did not have political institutions required for governments to commit in a credible manner to financial stability on a case by case basis.

Mburu (2006) assessed economic and political feasibility and desirability of EAMU. This study overcame the limitation of the previous studies by addressing the question of political viability of EAC monetary union. The study results found that politically, the EAC partner states lacked political institutional structures that could be compared to those in the CFA franc zones and the CMA to sustain a monetary union amongst the member countries. According to this study, heterogeneity of the political systems was a major challenge to the eventual political federation formation. Relative political capacity (RPC) and veto power which measures government's strength indicated little proof by the EAC partner states to guarantee responsible fiscal policies required for a monetary union that is well-functioning. The study concluded that EAC lacked homogenous political institutional framework to sustain a monetary union. In the overall, the study concluded that EAC partner states are not ready to establish a monetary union.

Durevall (2011) identifies political and institutional preconditions necessary for the EAC before actual implementation of the common currency. The study argued that given political risks of implementing a monetary union, political will of policy makers was necessary for successful implementation.

2.8 Overview of literature

The OCA theory is the main theoretical framework used to analyze suitability of countries that seek to form a monetary union. There are two OAC theories: the traditional and the new OCA theories. Traditional OCA theory evolved during the era of fixed-exchange rate regime and emphasizes convergence of real variables. The new OCA theory stresses the importance of nominal convergence and was developed when the world shifted from fixed exchange rate regime in the early 1970s to the flexible exchange rate regime.

The OCA theory is not standard as such and has several limitations. One of its major limitations is that it does not give an index or algorithm that can unambiguously indicate whether a given country can or cannot join a monetary union (Broz, 2005). Further, the OCA theory does not consider countries at economic development levels that are different and is not able to capture political integration due to difficulties of measuring political will. Nevertheless, it is the only available framework for analyzing appropriateness of countries desiring to create a monetary union. Indeed, it is the only one that has been used to analyze the Eurozone crisis (Krugman, 2012).

The nature of the OCA properties is such that they cannot be empirically investigated without being operationalized. The study utilized the concepts of unconditional and conditional convergence of neoclassical growth models to explain income convergence in EAC. Cyclical convergence has been operationalized by measuring the GDP growth rate deviations from the trend by use of filters such as BK and HP. Regression equations are then run using various techniques such as OLS or system of equations. This study borrowed from political science discipline and the works of Kingsolver (2011) to investigate the idea of political integration in EAC. In course of undertaking literature review, it could not be established whether another study had applied Kingsolver (2011) approach. Nonetheless, its measurement of political integration in terms of average percentage share of EAC partner states out of their national revenues to run the EAC Secretariat was considered intuitive for application in this study.

Empirical literature review revealed that studies have relied on the neoclassical growth models to determine income convergence of regions in a monetary union or those desiring to form one (Asongu, 2012; Drastichova and Ostrava, 2012). These studies examine either unconditional or conditional convergence or both. Conditional convergence has been investigated by use of variables like inflation and nominal exchange rates, terms of trade, savings rate, and gross capital formation, human capital among others to capture macroeconomic, structural and institutional variables.

Cyclical convergence has also been widely studied including its determinants, for example Goggin and Siedschlag (2013); Akin (2012); Dees and Zorell (2011); Siedschlag (2010); Baxter and Kouparitsas (2004); Siedschlag and Tondl (2011) and Antonakakis and Tondl (2011). The main methodologies applied include EBA and simultaneous equations estimated using 3SLS. This study adopted simultaneous equations approach to determine cyclical convergence in EAC to untangle direct and indirect transmission channels of business cycles. This was based on the realization that world economies are increasingly becoming integrated through the forces of globalization. Empirical studies on the concept of political integration for regions forming a monetary union are limited. Siedschlag and Tondl (2011) (2011) is the main empirical work relied upon in simultaneous equation analysis related to objective two of the study. The use of simultaneous equations allows extension of variables used in the analysis, overcoming endogeneity and multicolinearity problem of variables included.

Overall, literature review indicates that few studies have comprehensively examined the suitability of EAC countries in forming a monetary union by capturing complexity of such an initiative. The study makes a contribution in empirical analysis in three main ways. First, the study examines income convergence among the EAC partner states to determine whether income disparities have been declining over time. Second, the study utilized simultaneous equations to determine whether business cycles in EAC have over time, become more synchronized. Both income convergence and business synchronization in EAC are important because once the partner states enter into a monetary union, a common monetary policy will be imposed by the union Central Bank. Such a monetary policy intervention will be optimal only if the partner states economies respond in the same way. Third, the level of political integration in EAC and factors influencing it was investigated. This is based on the premise that common monetary policy will be difficult to materialize in the absence of a political union which is necessary for coordination of fiscal and monetary policies.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The research design, theoretical frameworks, various empirical methodologies that have been used in this study to achieve the set objectives are presented in this chapter. It also includes definition and measurement of variables, data type and sources and data analysis.

3.2 Research design

A quantitative research design was adopted in this study because it involves numeric and statistical approach. According to Creswell (2003), research which is quantitative comprises the gathering of statistics to make information quantifiable and be subjected to statistical investigation to give support or disprove alternative knowledge that has been claimed. This is the case for this study which relies chiefly on panel data techniques. Study design refers to the means that the researcher will use to answer the research questions (Bordage and Dawson, 2003). To answer the first question about the state of income convergence in EAC, panel data econometric approach for the five partner states for the period 1990 to 2012 was utilized. The choice of 1990 to 2012 period was based on data availability. Thus the study covers 23 years and the data is annual. Data was collected for each variable in each of the five countries. Panel data analysis was preferred over cross-sectional approach because it captures both cross-country variations and time-series dimensions of the data. Thus, it was also considered superior in this study since it permits specific country effects that cannot be observed to be correlated with the regressors.

Simultaneous equations were used to deal with the second question on how closer economic ties among the EAC countries have led to synchronization of business cycles. A measure of political integration was computed for the period 2000-2012 to provide an answer to the third question on the level of political integration in the EAC. A measure of political integration was based on the period 2000-2012. This is because partner states contribution to the Secretariat started in 2000 after the EAC Treaty came into effect. The fourth question on the factors that influence political integration in EAC was answered by measuring institutional distance, social integration and economic interconnectedness and then relating them to political integration.

3.3 Theoretical frameworks

There are three theoretical frameworks that have been used in this study: the neoclassical growth theory, specifically the Solow model of 1956 growth to explain income convergence. The OCA theory adopted by Mundell (1961), McKinnon (1963) and Kenen (1969) was used to discuss synchronization of business cycles. Political integration theory was associated with theories advanced by Hass (1961), Lindberg (1970) and Milward (1992).

3.3.1 Income convergence in EAC

Derivations in this section have relied heavily on Acemoglu (2007) but with modifications. The neoclassical growth model submits that there is a propensity of income per capita converging to a steady state. In general terms, convergence is said to occur when countries that are poor grow faster than their richer counterparts so that those that are poorer catch-up with the rich ones in the long run. In this study, convergence (catching-up) was derived from the Solow (1956) model of economic growth. Since $k_t = \frac{K_t}{A_t L_t} = \left(\frac{1}{A_t}\right) k_t$ and $y_t = \frac{Y_t}{A_t L_t} = \left(\frac{1}{A_t}\right) y_t$, so that we have $k_t = A_t k_t$ and $y_t = A_t y_t$, thus $k = g + k$ and $y = g + y$ can be obtained. In the above derivations, Y, K, L and A represent GDP, level of capital, labour and total factor productivity (TFP) in that order. The TFP ranges from 0 and 1 (0<TFP<1). $\tilde{k}$ is the capital per effective labour, k is the derivative of $\tilde{k}$ in terms of time, $\tilde{y}$ is output per effective labour and y is time derivative of $\tilde{y}$ and t refers to time. In a steady state $k = 0$ and $y = 0$, hence k and y both grow at the same rate as technical progress, g. But, outside the steady state neither k and y are zero, it is therefore important to know their values in order to determine k and y. Therefore:

$$y = Sh_K . k_t \tag{3.1}$$

Where Sh_K is identical to $\left(\frac{\Pi}{Y}\right)$ and is the saving rate, thus it is:

$$y_t = g + y = g + Sh_K . k_t \tag{3.2}$$

Dividing the fundamental growth equation by k_t, k is obtained and substituting the results in equation 3.2 yields saving rate per person:

$$y_t = g + Sh_K \left[\frac{sf\left(k_t\right)}{k_t} - (\delta + n + g) \right] \tag{3.3}$$

Assuming a Cobb-Douglas (CD) production function in capital and effective labor, a production function of the following form can be obtained:

$Y_t = F(K_t, E_t) = K_t^{\alpha} L_t^{1-\alpha} = K_t^{\alpha}(A_t L_t)^{1-\alpha}$. In this case, $K_t = Y_t^{1/\alpha}(A_t L_t)^{(\alpha-1)/\alpha}$ and therefore:

$$\frac{sf\left(k_t\right)}{k_t} = sA^{(1-\alpha)/\alpha} y_t^{(\alpha-1)\alpha} \text{ or } sf\,\frac{(\tilde{k}_t)}{\tilde{k}_t} = sA^{(1-\alpha)/\alpha} + (\alpha-1)\alpha \ln y_t \tag{3.4}$$

α is some response to a one per cent change in y_t.

From the CD production function, the following can be obtained:

$$Sh_K = \frac{\Pi}{Y} = \frac{K.PMK}{Y} = \frac{K(\partial Y/\partial K)}{Y} = \alpha = \frac{\partial Y}{\partial K}.\frac{K}{Y} = \alpha \tag{3.5}$$

α is elasticity of Y with respect to K.

3.5and 3.4 can be substituted into equation 3.2 and considering the fact that $y^{(\alpha-1)/\alpha} = \exp\left(\frac{\alpha-1}{\alpha}\log y\right)$, yields:

$$y_t = g + \alpha\left[sA_t^{(1-\alpha)\alpha} e^{\log y_t^{(\alpha-1)/\alpha}} - (\delta+n+g)\right] \tag{3.6}$$

From equation 3.6, a Taylor series approximation can be undertaken around the steady state value of y (that is, around $y = y^*$ or $\log y = \log y^*$) and this yield:

$$y_t = g + (\alpha-1)\left[sA_t^{(1-\alpha)\alpha} e^{\log y_t^{(\alpha-1)/\alpha}}\right]_{y=y^*} (\log y_t - \log y_t^*) \tag{3.7}$$

$y*$ is the steady state value of output per effective labour.

From equation 3.4, the following can be obtained:

$$\left[sA_t^{(1-\alpha)\alpha} e^{\log y_t^{(\alpha-1)/\alpha}}\right]_{y=y^*} = \frac{sf\left(k_t^*\right)}{k_t^*} \tag{3.8}$$

$\tilde{k}*$ is the steady state value of physical capital per effective labour.

Since $k = 0$ in the steady state, from the fundamental growth equation, then the golden-rule of saving rate can be obtained:

$$\frac{sf\left(k_t^*\right)}{k_t^*} = \delta + n + g \tag{3.9}$$

Where δ, is the depreciation rate of both physical and human capital, n is growth of the population rate and g is technology growth rate.

Thus, using equations 3.9 and 3.8, equation 3.7 can be written as follows:

$$y_t = g + (\alpha - 1)(\delta + n + g)(\log y_t - \log y_t) \tag{3.10}$$

Letting:

$$(\alpha - 1)(\delta + n + g) = \lambda \tag{3.11}$$

λ is the rate of convergence.

Then:

$$y_t = g + \lambda(\log y_t - \log y_t) \tag{3.12}$$

g is a constant growth rate. $\log y_t - \log y_t^*$ measures the per capita income distance which currently separates the economy from its long-run position. The larger the absolute value of $\log y_t - \log y_t^*$, the further away the economy is from its long-run position. Since $y = (dyt / dt) / yt$ and it is the same as $d \log yt / dt$, equation 3.12 can be re-written as follows:

$$\frac{d \log yt}{dt} = (g - \lambda \log y_t) + \lambda \log y_t) \tag{3.13}$$

which (moving from continuous to discrete time terms) can be approximated as follows:

$$\log y_{t+1} = (g - \lambda \log y_t^*) + \lambda \log y_t \tag{3.14}$$

This is to say:

$$\log y_{t+1} = (g - \lambda \log y_t^*) + (1+\lambda)\log y_t \tag{3.15}$$

Equation 3.15 is a first-order difference equation and the independent term $(g - \lambda \log y_t^*)$ is not a constant, for y_t^* grows at the rate g. Since $y_t = A_t y_t$ for all t, then:

$$\log(A_{t+1} y_{t+1}) = g - \lambda \log(A_t y_t^*) + (1+\lambda)\log(A_t y_t) \tag{3.16}$$

That is to say:

$$\begin{aligned}\log \tilde{y}_{t+1} &= g - \lambda \log \tilde{y}_t^* + (1+\lambda)\log \tilde{y}_t + \log A_t - \log\left[A_t(1+g)\right] = \\ &- \lambda \log \tilde{y}_t^* + (1+\lambda)\log \tilde{y}_t\end{aligned} \tag{3.17}$$

Where use has been made of the fact that $A_t = A_t(1+g)$ and that $\log(1+g) \approx g$ (this approximation is obtained by means of Taylor approximation of $\log(1+g)$ around the value of g=0 so that $1+g=1$.

Now, y_t^* is the steady state level of y_t, which is constant, that is, $y_t^* = y^*$. Therefore:

$$\log y_{t+1} = (1+\lambda)\log y_t - \lambda \log y^* \tag{3.18}$$

This is a first-order difference equation y_t, but of constant independent term

($-\lambda \log y^*$), therefore:

$$\log \tilde{y}_T = e^{\lambda T} \log \tilde{y}_0 + (1 - e^{\lambda T})\log \tilde{y}^* \tag{3.19}$$

Since y^* is constant, time period (T) of evaluation does not matter. Assuming it at the initial period, $t = 0$, then:

$$\log \tilde{y}_T = e^{\lambda T} \log \tilde{y}_0 + (1 - e^{\lambda T})\log \tilde{y}_0 \tag{3.20}$$

Equation 3.20, cannot be empirically estimated because data on labour-effective per capita income (y) are not available, it has to be written in terms of per capita

(y). Since $y_t = y_t / A_t$,

$$\log \frac{y_T}{A_T} = e^{\lambda T} \log \frac{y_0}{A_0} + (1 - e^{\lambda T}) \log \frac{y_0^*}{A_0} \qquad (3.21)$$

That is to say:

$$\log y_T = gT + (1 - e^{\lambda T}) \log y_0^* + e^{\lambda T} \log y_0 \qquad (3.22)$$

Where use has been made of the fact that $A_T = (1+g)^T A_0$ and therefore $\log A_T = T \log(1+g) + \log A_0 \approx T_g + \log A_0$. Subtracting $\log y_0$ from both sides yields:

$$\log \frac{y_T}{y_0} = gT + (1 - e^{\lambda T}) \log y_0^* (e^{\lambda T} - 1) \log y_0 \qquad (3.23)$$

The left-hand side of equation 3.23 is the per capita income growth rate of over the entire (0, T) time period. Hence, dividing by T, the result, $\frac{1}{T} - \log(y_T / y_0)$ is the average annual per capita income growth rate during the period, that is:

$$\frac{1}{T} \log\left(\frac{yT}{y_0}\right) = g + \frac{1 - e^{\lambda T}}{T} \log y_0^* + \frac{e^{\lambda T} - 1}{T} \log y_0 \qquad (3.24)$$

Since $g + \left[(1 - e^{\lambda T}) / T\right] \log y_0^*$ and $(e^{\lambda T} - 1) / T$ are both constant, let:

$$g + \frac{1 - e^{\lambda T}}{T} \log_0^* = \alpha \qquad (3.25)$$

$$\frac{e^{\lambda T} - 1}{T} = \beta < 0 \text{ is the convergence parameter} \qquad (3.26)$$

Therefore equation 3.24 can be re-written as follows:

$$\frac{1}{T} \log\left(\frac{yT}{y_0}\right) = \alpha + \beta \log y_0 ; \beta < 0 \qquad (3.27)$$

$\frac{1}{T}\log\left(\frac{yT}{y_0}\right)$ is the growth rate of y in the interval (0, T).

Thus, for a cross section of N countries (i=1,2,…, N) with the same long-run equilibrium, the regression

$$\frac{1}{T}\log\left(\frac{y_i,T}{y_i,0}\right) = \alpha + \beta \log y_{i,0} + \varepsilon_{i[0,T]} \qquad (3.28)$$

Where $\varepsilon_{i[0,T]}$, should produce an estimate $\hat{\beta} < 0$. $\varepsilon_{i[0,T]}$ is a random error term. According to equation 3.28, countries with a higher income per capita have a growth rate that is lower. Equation 3.28 gives the theoretical model upon which income convergence of the EAC partner states was based.

3.3.2 Business cycle synchronization in EAC

Business cycles can be seen as up-swing and down-swing of economic activities. Economic theory has not provided a complete guidance regarding impact of various linkages such as trade and finance on business cycle synchronization (Kose, Otrok and Whiteman, 2003a). Business cycle synchronization refers to the tendency of business cycles to move in the same or opposite direction. The theoretical framework assumed in this study is founded on OCA theory whose genesis was the seminal contribution of Mundell (1961) who identified the incidence of asymmetric shocks as one of the OCA criteria. The prediction is that, when there is business cycle correlation among countries forming a monetary union, the probability of asymmetric shocks is minimized and consequently reduces the pain of losing an independent monetary policy. Thus, when business cycles are synchronized among the partner states, the Central Bank of the monetary union can implement a common monetary policy to correct a certain imbalance and that intervention will be optimal for all member states.

Drawing from the OCA theory, this study argues that the channels through which business cycles are transmitted in EAC are trade and sectoral specialization with trade as the main channel of transmission. This idea can be traced from McKinnon (1963) and Frankel and Rose (1998). Through their endogeneity hypothesis, Frankel and Rose (1998) argued that monetary union members would fulfill OCA criteria after a single currency is adopted because transaction costs are reduced with the adoption of a common currency. As a consequence, trade increases leading to synchronization of business cycles. In other words, demand shocks are transmitted between countries through trade (Antonakakis and Tondl, 2011). Clark and van Wincoop (2001) established that a positive correlation existed between trade integration and business cycle synchronization. Imbs (2004) also obtains similar results.

The second channel on sectoral specialization follows Kenen (1969) observation that synchronization of business cycles will be less asymmetric in two countries if their economic structures are the same. If that is the case, an external demand or supply shock will have the same effect in the two economies. If countries have different economic structures, they will be susceptible to asymmetric shocks. For instance, if one of the economies is dependent on agriculture and the other manufacturing sector, an industry specific shock that is common will affect them differently so that business cycles become asynchronous. On a similar vein, if the two economies have differing energy needs, the one which has high energy demand will be affected more from increases in oil prices and that can reduce growth momentum (Siedschlag and Tondl, 2006).

3.3.3 Political integration in EAC

This study argues that political integration should be the most important criteria for determining efficacy of the EAC countries forming a monetary union. Neofunctionalist theory advanced by Haas (1958) was used to interpret and understand the implications of political integration. For Haas (1958) said "political integration is the process whereby political actors in several distinct national settings are persuaded to shift their loyalties, expectations and political activities toward a new center, whose institutions possess or demand jurisdiction over the pre-existing national states" (Haas, 1958: 16). According to this study, this new center is a supranational institution, the EAC Secretariat in this case. A supranational institution exercises influence at a higher level or outside the boundaries of individual partner state (Hatton, 2011).

Under neofunctionalism, economic cooperation in specific sectors should increase economic integration and eventually lead to political integration. Hatton (2011) notes that this is made possible through spillover effects which is in two forms. Firstly, it is through functional spillover where integration in one area of policy builds pressure for integration in other areas. Secondly, it is through political spill-over where supranational and sub-national actors in the integration process generate extra force for integration as they advance their interests.

The theory of intergovernmentalism as developed by Hoffmann (1966 and 1995) and later by Milward (1992) provides an indicator of political integration that can be measured as manifested by the growth in power of institutions generated by activities of political actors in a given state. Hoffmann (1966) by giving a critique to neofunctionalism approached stressed the importance of member states and their roles in shaping European structure (Moga, 2009). If the magnitude of the political indicator has been increasing over time, then that should be taken to mean that there has been growth of supranational political institution.

This study makes a case that EAC partner states should adopt a supranational model of political integration where member states over time will be willing to cede their sovereignty to a supranational institution having exclusive authority. Such an institution should be responsible for wage, monetary and fiscal policies among the EAC partner states. Figure 3.1illustrates the process of forming a supranational institution.

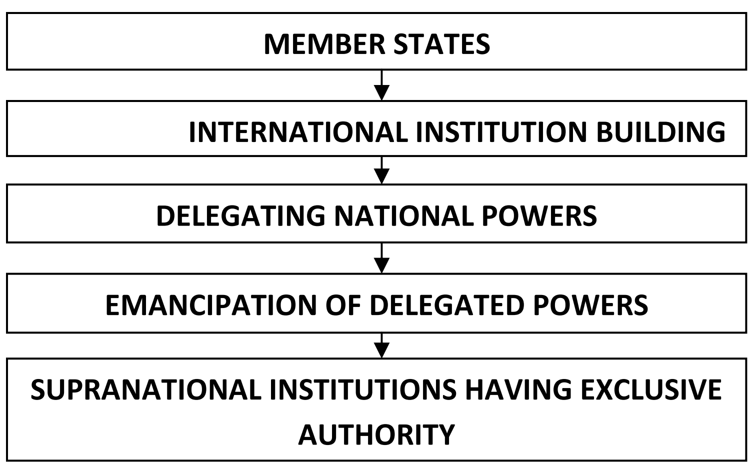

Figure 3.1: The genesis of a supranational system
Source: Ruszkowski (2006).

From the foregoing analysis, the ideal level of political integration for EAC or any other monetary union for that matter is having a supranational authority with exclusive authority. The United States of America (USA) which has 50 states is a good example. Even though these states are semi-autonomous, the national government has exclusive powers in the conduct of fiscal and monetary policies. When political integration is achieved, partner states in EAC will have to accept and respect common laws and institutions. If that happens, there will be intense feeling and strong sense of being members of the same nation. This, according to De Grauwe (2009) is what is lacking in the EMU. This is what the author calls an omitted deep variable thereby making the process towards political unification difficult. Shared values are an important feature of a supranational system (Ruszkowski, 2006; 2009). In a sense, the supranational institution should create unity in diversity. This is given that the EAC countries are heterogeneous socially, politically and economically. In order to guarantee long-term success of EAC monetary union, partner states must work towards supranationalism where they will be exercising their sovereignty jointly.

3.4 Empirical approaches

In this section, empirical model specification estimated for income convergence which has two models-unconditional and conditional convergence is explained in details. Specification of system of equations for business cycle synchronization in the EAC is also made. A measure of political integration and factors influencing it are also part of this section.

3.4.1 Empirical model specification of income convergence in EAC

This section details empirical model specifications for unconditional and conditional convergence in the EAC. To determine whether unconditional convergence hypothesis holds for EAC partner states the following equation (3.29) was estimated:

$$\Delta y_{i,0,T} = \alpha - \beta \log(y_{i,T}) + \varepsilon_{i,T} \tag{3.29}$$

Equation 3.29 is a continuation from equation 3.28 in section 3.3.1. The dependent variable is the annual average per capita growth rate for period i and T, while the initial per capita income (for year 1990) is the only explanatory variable. $\varepsilon_{i,T}$ is a random term. Unconditional convergence would be supported if $\beta < 0$.

To test for conditional convergence, equation 3.29 is augmented with control variables so that it now takes the following functional form:

$$\Delta y_{i,0,T} = \alpha - \beta \log(y_{i,T}) + \gamma Z_{i,T} + \varepsilon_{i,T} \tag{3.30}$$

Where:

$Z_{i,T}$ and γ are vectors of control variables and regression parameters respectively.

From regression equation 3.30, conditional convergence will be supported if $\beta < 0$. This is after differences among the EAC partner states are controlled for. Low per capita income would be associated with growth rates that are higher in the future. Control variables that were included in equation 3.30 included the following: physical and human capital, labour force participation rate, population growth rate, debt to GDP ratio, inflation and exchange rates and trade openness.

Physical capital accumulation was proxied by gross capital formation. A positive relationship is expected between physical and human capital and labour with growth of income per capita in accordance to the neoclassical and endogenous growth theories. Population growth has been emphasized in empirical studies as an important variable in explaining economic growth (Bonnefond, 2014). Population growth is considered as an opportunity cost for productive activities because capital will be used by new workers instead of using it to raise productivity of the existing workers (Barro, 1998). Thus, an inverse relationship between growth of population and per capita income growth was expected. Inflation rate and trade openness are considered as important policy variables in explaining growth convergence (Michelis and Neaime, 2004). Nominal exchange rate may not affect long-run economic growth (Petreski, 2009). It will depend on the transmission channels such as trade, investment and productivity. Relationship on economic growth can be either positive or negative. The effect of debt to GDP ratio is indeterminate because large stock of debt can retard growth while a smaller work can act a growth stimulant (Szeles and Marinescu, 2010).

3.4.2 Business cycle synchronization in EAC

This study followed closely the works of (Imbs, 2004; 2006; Dees and Zorell, 2011; Siedschlag and Tondl, 2006; 2011; Antonakakis and Tondl, 2011, and Akin, 2012) and estimated bilateral output correlations of EAC partner states with measures on trade integration and sectoral specialization. Trade integration and sectoral specialization variables were considered to be endogenous so that each was modeled separately within the system. The aim was to determine how closer economic ties among the EAC countries have contributed to business cycle synchronization. To achieve this objective, a system of equations relating correlation of business cycles with measures of bilateral trade intensity and sectoral similarity in production was specified and estimated. Simultaneous equations allow modeling of both direct and indirect channels of synchronization of business cycles and takes care endogeneity problem (Xie, Cheng and Chia, 2013). A system of three simultaneous equations represented the inter-linkage of these variables.

Each observation corresponds to a country pair (i, j):

$$\sigma_{ijt} = \alpha_0 + \alpha_1 TRADE_{ijt} + \alpha_2 SPEC_{ijt} + \alpha_3 I_{1ijt} + \varepsilon_{1ijt} \tag{3.31}$$

$$TRADE_{ijt} = \beta_1 \sigma_{ijt} + I_{2ijt} + \varepsilon_{2ijt} \tag{3.32}$$

$$SPEC_{ijt} = \gamma_1 TRADE_{ijt} + I_{3ijt} + \varepsilon_{3jit} \tag{3.33}$$

$$I_{1ijt} \neq I_{2ijt} \neq I_{3ijt}$$

From principal equation (3.31), σ_{ijt} is business cycle correlation between a pair of EAC countries i and j at time t. Variable $TRADE$ is the bilateral trade between two countries divided by the sum of their GDPs. It measures demand shocks that are transmitted through trade linkages. Variable $SPEC_{ijt}$ is a measure of sectoral specialization between two countries (agriculture, industry and services). It indicates the extent of sector specific shocks- σ_{ijt}, $TRADE$ and $SPEC$ are endogenous variables while $I_{1ijt} \neq I_{2ijt} \neq I_{3ijt}$ are vectors that contain exogenous variables of equations (3.31) and (3.32). However, I_1 is empty for the baseline model of estimation. α , β and γ are parameters to be estimated and ε_{ijt} represents the random terms.

Equations (3.32) and (3.33) are auxiliary and capture the simultaneity contained in the principal equation (3.30). Equation (3.31), bilateral trade, is explained by correlation of business cycles and a set of exogenous factors (I_{1ijt}) suggested in the gravity model: the log of GDP product of the trading partners, the contiguity dummy and population.

Equation (3.33) captures the argument that sectoral specialization of a given region increases with an increase in trade integration. Sectoral specialization is explained by trade integration and a set of exogenous variables: GDP gap, product of GDP per capita and product of surface area. In addition, Shiedschlag (2010) argues that sectoral specialization is likely to be determined by a country's size. This implies that bigger countries are likely to be more diversified relative to smaller ones. To control for size, Schiedschlag (2010) introduced two control variables: surface area and real per capita GDP. These variables were then transformed by taking products of surface area and per capita GDP for country i, and j and then taking their natural logarithms. According to Imbs and Wacziarg (2003), countries tend to diversify into different industries at the early stage, but specialize again after attaining a relatively higher level of income. The argument is that countries have different patterns of specialization depending on their stage of development (Goggin and Siedschlag, 2013).

3.4.3 Political integration in EAC

The first step in determining political integration in the EAC involved the calculation of a measure of political integration. The calculation of political integration measure was borrowed from the work of Kingsolver (2011). According to Kingsolver (2011) who adopted Fisher's (1969) view, argues that political integration is a process best illustrated by the growth in decision making ability of a supranational institution of the integrating parties. For purpose of this study, the institution being referred to is the EAC Secretariat. If the level of political integration increases over time, it implies that the decision making ability of EAC Secretariat has been rising.

Computation of the measure of political integration in EAC was executed as follows. First, the combined EAC member-state annual contribution to run the Secretariat was summed up and an average taken. Second, the national average revenue of all the partner states for each year was computed. Political integration was calculated as the percentage of government revenue received by the supranational institution-EAC Secretariat. An increasing value over time was taken as implying that the level of political integration has been increasing. Conversely, a decreasing value demonstrated a declining level of political integration over time.

3.4.4 Factors influencing political integration in EAC

This study hypothesized institutional distance, social integration and economic interconnectedness as possible factors that could influence political integration in EAC. The idea of institutional distance was borrowed from the works of De Groot and Linders

(2004) and Prasada (2009) as a possible explanatory variable of political integration in EAC. Social homogeneity and economic interconnectedness variables were borrowed from Kingsolver (2011) to explain political integration in EAC. This study contends that political integration in EAC might be a long process but will be enhanced if progressively, there is a decrease in institutional, social and economic aspects distance.

Institutional distance was calculated using an index developed by Kogut and Sign (1988) and applied by Linders, Burger and van Oort, (2008). World Governance indicators developed by Kaufman and others at the World Bank were used to construct the index. The indicator uses the six measures of governance quality including: political stability, voice and accountability, and absence of violence, regulatory quality, government effectiveness, control of corruption and rule of law. These indexes are already constructed and therefore no computation was required. Institutional distance reveals that a higher level of institutional differences among countries in terms of their effectiveness can increase adjustment costs and may also reduce bilateral trust (De Groot and Linders, 2004).

To determine the level of social homogeneity between the integrating countries, a breakdown of the EAC partner states demographics was made and compared to the overall demographics. As indicated earlier, the idea of social homogeneity including how it is calculated was borrowed from Kingsolver (2011). Demographic breakdown considered the ages 0 to 14 years, 15 to 65 years and those above 65 years of age. After determining EAC partner states' demographic breakdowns for each demographic characteristic which was measured, a compilation of the differences between the average partner state and the EAC average was undertaken. Social integration level was obtained by summing the differences. If the value has been increasing over time, then the level of social integration was said to have decreased.

The events in EMU have served to demonstrate that economic interconnectedness may not naturally lead to political integration. One of the theories driving political integration in Europe was the neofunctionalist spillover theory initially advanced by Haas (1958) which assumed that economic integration will spill over to other functional areas leading to more political, cultural and social integration. Economic connections can be viewed from trade relations that can make semi-sovereign states to further integrate.

To calculate economic interconnectedness in EAC, export and import data for the five partner states in EAC was averaged to obtain the average of partner-state imports received from other EAC countries and the average of member-state exports exported to other EAC member countries. The average mean of imports and exports was computed and divided by mean GDP of the partner states for each year and then multiplied by 100. If the figures so computed increased over time, it was taken to mean that economic interconnectedness of partner states has been growing over time. Increased economic interconnectedness can also be taken as indicating the strength of the internal market (Kingsolver, 2011).

After calculating political integration measure, the next step entailed graphing political integration measure against institutional distance, social homogeneity and economic interconnectedness in EAC. Even though causal relationship may not be established through graphical and correlation analysis, it can indicate those factors likely to influence political integration in EAC. Thus, graphical and correlation analysis approaches were used to ascertain factors that could be influencing political integration in EAC.

3.5 Definition and measurement of variables

Definition and measurement of variable used in this study is presented in Table 3.1.

Table 3.1: Definition and measurement of variables

Variable name	Definition	Measurement
Per capita GDP growth rate	Refers to a rise in per capita GDP	It is measured by comparing per capita GDP in a year with that of the previous year.
Human capital	It is a measure of quality of labour in terms of skills, knowledge and experience.	Human capital Index per person was based on years of schooling (Barro/Lee, 2012) and returns to education (Psacharopoulos, 1994)
Initial per capita GDP	It is per capita GDP for year 1990.	It is per capita GDP for the year 1990 for the EAC partner states and it was used as a proxy of the original condition of the country.
Labour force participation rate	Labour force participation rate is defined as the section of working population in the age group of 16-64 in the economy currently employed or seeking employment.	It is calculated as the labour force divided by the total working-age population. It is used as a proxy for those individuals aged between 15-64 years.
Trade openness	It is a measure of economic policies that either restrict or invite trade between countries	It was measured as the total sum of the value of imports and exports of goods and services as a share of GDP. It gives inward or outward orientation of an economy.
Population growth	Refers to an increase in the number of people in a population.	It was measured as the total per cent change of population of the current year relative to the previous one.
Nominal exchange rate	Is defined as the number of units of domestic currency per unit of foreign currency.	It was measured as a ratio of EAC partner state currency per unit of foreign currency (US$) in this case. Kenya, Uganda and Tanzania have the shilling awhile Burundi and Rwanda have the franc.
Physical capital	Refers to a factor of production (or input into the process of production), such as machinery,	Gross fixed capital formation is measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period plus certain additions to

	buildings, and computers. Gross fixed capital formation was used as a proxy.	the value of non- produced assets (such as subsoil assets or major improvements in the quantity, quality or productivity of land) realized by the productive activity of institutional units.
Inflation rate	Refers to the rate at which goods and services prices are rising over a specified period of time.	The consumer price index (CPI) yearly per cent change was used as a measure.
Debt to GDP ratio	This is the ratio of a country's total debt to its GDP.	It was measured as national debt stock divided by GDP.
Business cycle synchronization	A business cycle refers to a predictable long-term pattern of alternating same trends in economic variables in periods of economic growth (recovery) and decline (recession). Synchronization of business cycles refers to the positive correlation between economies.	Cyclical component of GDP extracted using BK filter. Kenya was used as the country of reference.
Trade integration index	It is an index that measures whether trade value between two countries is greater or smaller relative to trade with the world.	Trade intensity was approximated as follows: $Trade_{\tau}(i, j) = \frac{1}{T}\sum_{t}\frac{X_{i,j,t}^{t} + M_{i,j,t}^{t}}{Y_i^t + Y_j^t}$ where $X_{i,j,t}^{t}$ is total exports from country i to j in year t. $M_{i,j,t}^{t}$ represents imports from country i to j. Y_i^t and Y_j^t is nominal GDP of country i and j measured in US$ at time t.
Sectoral specialization	Refers to the way an economy is structured in terms of industries- agriculture, manufacturing and services.	This study applied Krugman index of concentration to measure sectoral production similarities. $Structure_{\tau}$ $(i, j) = \frac{1}{T}\sum_{t}\sum_{s=1}^{s}\left\|\frac{Y_{i,s}}{Y_i} - \frac{Y_{j,s}}{Y_j}\right\|$. Where $Y_{i,s}$ is the value added in US$ of sector s in country i and Y_i is GDP in US$ at year t. $Structure_{\tau}$ (i, j) is a broad measure of average discrepancies in the GDP shares of agriculture, industry and services sectors for countries i and j in period t.
Contiguity	Refers to state of EAC countries neighboring each	Is a dummy variable: 1 if the partner state boarders Kenya, 0 otherwise.

	other.	
Political integration		It was measured as the average contribution to the EAC Secretariat by individual partner states in a given year divided by average revenues of each partner state in that year multiplied by 100.
Institutional distance (ID)	For purposes of this study, institutional distance refers to differences in bilateral trust.	The ID index is borrowed from Kogut and Singh (1988) and was calculated as follows: $ID_{ij} = \frac{1}{6}\sum_{i=1}^{6}\frac{(I_{ki} - I_{kj})^2}{V_k}$ Where I_{ki} indicates country $i's$ score on the k^{th} dimension and the V_k is the variance of this dimension across all countries.
Social integration	Refers to a situation of homogeneity despite differences based on language, culture and other such identities.	It was calculated using demographic breakdown of ages 0-14, 15-65 and above 65 years this was taking average of EAC partner state and that of the EAC.
Economic interconnectedness	Refers to the strength of economic association of the EAC partner states.	It was computed by taking the average export and imports of each partenr state to the EAC countries for a given year divided by average GDP of EAC for that year.
Population	Refers to the number of inhabitants in each of the EAC partner states.	It was calculated as the summation of inhabitants in each of the EAC partner states in a given year.
GDP product	For purposes of this study, it refers to the GDP of Kenya multiplied by the GDP of the other EAC partner state in a given year. GDP in US$.	It was measured as the GDP of Kenya multiplied with GDP of each of the EAC prtner state for every year covered in the study.
GDP gap	Refers to difference between Kenya's GDP (US$) and that of another partner state in the EAC.	It was obtained by subtracting individual partner state GDP from that of Kenya for a given year.
Product of GDP per capita	For purposes of this study, it refers to the GDP per capita of kenya (US$) multiplied by that of the	It was calculated by multiplying the GDP per capita of kenya (US$) and that of the other EAC partner states in a given year.

	other EAC partner state in a given year.	
Product of surface area	Refers to the surface area of one entity multilied by that of another.	For the purpose of this study, it was obtained by multiplying surface area of Kenya in KM^2 with that of individual EAC partner states.

3.6 Data type and data sources

Data used in this study was from secondary sources and obtained from various sources as discussed in this sub-section. Data on population growth, merchandise imports and exports (agriculture, industry and services), per capita GDP growth rate, per capita GDP, labour force participation rate, population, gross fixed capital formation, trade openness, initial GDP per capita and population ages were obtained from the World Development Indicators (WDI) of the World Bank. Inflation rate and debt to GDP ratio data was obtained from the International Monetary Fund (IMF). Data on human capital and exchange rate was obtained from Penn World Tables (PWT 8.0). Data on contiguity was obtained from *CollectifEuropéend'équipes de pédagogieinstitutionnelle* (CEEPI). Contributions by EAC member states to the EAC secretariat was obtained from the EAC secretariat while intra-EAC statistics were obtained from the EAC official website. Governance indicators were from the World Bank open data portal on governance indicators.

3.7. Data coding, cleaning and refinement

Prior to empirical estimation, data cleaning, coding and entry was undertaken and relevant model specifications tests done.

3.8 Data analysis

Data for objectives one and two was analyzed using STATA software while objective three and four data was analyzed using excel spreadsheet. Data analysis was based on regression, descriptive and graphical analyses. The first objective aimed at assessing the state of income convergence in EAC, necessary for the establishment of a monetary union. Unconditional convergence was analyzed by estimating equation 3.29 using ordinary least squares (OLS) approach. Prior to undertaking regression analysis, multicolinearity and panel unit root tests were undertaken on all variables to determine their order of integration. Regression analysis for equation 3.30 was implemented using autoregressive distributed lag (ARDL) models: pooled mean group (PMG) and mean group (MG) because data exhibited mixed orders of integration. Specifically, variables were integrated of either order zero or one. Hausman test was used to identify the most suitable model for the data.

The second objective of this study was to determine how closer economic ties among the EAC countries have contributed to business cycle synchronization, necessary for the establishment of a monetary union. To achieve this objective, simultaneous equations 3.31-3.33 were estimated using the 3SLS estimator. A similar estimation procedure was used by Siedschlag (2010) and Xie, Cheng and Chia (2013). The 3SLS combines the two-stage least square (2SLS) estimator with seemingly unrelated regressions (SUR) to produce consistent and efficient estimates and is superior to both 2SLS and SURE (Xie *et al.* 2013).

The third objective was to establish the level of political integration in EAC, necessary for the establishment of a monetary union. A measure of political integration in EAC was constructed to achieve this objective. The fourth objective was to ascertain the factors influencing political integration in EAC, necessary for the establishment of a monetary union. To this end, measures of institutional distance, social integration and economic interconnectedness were computed. A graphical and correlation analysis of these measures was undertaken to give indications of their relationship with political integration. This is for ascertaining factors influencing political integration in the EAC.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter provides empirical findings for the income convergence model, business cycle synchronization and political integration in the EAC.

4.2 Descriptive statistics

4.2.1 Descriptive Statistics for the State of Income Convergence in EAC

Table 4.1 provides descriptive statistics for the income convergence model variables for the five EAC partner states (Kenya, Uganda, Tanzania, Rwanda and Burundi). The critical statistics presented are the mean, maximum and minimum values and the standard deviations of the variables. Appendix 1 presents data used to generate descriptive statistics in Table 4.1.

Table 4.1: Descriptive statistics for the income convergence model

Variable name	Mean	Std. Dev.	Min	Max	No. of observations
Per capita GDP growth rate (%) (dependent variable)	1.61	6.73	-47.72	37.13	115
Initial per capita GDP (US$)	384.96	146.21	218.06	555.33	115
Physical capital	30.74	26.10	2.78	83.10	115
Human capital	1.60	0.22	1.26	2.05	115
Labour force participation rate (%)	126.09	92.18	65.50	429.40	115
Population growth rate (%)	2.67	1.77	-6.34	7.99	115
Inflation rate (%)	12.43	11.21	-2.42	66.31	115
Debt to GDP ratio (%)	73.25	35.27	18.46	171.95	115
Trade openness	42.77	12.44	19.68	72.86	115
Nominal exchange rate	-	-	-	-	-

Source: Derived from the collected data

Over the period 1990-2012, the growth rate of per capita GDP was 1.61 per cent. This can be said to be a modest rate of growth. The Asian Tigers, namely Taiwan, Singapore, South Korea and Hong Kong achieved a growth rate that averaged over 6 per cent for the period 1960-1990 (Sarel, 1996). In the EAC, the maximum GDP per capita growth rate realized was 37.13 per cent and the lowest was negative 47.73 per cent.

On average, the initial per capita GDP for the EAC was US$ 384.96 with maximum and minimum values being US$ 555.33 and US$ 218.06, respectively. This means that the EAC as a region, at the initial period of this study (year 1990) were far from attaining the middle-income status. According to classification by the World Bank, lower middle-income status is achieved when a per-capita income of US$ 1,045 is attained. Gross capital formation as a per cent of GDP averaged 30.74 per cent while maximum and minimum rates were 83.10 and 2.78 per cent, respectively. Gross capital formation is usually used as a proxy for general investments or stock of private capital (Žemgulienė, 2012). Capital is a crucial ingredient of GDP growth in the Solow and endogenous growth models.

Human capital is a human capital index per person based on years of schooling (Barro and Lee, 2013) and returns to education (Psacharopoulos, 1994). Human capital index averaged 1.60. The index had a maximum of 2.05 and a minimum of 1.26. This level of human capital index can be regarded as average because for developed countries, their index is slightly above 3.0. Labour force participation rate, which was used as a proxy for labour averaged 51.19 per cent for those whose age ranges from 15-64 years, as indicated in Table 4.1. Average population growth rate for EAC partner states over the study period was high at 2.67 per cent. A rise in natural growth rate of a population is considered as an opportunity cost for productive activities (Bonnefond, 2014). The highest population growth rate achieved was 7.99 per cent and the lowest was -6.34 per cent.

According to Table 4.1, the average rate of inflation for the period under consideration was high at 12.43 per cent. This rate of inflation rate is more than a single digit as envisaged in the EAC Monetary Union Protocol. According to this protocol, headline inflation rate should be about 8 per cent under macroeconomic convergence criteria (EAC, 2013).

The debt to GDP ratio measured as the general governments' gross debt as a per cent of GDP averaged 73.25 per cent. According to the EAC Monetary Union Protocol, public debt should not exceed 50 per cent of GDP. The ratio of debt to GDP is one of the variables under macroeconomic convergence criteria. However, this debt to GDP ratio threshold is higher than the 60 per cent as was envisaged in the EU under the Maastricht Criteria (De Grauwe, 2009). There is no consensus in empirical literature on debt-GDP ratio threshold beyond which the debt acts as a drag on economic growth. Empirical evidence suggested by Reinhard and Rogoff (2010) indicated that countries which had a debt-GDP ratio above 90 per cent had a lower GDP growth than others. A lower figure for the debt-GDP ratio is better to ensure debt sustainability and fiscal flexibility of the partner states.

Even though descriptive statistics for the exchange rate variable are available, its interpretation is not straightforward because all the five partner states in the EAC have different currencies. That is why they have been eliminated in Table 4.1. Trade openness for the entire study period averaged 42.77 per cent which is a relatively low level of openness. Trade openness should be higher given that the EAC countries have increased their participation in international trade. Trade openness increases competition thereby creating scope for increasing productivity and innovation. Firms can also enjoy economies of scale due to large markets.

Variables that had high standard deviations implying that they had a large deviation from their means were the exchange rate and initial per capita GDP. Their standard deviations were US$ 592.75 and US$ 146.21. This indicates that EAC countries are far from attaining convergence in these macroeconomic variables. Human capital, population growth and investment as a per cent of GDP had the lowest standard deviations.

4.3 Statistical Properties of the Variables

This sub-section presents investigation of statistical properties of the data, specifically panel unit roots because of the long time dimension of 23 years. Also investigated is whether the variables used to determine income convergence in EAC have a problem of multicolinearity.

4.3.1. Panel Unit Root Tests

The study covers the period 1990-2012 and totals to 23 years and 10 regressors. A time dimension of 23 years is a fairly long period and therefore the macroeconomic variables in the study were likely to have unit roots (Nelson and Plosser, 1982). A stochastic process is said to be stationary when the mean and variance do not change over time. Even though unit roots are often associated with time series dataset, there is also need to test for stationarity of panel datasets. This is because running a regression with variables that are not stationary will produce spurious regression results (Nelson and Plosser, 1982).

The study relied on two panel unit root tests: Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS). This is for purposes of determining the order of integration of variables and allow for comparison. According to LLC (2002), this test best fits a panel of moderate size which has between 10-250 panels and 25-250 observations. Panel dataset used in this study can be considered to be moderate because it has five cross sections and 115 observations. The null hypothesis under LLC and IPS is that the series contains a unit root against the alternative hypothesis that the panels are stationary. Table 4.2 presents the results for the unit root test for the income convergence model.

Table 2.2: Panel unit root tests for the income convergence model

Variable Name	Level		First order difference	
	LLC test	IPS test	LLC test	IPS test
Growth rate of GDP per capita	-2.73*** (0.00)	-3.38*** (0.00)	-	-
Initial per capita GDP	-	-	-	-
Gross fixed capital formation	0.79 (0.78)	1.65 (0.95)	-4.26 *** (0.00)	-4.12*** (0.00)
Human capital	-3.89*** (0.00)	-0.48 (0.32)	-	-
Labour	-1.27 (0.10)	-3.31*** (0.00)	-	-
Population growth	-9.52*** (0.00)	-10.15*** (0.00)	-	-
Inflation	-1.87** (0.03)	-1.99** (0.02)	-	-
Debt to GDP ratio	-0.71 (0.24)	0.22 (0.59)	-3.02*** (0.00)	-3.35*** (0.00)
Exchange rate	-2.28 ** (0.01)	-1.09 (0.14)	-	-1.06 (0.00)
Trade openness	-1.14 (0.13)	-0.75 (0.23)	-5.96*** (0.00)	-6.08*** (0.00)

Source: Derived from the collected data
*Note: p-values are in parentheses; ***, ** and * indicates statistical significance at 1%, 5% and 10% respectively. These tests assume asymptotic normality (Baltagi, 2001).*

The results of the LLC panel unit root test indicate that variables growth rate of GDP per capita; human capital, population growth and exchange rate were statistically significant at one per cent level. Inflation rate was statistically significant at five per cent level. Human capital was statistically significant at ten per cent level. Thus, according to LLC test, the null hypothesis that the panel contains unit roots for variables growth rate of GDP per capita, human capital, labour, population growth, inflation and exchange rates was rejected and the alternative hypothesis that the panels are stationary was not rejected. This implies that these variables were stationary at levels suggesting that they are integrated of order zero, I (0). Test statistic for variables gross fixed capital formation, debt to GDP ratio and trade openness were not statistically significant meaning that they were not stationary at levels. Thus, according to LLC test, these variables had at least one unit root and required to be differenced to become stationary.

According to the IPS test results presented in Table 4.2 shows that the test statistic for variables, per capita GDP growth rate, labour and population growth of were statistically significant at one per cent level, while inflation rate was statistically significant at five per cent. This implies that these variables are stationary at levels. However, test statistic for variables, gross fixed capital formation, human capital, debt to GDP ratio, exchange rate and trade openness were not statistically significant. This suggests that these variables were not stationary at levels and had to be differenced at least once for them to become stationary.

Variables that could be considered not to be stationary at levels in accordance with LLC and IPS tests were: gross fixed capital formation, debt to GDP ratio and trade openness. When these variables were differenced once, they became stationary suggesting that they were integrated of order one, I (1). Thus, panel unit root tests results in Table 4.2 show that variables for the income convergence model have a mixed order of integration. Some variables were integrated of order zero I (0) while others were integrated of order one I (1).

4.3.2. Multicolinearity test

The multicolinearity test was carried out to give indications of whether multicolinearity should be a concern for variable in the income convergence model. Table 4.3 gives a correlation matrix for variables of the income convergence model. The coefficient of correlation gives the degree of association of variables and coefficient's sign provides an idea about the direction of that relationship, which can either be positive or negative.

Table 4.3: Correlation matrix for variables in the income convergence model

		Initial per capita GDP	Physical capital	Human capital	Labour force participation rate	Population growth rate	Inflation rate	Debt to GDP ratio	Nominal exchange rate	Trade openness
Per capita GDP growth rate	1.00									
Initial per capita GDP	0.08 (0.40)	1.00								
Physical capital	0.19 (0.05)	0.58 (0.00)	1.00							
Human capital	0.25 (0.01)	0.22 (0.02)	0.54 (0.00)	1.00						
Labour force participation rate	0.16 (0.09)	-0.20 (0.04)	-0.49 (0.00)	-0.01 (0.89)	1.00					
Population growth rate	0.19 (0.04)	0.18 (0.05)	0.21 (0.03)	0.25 (0.01)	0.06 (0.55)	1.00				
Inflation rate	-0.01 (0.90)	0.02 (0.80)	0.02 (0.85)	-0.12 (0.19)	-0.12 (0.19)	-0.14 (0.13)	1.00			
Debt to GDP ratio	-0.18 (0.06)	-0.33 (0.00)	-0.20 (0.03)	-0.30 (0.00)	-0.24 (0.01)	0.04 (0.71)	0.28 (0.00)	1.00		
Nominal exchange rate	0.18 (0.05)	0.14 (0.13)	0.71 (0.00)	0.74 (0.00)	-0.37 (0.00)	0.26 (0.01)	-0.17 (0.07)	-0.15 (0.11)	1.00	
Trade openness	-0.21 (0.02)	0.44 (0.00)	-0.08 (0.39)	0.05 (0.58)	0.33 (0.00)	0.10 (0.28)	0.13 (0.18)	-0.29 0.00	-0.16 (0.08)	1.00

Source: Derived from the collected data

A statistically significant correlation coefficient of more than 0.70 is considered high. Multicolinearity can be said to be of concern for variables physical and human capital and nominal exchange rate with correlation coefficients of 0.71 and 0.74 respectively. These variables have a relatively strong linear relationship among them. All the other variables had correlation coefficient of less than 0.70 meaning that there is a weak linear relationship among them. In the overall, multicolinearity is not a major issue in the income convergence model variables.

4.4 Empirical Findings

Empirical findings for the state of income convergence in the EAC which can either be unconditional or conditional or both are presented in this sub-section.

4.4.1 State of income convergence in EAC

The first objective of this study was to investigate the state of income convergence in the EAC. Income convergence can either be unconditional and conditional convergence. Both unconditional and conditional convergence of the EAC partner states was examined for the period 1990 to 2012 using panel data econometric techniques. Empirical findings are presented in sections 4.4.1.1 and 4.4.1.2.

4.4.1.1 Unconditional convergence in EAC

Unconditional convergence occurs when identical economies converge to a common long-run equilibrium. It hypothesizes that those countries with income levels that are low are expected to grow faster than richer ones assuming that the original level of income for all countries is the same. This is a strong assumption because countries differ in terms of institutions, policies, technology or even investments meaning that their steady state level will be different (Borys, Polgár and Zlate, 2008). Unconditional convergence is supported when the gap in terms of income between two countries reduces irrespective of the characteristics of the countries. To determine unconditional convergence in EAC, the average annual per capita income growth rate was regressed against the initial level of per capita income in accordance to equation 3.29 and results are presented in Table 4.4.

Table 4.4: Results for the unconditional convergence model

Dependent variable	GDP per capita growth rate (%)			
Explanatory variables	**Estimate of β**	**Std. err**	**z statistic**	**p-value**
Initial per capita income, 1990	0.004	0.007	0.490	0.622
Constant	0.251	2.950	0.09	0.932
F-Statistic	0.72			0.39
Adjusted R –squared	0.0063			0.623

Source: Derived from the collected data

Empirical results in Table 4.4 show that the F-statistic is not statistically significant. This was not entirely unexpected because in a regression to test for unconditional convergence, the initial level of per capita income is the only explanatory variable. A study conducted by the Organisation of Islamic Cooperation (IOC, 2013) also found the coefficient of F-statistic for the unconditional convergence model to be statistically insignificant. Therefore, the relationship between the initial level of income and growth for the years under consideration appear to be weak.

The adjusted R-squared is also small meaning that the initial per capita income could only explain 0.63 per cent of the variations of the dependent variable. A possible explanation for the low value of adjusted R-squared is that per capita income growth could be conditional. This means that convergence could be explained by other factors that control for the differences in the long-run values. Another explanation is that only one explanatory variable (initial per capita income) was included in the regression and a few cross-sections because the EAC comprises of five countries. In addition, theoretical prediction of unconditional convergence is hinged on a strong assumption that the levels of macroeconomic variables such as savings, technology, growth of the population and depreciation are the same for countries. Thus, a selected number of control variables were added to equation 3.29 for convergence to become conditional. The empirical findings are presented in section 4.4.1.2

In unconditional convergence empirical analysis, adjusted R-squared usually has a low value. For instance, Szeles and Malinescu (2010) while testing for unconditional convergence for a number of Central and Eastern European Countries (CEECs) countries found an R-squared of 0.81, 0.24 and 0.24 for different models for 11, 10 and 9 sample of countries. When determining unconditional convergence in an empirical analysis, the most important consideration is the sign of the coefficient of initial per capita income and whether this coefficient is statistically significant. In unconditional regressions, the coefficient of the initial per capita GDP is usually very small (Michelis and Neaime, 2004).

As shown in Table 4.4, the coefficient for the log of initial per capita income had unexpected positive sign and was not statistically significant. This implies non-fulfillment of unconditional beta convergence in the EAC. According to the neoclassical growth theory, countries that are poor should grow faster than richer ones. This means that the relationship between the initial per capita income and per capita income growth rate should be negative. The positive coefficient indicates that the differences between the EAC countries have not been narrowing as each economy approaches the long-run level. The implication is that the EAC countries have a room for “catch-up” growth. Therefore, based on the results in Table 4.4, unconditional convergence hypothesis does not hold for EAC.

The coefficient of initial per capita GDP as shown in Table 4.4 was 0.004 and had a positive sign which implies that the EAC countries were diverging from their initial position at a rate of 0.4 per cent per year for the 1990-2012 period. According to the neoclassical growth theory, the initial per capita income coefficient should be less than one. This outcome may not be entirely unexpected because Barro (1991) noted that the hypothesis that poor economies grow at a faster rate than richer ones appears not to be supported by cross-country empirical evidence. The implication is that per capita income growth rates have very little association with the starting per capita income level.

From the foregoing analysis, there was no unconditional convergence towards the steady-state among the EAC countries. The implication is that the theory of unconditional convergence does not apply in the context of the EAC partner states. Thus, there was no catching-up over the study period 1990-2012. This finding means that there has not been a decline in terms of income gaps among the EAC partner states regardless of their characteristics such as institutions, policies, technology and investments. Sala and Trivin

(2014) find some catching-up by some countries in Sub-Saharan Africa and convergence was not found to be in existence for the three decades considered in the study. However, other studies such as Amplatz (2003) and Szeles and Marinescu (2010) established the existence of unconditional convergence in Central European countries.

4.4.1.2 Conditional beta convergence in EAC

Conditional convergence happens when economic differences between two economies that have the same observable characteristics such as institutions, policies, technology becomes narrower over time. With conditional convergence, each economy has its own per capita income level towards which it is converging (Reza and Zahra, 2008). The conditional convergence criteria require that there should be an inverse relationship between the initial per capita GDP growth rate and growth in succeeding years after introducing control variables for long-run level growth of GDP per capita.

Panel unit root tests results in Table 4.2 indicated that the variables used in this study had mixed orders of integration, that is I (0) and I (1) suggesting that ARDL model cointegration test was applicable. Therefore, the autoregressive distributed lag ARDL (p,q) model and not the traditional panel cointegration test had to be used (Samargandi, Fidrmuc and Ghosh, 2013). There are two types of ARDL estimators: the mean group (MG) by Pesaran and Smith (1995) and pooled mean group (PMG) by Pesaran, Shin and Smith (1999). These estimators are able to take into account the issue of heterogeneity of the adjustment process and the long-run equilibrium (Demetriades and Laws, 2006).

Endogeneity is a common problem in growth convergence models (Islam, 2003). A dependent variable is said to be endogenous if it is correlated with the error term. Endogeneity occurs mainly due to omitted variable problem and simultaneity bias which arises when there is a causal link between the Y and X variables in a regression. Omitted variable bias in convergence regressions arises because of unobservable time-invariant characteristics that are country-specific and correlated with one or more of the X variables (Moral-Benito, 2010). If the problem of endogeneity is not addressed, parameter estimates will be biased and inconsistent.

In this study, based on the study variables in Table 4.1 (that included control variables), one can reasonably argue that gross capital formation used as a proxy for investments was simultaneously determined with GDP per capita growth. A similar argument can be made for human capital. Human capital may be highly income inelastic and, as service sector-dominated high-income economies, may demand for better educated workforce (Shultz, 1986; Sianesi and van Reene, 2003). The assumption of predetermination may be violated even if human capital observation is measured at the beginning of the interval (Barro and Sala-i-Martin, 1992).

Further, there also exists both empirical and theoretical argument about simultaneity between population and growth (Caselli, 1996). Therefore, in this study, variables that can be considered to be endogenous are the gross capital formation, population growth and human capital. In addition, measurement error was likely to bias the estimated results downwards. From the foregoing analysis, there exists a strong case that strict exogeneity assumption may be violated in the regression unless the endogeneity problem is addressed. However, despite these possibilities of endogeneity, the use of lagged dependent and independent variables ensured that consistent estimates were obtained. This was observed by Pesaran *et al*. (1999) and especially when applying MG and PMG estimators.

Equation 3.30 was estimated with PMG and MG estimators but Hausman test was applied to establish whether there were significant differences among them. Some degree of homogeneity in terms of say economic growth among the EAC countries can be expected. Nonetheless, there is a great likelihood of differences in the short-run because of laws and regulations that differ. The PMG estimator is more efficient than MG if long-run homogeneity is assumed (Samargandi *et al*. 2013). In addition, the MG estimator might suffer from degrees of freedom given that the time for this study was 23 years. It would, therefore, appear that PMG is more relevant for this study. However, to determine the most relevant estimator, Hausman test was applied. The null hypothesis for this test is that there is no statistically significant difference among the three estimators. If the null hypothesis is rejected, then, PMG estimator is more efficient. If the test statistic is not significant, PMG will be the most appropriate estimator.

The Hausman test statistic for the hypothesis that PMG is more efficient than MG under null hypothesis was 0.97 and statistically insignificant. Therefore, the Hausman test supported PMG as the more efficient estimator. Consequently, the results presented are based on the PMG estimation. However, for the purposes of comparison, MG regression results are also presented. Table 4.5 presents the findings of PMG and MG estimation of the long-run and short-run coefficients of conditional convergence model.

Table 4.5: Estimates of conditional convergence in the EAC

Dependent variable: Per capita GDP growth rate						
	PMG			**MG**		
Variable name	**Coefficient**	**Std. Err.**	**P value**	**Coefficient**	**Std. Err.**	**P value**
Long-run coefficients						
Initial per capita GDP	-0.05	0.01	0.00	-0.01	0.01	0.32
Physical capital	0.06	0.03	0.01	1.66	0.62	0.01
Human capital	-9.97	2.86	0.00	80.07	58.60	0.17
Labour force participation rate	0.12	0.22	0.57	-0.69	1.10	0.53
Population growth rate	-0.25	0.25	0.31	3.64	3.30	0.27
Inflation rate	-0.12	0.02	0.00	-0.28	0.36	0.43
Debt to GDP ratio	-0.01	0.01	0.32	-0.15	0.11	0.17
Nominal exchange rate	0.01	0.00	0.00	-0.01	0.03	0.78
Trade openness	0.02	0.02	0.14	-0.23	0.26	0.37
Error correction term	-0.73	0.25	0.00	-1.11	0.42	0.01
Short-run coefficients						
D(Physical capital)	0.39	0.26	0.13	-0.95	0.73	0.19
D(Human capital)	-36.39	18.42	0.05	7.06	96.29	0.94
D(Labour force participation rate)	3.63	1.68	0.03	-2.60	5.55	0.64
D(Population growth rate)	2.57	2.74	0.35	4.08	5.60	0.47
D(Inflation rate)	-0.16	0.09	0.06	-0.17	0.06	0.00
D(Debt to GDP ratio)	-0.01	0.02	0.65	0.01	0.04	0.89
D(Nominal exchange rate)	0.02	0.02	0.20	-0.06	0.07	0.36
D(Trade openness)	-0.10	0.14	0.47	0.26	0.25	0.30
Constant	17.08	7.19	0.02	149.24	197.88	0.45

*Source: Derived from the collected data. Note ***and * imply statistical significance at 1% and 10% level respectively. Standard errors are in the parenthesis. Explanatory variables are in natural logs.*

Table 4.5 indicates that only short-run coefficients for variables human capital, labour force participation rates and inflation rate were statistically significant. This reflects presence of short-run relationship between growth of GDP per capita and these variables.

Results in Table 4.5 supported conditional convergence in EAC over the period 1990-2012 as presented. The initial per capita GDP coefficient was -0.05, had the expected negative sign in accordance with theory and was statistically significant. This implies that over the 1990-2012 periods, the EAC economies have been converging to their steady-state. The negative relationship indicates that the EAC partner states have the same structural characteristics. Therefore, poorer countries in EAC grew faster than their richer counterparts. Thus, the proposition that those countries that are poorer tend to grow more rapidly than richer ones after controlling for the determinants of the long-run level of per capita GDP holds for the EAC partner states.

A coefficient of -0.05 indicates that the speed of convergence in EAC was 0.05 per cent. This is lower than the 2-3 per cent found by Baro and Sala-i-Martin (1991 and 1992) in their empirical analysis. However, Caselli, Esquivel and Lefort. (1996) observes that such differences in convergence are common in growth models. Ding and Knight (2011) argue that variables included in a growth equation can give rise to such differences given that there is yet to be a consensus on the theoretical framework that should form the basis for empirical work on economic growth. The convergence proposition postulates that when the level productivity is high in one or more countries relative to others, the latter group of countries will start to converge through technology adoption from developed countries (Song, Sek, and Har, 2013). Steady state income differences among the EAC partner states, for example, in terms of natural endowment, education system, macroeconomic environment, political and population structure could be said to be working in favour of per capita income convergence.

The observed conditional convergence is in line with the predictions of Mankiw, Romer and Weil (1992) and Paola (2007) whose empirical work concluded that once growth of population, physical and human capital investments among other control variables are introduced, cross-country data generally support per capita income convergence. Such an empirical result is consistent with the conclusions of Sala-I-Martin (1996), Islam (1995), and Parikh and Shibata (2004). Kalbasi (2010) also finds convergence among Middle East countries for both oil-producers and non-oil producers even though their speed of convergence differed.

However, some studies did not find convergence among countries as predicted by neoclassical growth theory. Basil (2002) for example, investigated convergence among the ECOWAS countries assuming cross-country homogeneity but failed to find a strong evidence for the per capita income convergence. Aboagye and Turkson (2013) also failed to find evidence of income per capita convergence amongst the SSA countries. Hein and Trug (2005), and Welsch and Bonn (2006) finds that per capita income in the EU countries had diverged.

The fact that the error correction term (-0.73) had theoretically expected sign and was statistically significant provides evidence about the existence of a long-run relationship among the variables (Martins, 2011). It also indicates that the model converges towards the equilibrium. The magnitude of the error correction term for the PMG of -0.73 suggests that 0.73 per cent of the equilibrium error was corrected in one year. The results presented in Table 4.5 shows that adjustment under MG was 1.11 per cent.

Apart from the initial per capita GDP, the other variables that emerged important in explaining conditional convergence include physical and human capital, inflation rate ratio and nominal exchange rate. Coefficients of labour force participation rate, population growth, debt to GDP ratio and trade openness variables were not statistically significant.

The physical capital variable had a positive sign for its coefficient and statistically significant as expected according to theoretical prediction by Solow (1956). Gross fixed capital formation was used as a proxy. The size of physical capital was 0.06; this indicates that a one per cent increase in capital formation will lead to a GDP per capita growth rate of 0.06 per cent. African countries have huge physical capital gaps especially infrastructures and this stifles their growth. Deficit in infrastructure has been recognized as a major impediment to the African economy's growth and causes transport costs to increase and reducing the overall level of competitiveness (UNECA, 2015). According to Ramachandran, Gelb and Shah (2009) and Foster and Brineco-Garmendia (2010), infrastructural deficit may be reducing Africa continent's income per capita growth rate by an annual average of 2 per cent. An improvement in infrastructure is expected to yield high returns for the continent (Hoekman and Nicita, 2011). Physical capital improvement should also attract both domestic and foreign investments in the EAC economies. Calderon and Serven (2010) find a positive and statistically significant relationship between infrastructure and long-run growth in SSA.

The relationship between per capita GDP growth rate and human capital was found to be negative and statistically significant. This goes against theoretical prediction that human capital stock should have a positive growth effect by raising a country's capacity to adopt new technologies (Romer, 1990). Mankiw *et al.* (1992) observe that human capital should have positive effect on growth and further note that labour productivity can be increased by education and consequently cause a higher equilibrium output level. Education is also seen as a way of promoting economic growth through innovation (Romer, 1990). From these results, a one per cent increase in human capital will lead to a reduction of -9.10 per cent in per capita income growth rate. Education and training are usually used as a proxy for human capital in most empirical works. Despite the theoretical prediction of a direct effect of human capital on economic growth, many empirical works have failed to find such an effect (Moral-Benito, 2010).

Using economic growth rates data for cross-section of countries, Benhabib and Spiegel (1994) and Pritchett (2001) demonstrated that human capital increases due to education attainment improvements did not have positive effect on output per worker. This could be due to the gap between the skills needed in the labour market to generate social returns and the education offered. According to Krueger and Lindahl (1999), measurement errors could account for not finding a statistically significant link between GDP per capita growth rate and human capital. This is the most probable reason for that unexpected sign of human capital in East Africa. Other studies, for example, Hanushek and Kimko (2000) find a strong relationship between quality of education and economic growth. A 1 per cent increase in average education raised per capita output by between 3-6 per cent in accordance with neoclassical specifications and a 1 per cent growth rate as per the new growth theories according to empirical findings of Sianesi and van Reenen (2003).

Inflation is one of the most commonly used indicators of macroeconomic stability and it is theoretically anticipated to have harmful effect on growth of per capita income. Fischer (1993) demonstrated that inflation had a negative effect on growth by lowering investment and growth of productivity. The coefficient of inflation rate was -0.12 as theoretically expected. This implies that a one per cent increase in inflation rate will reduce per capita GDP growth by 0.12 per cent. Inflationally pressure can be expected to have negative effect on per capita GDP growth rate. This is because inflation can lead to uncertainty about the future profitability of investment projects especially when associated with increased price variability. This can lead to more conservative investment strategies than would otherwise be the case, ultimately leading to lower levels of investment and economic growth. Inflation may also reduce a country's international competitiveness, by making its exports relatively more expensive, thus impacting on the balance of payments. Moreover, inflation can interact with the tax system to distort borrowing and lending decisions. Firms may have to devote more resources to dealing with the effects of inflation.

The exchange rate variable had a statistically significant coefficient of 0.01 at one per cent level of significance. Therefore, a one per cent increase in the exchange rate will cause a 0.01 increase in per capita GDP growth rate. This implies that increase in the growth rate of exchange rate (depreciation of the domestic currency) boosted per capita GDP growth rate. This exchange rate depreciation promoted competitiveness of the Kenyan exports and therefore acted as a growth stimulant. Kaplan (2006) finds similar results; undervalued exchange rate promoted export-led growth in China and East Asian economies. This finding contradicts results such as those by Szeles and Marinescu (2010). Just like inflation, exchange rate is also used in empirical analysis as an indicator for assessing macroeconomic stability. From the foregoing analysis, EAC partner states can be said to be converging to their long-run level after the determinants of per capita GDP growth were controlled for.

4.4.2 Business cycle synchronization in the EAC

The second objective of the study sought to determine how closer economic ties among the EAC countries have contributed to business cycle synchronization. Two factors that were hypothesized to influence business cycle synchronization by making them either synchronous or asynchronous were the degree of trade integration and sectoral specialization of the EAC economies. This objective was realized through the estimation of simultaneous equations 3.31 to 3.33, which have endogenous variables as regressors. With structural equations, the random term becomes interrelated with the explained variables leading to the violation of classical OLS assumption. In addition, given that some of the regressors are the dependent variables of other equations in the system, the disturbance terms among the equations are correlated. This creates possibility of endogeneity problem.

To address the potential of endogeneity problem, 3SLS approach was used to estimate the simultaneous equations so as to obtain consistent estimates. Identification of the system was ensured through addition of relevant exogenous variables to each equation. Antonakakis and Tondl (2011) and Xie, Cheng and Chia (2013) used this kind of approach. These exogenous variables were different for each equation as explained in Section 3.4.2.

4.4.2.1 Descriptive statistics for business cycle synchronization model

Table 4.6 presents descriptive statistics of variables for the second objectives to determine how closer economic ties among the EAC countries have contributed to business cycle synchronization. These statistics give an indication of the location of the data and variability. Appendix 2 contains raw data used to compute descriptive statistics in Table 4.6.

Table 4.6: Descriptive statistics for the cyclical convergence model

	No of observation	Mean	Std. Dev.	Min	Max
Business cycle synchronization	92	0.93	0.08	0.81	1.00
Trade integration	92	0.01	0.01	0.00	0.02
Sectoral specialization	92	-0.07	0.04	-0.12	-0.02
GDP product (US$)	92	208.30	354.86	7.38	1970.43
Contiguity	92	0.50	0.50	0.00	1.00
Population (millions)	92	18.68	12.53	5.41	44.93
GDP gap (US$)	92	13.77	10.07	1.55	47.90
Product of GDP per capita (US$)	92	159768.50	133745.30	34626.64	584306.60
Product of the surface area (KM^2)	92	$17.70*10^{10}$	$22.30*10^{9}$	$45.60*10^{7}$	$55.10*10^{8}$

Source: Derived from the collected data

Table 4.6 reports the mean, standard deviation, minimum and maximum values of variables in question. Standard deviation is a measure of dispersion and the higher its value, the greater is the dispersion or fluctuation in a variable. Variables with the highest mean values are GDP product, products of GDP per capita and product of the surface area. Variables with the highest mean values also had the highest standard deviation.

The mean correlation coefficient of business cycles synchronization across EAC countries was 0.93 and the difference between minimum and maximum values small. This suggests that business cycle synchronization was stable during the period under review. A correlation coefficient of 0.93 for business cycle synchronization implies that the EAC economies are closely interlinked. A possible explanation of this is that Uganda and Tanzania are the leading export destinations for Kenya, usually in position one and two, respectively. However, average trade integration was low at 0.01 meaning that trade relationship is not intense. Value of trade integration greater than one indicates an intense trade relationship (Chandran, 2010). A possible explanation for this is that the other two countries of the EAC, namely Burundi and Rwanda are relatively small economies with little trade between them and Kenya. In addition, intra-EAC trade has been on a decline as shown in Figures 1.2 and 1.3 in Chapter one.

The value for sectoral specialization index was also small at -0.07. This means small specialization difference among the EAC partner states. It implies a large share of their economic sectors are similar (Böwer and Guilleminea, 2006; Siedschlag, 2010). This was not unexpected given that the economic structures of the EAC countries are almost similar with agriculture being the most dominant sector. The mean of product of GDP was US$ 208.30 billion and that of contiguity dummy was 0.50 meaning half of the EAC countries borders Kenya. Mean population of the EAC partner states was 18.68 million with a minimum and a maximum of 5.41 and 44.93 million, respectively. The mean for the GDP gap variable was US$ 13.77 billion and a standard deviation of US$ 10.07 billion. Product of per capita GDP and EAC surface area averaged US$ 15,768.50 and $17.70*10^{10}$ km^2, respectively.

4.4.2.2 Test for the presence of multicolinearity

As indicated in Section 4.3.2, multicolinearity is considered as a challenge when it is above 0.70. Table 4.7 gives a correlation matrix meant to provide indications of the presence or absence of multicolinearity problem in the business cycle synchronization dataset.

Table 4.7: Correlation matrix for variables of the cyclical convergence model

	Business cycle synchronization	Trade integration	Sectoral specialization	GDP product	Contiguity	Population	GDP gap	Product of GDP per capita (US$)	Product of surface area
Business cycle synchronization	1.00								
Trade integration	0.88	1.00							
Sectoral specialization	-0.47	-0.44	1.00						
GDP product (US$)	0.63	0.55	-0.14	1.00					
Contiguity	0.86	0.85	0.00	0.62	1.00				
Population (number	0.84	0.76	0.02	0.79	0.95	1.00			
GDP gap (US$)	-0.51	-0.38	-0.10	0.00	-0.58	-0.47	1.00		
Product of GDP per capita (US$)	0.33	0.25	-0.25	0.88	0.21	0.42	0.35	1.00	
Product of surface area (US$)	0.91	0.74	-0.08	0.64	0.94	0.94	-0.63	0.27	1.00

Source: Derived from the collected data

According to Table 4.7, some of the variables that showed high multicolinearity were business cycle synchronization with trade integration, contiguity, population and product of service area having correlation coefficients of 0.88, 0.85, 0.84 and 0.91, respectively. High level of multicolinearity was mainly associated with variables business cycle synchronization, contiguity and population.

4.4.2.3 Closer economic ties and business cycle synchronization in the EAC

This section analyses how closer economic ties among the EAC countries have contributed to business cycle synchronization. Empirical strategy involved 3SLS estimation of simultaneous equation 3.31, 3.32 and 3.33. However, 2SLS estimates have also been presented for purposes of comparison. Table 4.8 gives results for 2SLS and 3SLS regressions.

Table 4.8: Simultaneous equation estimates

Dependent variable	**Business cycle synchronization**	
	2 SLS estimates	**3 SLS estimates**
Business cycle correlation (dependent variable)		
Trade integration	11.71***	11.49***
	(0.81)	(0.79)
Sectoral specialization	-0.41***	-0.58***
	(0.14)	(0.14)
Constant	0.81	0.80
	(0.01)	(0.01)
N	92	92
R^2	0.7583	0.7261
Trade integration (dependent variable)		
Business cycle correlation	0.005	-0.01**
	(0.01)	(0.01)
GDP product	0.003***	0.002***
	(0.0004)	(0.0003)
Contiguity	0.03***	0.02***
	(0.002)	(0.002)
Population	-0.02***	-0.01***
	(.002)	(0.002)
Constant	0.01***	0.02***
	(0.02)	(0.01)
N	92	92
R^2	0.865	0.764
Sectoral specialization (dependent variable)		
Trade integration	-2.25	-0.50
	(1.37)	(1.31)
GDP gap	-0.001	0.01
	(0.01)	(0.01)
Product of GDP per capita	-0.01*	-0.02**
	(0.01)	(0.01)
Product of surface area	0.004	0.001
	(0.01)	(0.005)
Constant	-0.001	0.10
	(0.11)	(0.10)
N	92	92
R^2	0.2367	0.0893

*Source: Derived from the collected data. Note ***, **, * imply significant at 1%, 5% and 10% respectively. Standard errors are in the parenthesis.*

In the case of principal equation, 72.61 per cent of the variations in the dependent variable were explained by the explanatory variables. For the auxiliary equations 3.32 and 3.33, 76.40 and 8.93 per cent of the variations in the dependent variable were explained by the regressors respectively. Table 4.8 revealed that there is a direct positive relationship between trade integration and business cycle synchronization in the EAC. A one per cent increase in trade will increase business cycle synchronization by 11.49 per cent. Thus, *ceteris paribus*, trade integration has contributed to the synchronization of business cycles in the EAC for the study period. These results are consistent with studies such as Clark and van Wincoop (2001), Fidrmuc, (2004), Imbs (2004), Siedschlag (2010), Siedschlag and Tondl (2011), Rana, Cheng and Chia (2012) and Xie *et al* (2013). They empirically established a direct positive and important relationship between trade integration and co-movement of business cycles. The implication is that trade promotes synchronization of business cycles in the EAC. This supports the endogeneity hypothesis by Frankel and Rose (1998).

Empirical results presented in Table 4.8 show that sectoral specialization had a direct inverse relationship with synchronization of business cycles in the EAC. The implication is that the growth cycle of an EAC partner state with highly specialized sectoral structure was less correlated with EAC region growth cycle. A one per cent increase in sectoral specialization will reduce business cycle synchronization by 0.58 per cent. These results are consistent with the findings of Siedschlag (2010) and Xie *et al* (2013). Thus, if industrial structures of the EAC partner states diverge, their business cycles will not converge.

The estimated simultaneous equations for trade integration and sectoral specialization reveal additional information about indirect effects of the determinants of business cycle in EAC. Business cycle synchronization had a negative and statistically significant effect on trade integration revealing that EAC countries with differing business cycles trade less with each other. The results also show that holding other factors constant, trade integration had a positive and important relationship with contiguity. This is consistent with theory and in line with empirical studies such as that of Linders, Burger and van Oort (2008). Transport costs can be expected to be lower for countries that boarder each other and hence a positive effect on trade.

Further, from the sectoral specialization, GDP product was positively related with trade integration implying that countries the size of domestic market matter for intra-EAC trade. In gravity equations, GDP is used as a proxy for the size of the domestic market. The results also reveal that there is an inverse and statistically significant between population and trade integration. The negative coefficient of the parameter estimates implies that population had import substitution effect (Martinez-Marzoso and Nowak-Lehman, 2003). The GDP gap, contiguity dummy and population variables are used in most gravity equations as explanatory variables. A one per cent increase in population will reduce bilateral trade by 0.01 per cent.

Unlike in the case of trade integration, sectoral specialization shows a negative and statistically significant relationship between trade and specialization. This suggests that trade integration had an indirect negative effect on business cycle synchronization in EAC via sectoral specialization. Thus, higher trade integration does not result in higher sectoral specialization. The only statistically significant exogenous variable was the product of GDP per capita which was inversely related to sectoral specialization. A one percent increase in the product of GDP per capita will reduce trade by 0.02 per cent. This implies that product of GDP per capita did not promote sectoral specialization in the EAC. This could be due to the fact that consumers tended to consume more of domestically produced goods.

4.4.3 Political integration in the EAC

This section analyses the level of political integration in the EAC for the period 2000-2012. The status of political integration in the EAC was gauged by examining the growth in decision making ability of the EAC Secretariat as a supranational institution. To measure political integration, the relative budget revenue of the EAC Secretariat and partner states was used. Political integration was calculated by adding EAC partner states contribution to the Secretariat for a given year and then divided by the sum of individual partner state revenues for that year and then the resultant figure was multiplied by 100. A similar approach was used by Kingsolver (2011). The relative growth in supranational budget revenues of the EAC Secretariat relative to EAC partner states' combined government revenues was taken as an increase in political integration.

It can be reasonably assumed that over time, as EAC partner states grant more powers to the Secretariat, this power can be larger than that of individual partner state. If partner states are willing to increase their budgetary allocation to the Secretariat, ceding of sovereignty to a supranational institution in the future to actualize political integration may not be difficult. Figure 4.1 shows the combined contribution of EAC partner states to the Secretariat over the period 2000-2012. Data used to generate Figure 4.1 one is in Appendix 3.

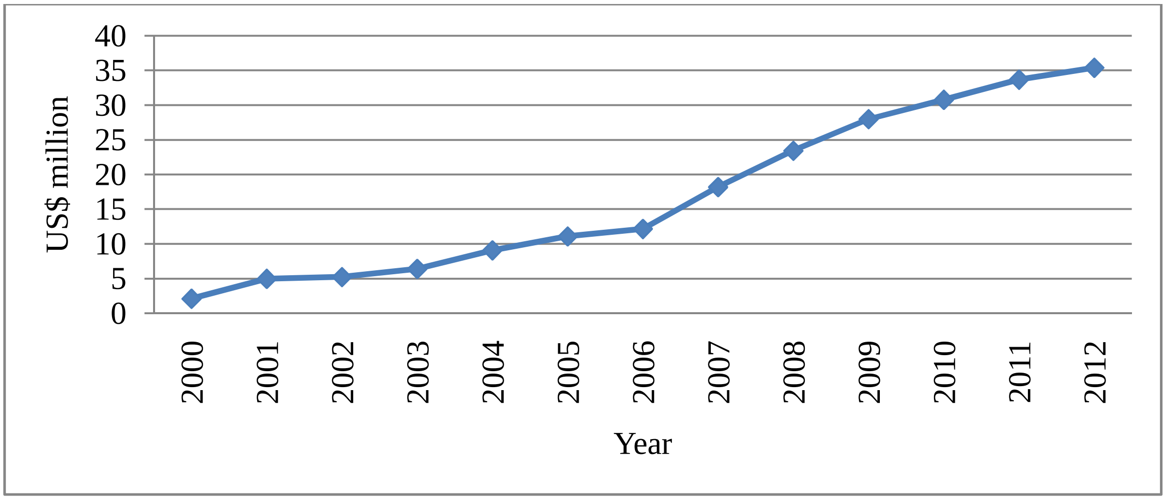

Figure 4.1: EAC partner sates contributions to the Secretariat (US$): 2000-2012

Source: Derived from the collected data

According to Figure 4.1, the EAC partner states have increased their funding to the Secretariat from US$ 2 million in the year 2000 to reach US$ 35 million in 2012. Thus, funding increased by 17.5 folds over that period. An increase in the contribution of funds to run the EAC Secretariat can be taken as an indication that the EAC partner states have granted more powers and responsibilities to the EAC Secretariat as an institution. Therefore, increased revenue to the EAC Secretariat can be said to be a sign that the partner states and by extension the citizens have more trust in the EAC Secretariat. Increased budgetary allocation to the Secretariat is also an indicator of political will from the partner states and a belief in the process of integration in general. The EAC partner states contribute equal amounts of money to run the secretariat in order to ensure that no partner has more powers than the other in the secretariat.

Figure 4.1 shows that around year 2006, there was a sudden kink of the curve; this is because EAC membership rose from three to five with the entry of Rwanda and Burundi in 20017. This also mean that partner states contribution to the EAC Secretariat also increased. The relative growth in the EAC Secretariat budget revenue can be interpreted to mean that partner states have an interest in making the process of integration work.

The sovereign debt crisis in the EU exposed conceptual weakness of the EMU. Issing (2016) also observed that the 2009 financial crisis in the EMU generated discussions into its architectural designs. These discussions strengthened the idea that there cannot be a lasting monetary union in the absence of a political integration (Degryse and Pochet, 2012). Rossi and Dafflon (2012) refer to this lack of political integration in the EMU as the original sin.

Issing (2016) indicated that there were proposals to complete the EMU tabled by Five Presidents: the presidents of the Euro group, European Council, European Commission, European Parliament and European Central Bank. The need to form a political union featured highly among the four suggestions that were offered. The first suggestion was that there should be an authentic economic union to ensure that each economy had the required structural features to flourish. Second, is that there was to be financial union to ensure integrity of the euro and sharing of risks with the private sector. This was by completing Banking Union and speeding up Capital Market Union which was also the third suggestion. Finally, was movement towards a political union to provide foundation for the other three fronts through accountable democracy, legitimacy and strengthening of institutions.

Figure 4.2 provides a graphical presentation of political integration in the EAC over the period 2000-2009. Political integration measure is in per cent and data used to generate Figure 4.2 is in Appendix 4.

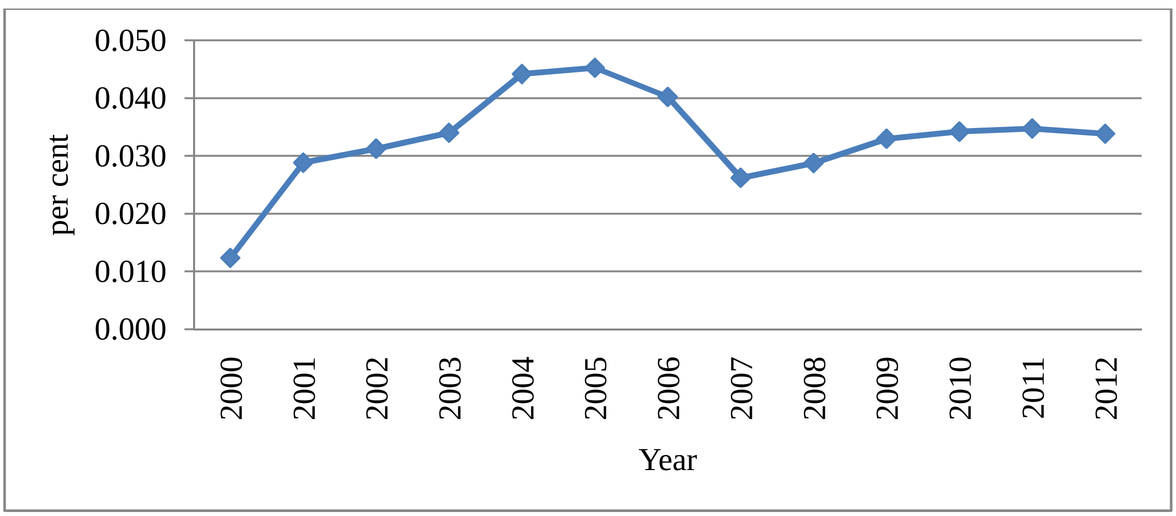

Figure 4.2: Political integration in EAC: 2000-2012

Source: Derived from the collected data

According to Figure 4.2, political integration in EAC showed a mixed trend of increasing and decreasing. The figure shows that there was a steady rise in the level of political integration in EAC from the year 2000 to 2005. This coincided with early stages of the

EAC after its revival. The Treaty setting up the EAC was signed in Arusha on 30th November, 1999 and came into effect on 7th July, 2000. Thus, there is probability that there was increased enthusiasm by the then three partner states and their collective willingness to see economic integration work cannot be ruled out. Further, rising political integration in 2005-2007 also indicate that the EAC partner states were contributing an increasing share of their national revenues to support the EAC Secretariat.

Political integration declined sharply in 2005 and 2007 before rising again albeit slowly until the year 2012. This period of sharp decline in political integration coincided with the formation of EAC customs union even though no causal link can be established. It implies that the EAC partner states contributed a relatively lower share of their national revenues to support the Secretariat. In addition, formation of a customs union, which involves the setting of a common external tariff (CET) and further internal liberalization within the EAC, could have reduced enthusiasm of the partner states. This is probably because of decline in tariff revenue as a source of income to governments. However, at the global level, most countries have seen a generalized decline in tariff revenues due to tariff reductions necessitated by World Trade Organization (WTO) trade negotiations. Trade taxes are considered as an easy way of raising revenue by most African countries due to their inefficient tax administration systems (UNECA, 2004). However, political integration situation normalized after the year 2007 and rose steadily thereafter. This corresponded with the period of accession by Burundi and Rwanda to the EAC Treaty on 18th June, 2007. It is on 1st July, 2007 that they became full members so that the combined EAC membership rose from three to five.

Unlike the concept of monetary union, which has a clear-cut meaning, this does not hold for political integration. De Grauwe (2006: 2) observes that: "in contrast to monetary union, a political union is not a black or white affair that allows us to say exactly when the political union has been reached". Further, there is no generally accepted measure of political integration or index. Therefore, while an approximation of political integration can be made, it is difficult to ascertain with certainty when political integration is adequate to sustain a monetary union. Nonetheless, the measure political integration computed in this study can give an indication of the progress made towards political unification.

Despite the limitation of measuring political integration, political integration in the EAC can be generally regarded as being low because the index was below one per cent as illustrated in Figure 4.2. Political integration in the EAC was low as reflected by the fact that over the entire study period, it has not even reached 1 per cent in any of the year under consideration. In the study by Kingsolver (2011), the highest level of political integration achieved was 2.53 for the EU for the year 1995.

In the context of EAC monetary union, the level of political integration should allow for the creation of a supranational institution, which has legitimacy and powers from the five partner states to tax and spend. The political integration and indeed the economic integration in EAC will be complete and sustainable once it is embedded in a fiscal and political union. This view is strongly held by De Grauwe (2014) who argues that fiscal union has two dimensions. First, it involves partial consolidation of national government debts. Second, it comprises partial centralization of national government budgets to afford organization of an automatic transfer system in the event of economic shocks that are asymmetric. Fiscal union can only be possible in a political union. Without a political union, monetary union in the EAC will remain a fragile undertaking.

Political integration in EAC can eliminate the “original sin” which has been associated with the EMU. This original sin has limited the ability of the EMU to effectively deal with asymmetric shocks that have arisen from time to time. Increased political integration in the EAC will be good as it will allow collective and supranational action when need arise. It will also enjoy broad based legitimacy. If this is the case, it will allow imposition of political choices at the EAC partner states which would have otherwise been impossible in the absence of political integration.

4.4.4 Factors influencing political integration in EAC

The fourth objective of this study was to ascertain the factors influencing political integration in EAC, necessary for the establishment of a monetary union. Factors that were hypothesized to have an effect on political integration include institutional distance, social integration and economic interconnectedness. Graphical analysis and correlation matrix were used to analyze these factors in relation to political integration.

4.4.4.1 Institutional distance and its effect on political integration in EAC

Institutional distance index was constructed using the World Governance Indictors of the World Bank. The computation of this indicator was based on six governance quality dimensions. These are political stability, accountability, quality of regulation, effectiveness of government, control of corruption and rule of law. The six indices were used to measure the quality of governance of the country in question. The institutional distance indicator is based on Kogut and Singh (1988) institutional distance index. It ranges from zero to a 100. A lower value implies a lower institutional distance and a higher value implies a high level of institutional distance. Figure 4.3 gives the state of institutional distance in EAC (raw dataset is in Appendix 5).

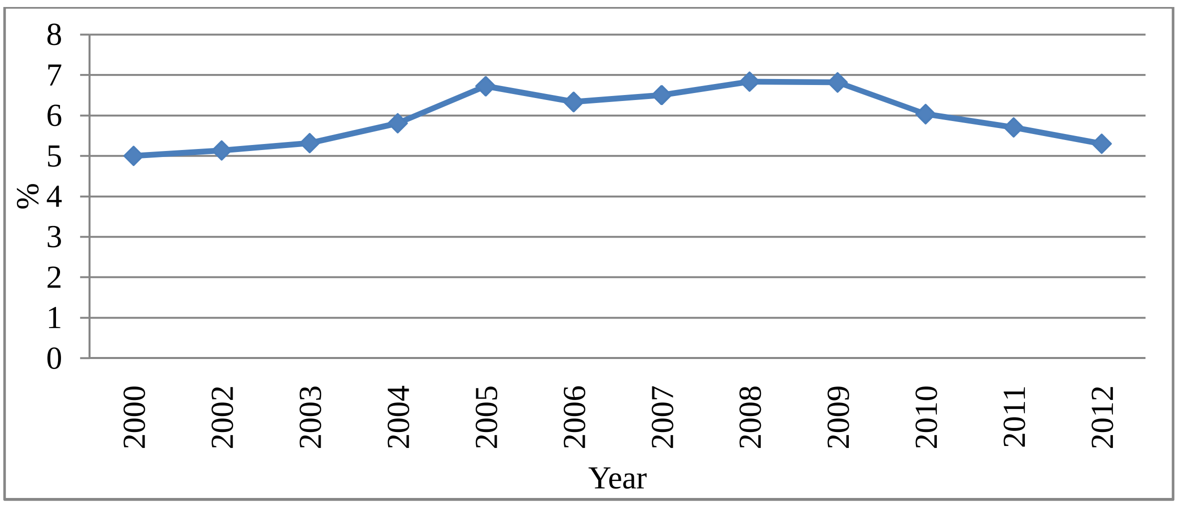

Figure 4.3: Institutional distance in EAC: 2000-2012

Source: Derived from the collected data

Figure 4.3 shows that institutional distance among the EAC partner states appear to have been on an increasing trend between 2000 and 2005. This can be taken as indicating a decline in bilateral trust because a rise in the index implies increased institutional distance. However, institutional distance was fairly stable over 2005 to 2009 periods but has been on a declining trend from 2009-2012. A decline in institutional distance over 2009-2012 period and this can be seen as reflecting an increase in bilateral trust. It can also be seen as an increase in support by individuals in the EAC states to the ongoing process of economic integration in the region. According to De Groot and Linders (2004), a rise in institutional distance implies a higher adjustment costs and a reduction in bilateral trust. It also reflects a decline of differences in quality of governance. The lowest level of bilateral trust was recorded in the year 2005 (approximately seven per cent) showing an increase in institutional distance. A general observation is that there has not been a very fundamental change in institutional distance over the period 2000-2012.

A well-functioning monetary union is only possible when there is a collective mechanism of mutual trust and control (De Grauwe, 2011). If individuals in the EAC partner states are satisfied with the way EAC institutions are functioning, but are dissatisfied with the running of their own domestic institutions, support for increased integration is likely to rise. Nevertheless, the worse the domestic political system and the better at the supranational level, the lower would be the risk of transferring sovereignty to a supranational institution (Sanchez-Cuenca, 2000).

Degryse and Pochet (2011) observe that the Eurozone crisis that has been facing the EMU since 2009 has increased awareness about its institutional deficiency in creating a harmonious and a lasting form of economic and monetary integration. Already, the EAC has seven key institutions (organs): the Summit, the East African Court of Justice, the Council of Ministers, the Sectoral Committees, the Co-ordinating Committee, the East African Legislative Assembly and the Secretariat. Key institutions in the EMU include the

Commission, the Parliament and the Court of Justice. It is evident that there is marked similarity of EAC and EMU institutional arrangements. Issing (2016) noted that the institutional arrangement of the EMU is a complex system with mixed competencies and has a long way to go before it becomes a complete political union. According to this view, the EMU is still an incomplete house (Issing, 2016). Figure 4.4 shows the graphical relationship between political integration and institutional distance in the EAC for the period 2000-2012.

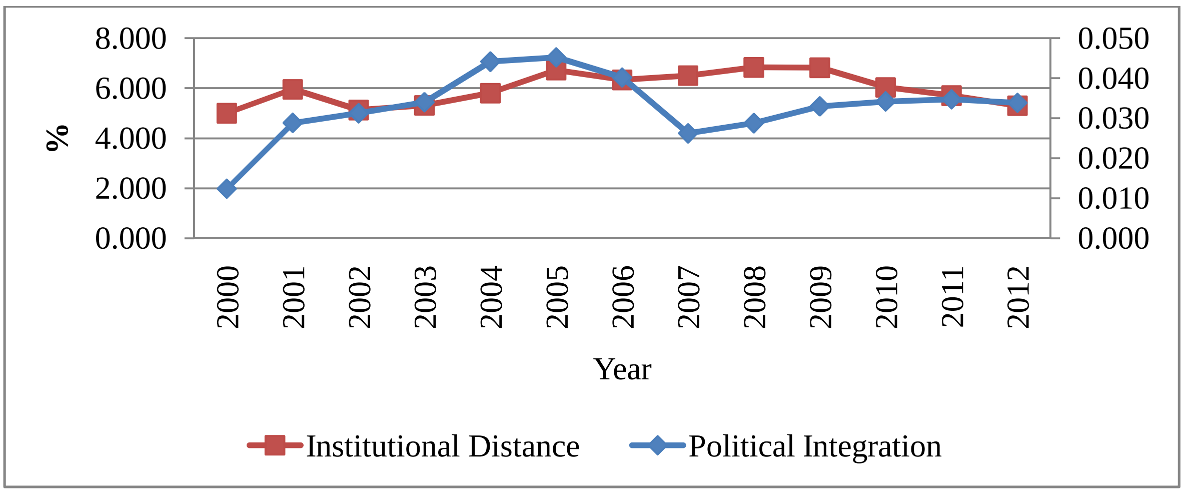

Figure 4.4: Relationship between political integration and institutional distance in the EAC: 2000-2012

Note: Institutional distance is on primary axis and political integration is on the secondary axis.
Source: Derived from the collected data

Political integration and institutional distance appear to be moving together or in the same direction as shown in Figure 4.4. Even though no causal link can be established, the relationship between the two variables can be said to be direct. There were years of convergence between institutional distance and political integration, for instance in year

2003, 2005, 2006, 2011 and 2012. This implies that during this time period, institutional and political integration had complementary roles, that is, they reinforced each others.

Institutional arrangement of the EAC is crucial in determining achievement and long-term viability of the envisaged monetary union. The institutional arrangement especially with regards to fiscal policy in the EAC appears to be weak. This is because of the following reasons fiscal policy in terms of government expenditure and taxation are still in the hands of the partner states governments and parliaments. Further, in all the EAC partner states, spending and taxation decisions are based on processes that are deeply entrenched in specific national democratic institutions.

4.4.4.2 Social integration and its effect on political integration in EAC

Social dimensions such as culture, norms and values are important when considering forming a monetary union. Forming a monetary union in situations where there are heterogeneous populations with varying social and economic structure, language, culture and identity has its own benefits and costs (Spolaore, 2013). Benefits and costs trade-off is important to the political viability and steadiness of integration institutions amongst the populations (Alesina and Spolaore, 2003).

Social integration indicator was calculated using demographic breakdown of each EAC partner states: ages 0-14 years, 15-65 years and above 65 years of age. Social integration index was calculated by obtaining the difference between the partner states demographics and that of the EAC. This approach was borrowed from Kingsolver (2011). Data for variables such as cultural similarity that can be used to measure social integration is not available. Social integration can be seen as creating unity in diversity so that there is inclusion and participation by majority in the society. A higher value indicates a lower level of social integration. The social integration results obtained from the analysis are presented in Figure 4.5 and raw data is available in Appendix 6.

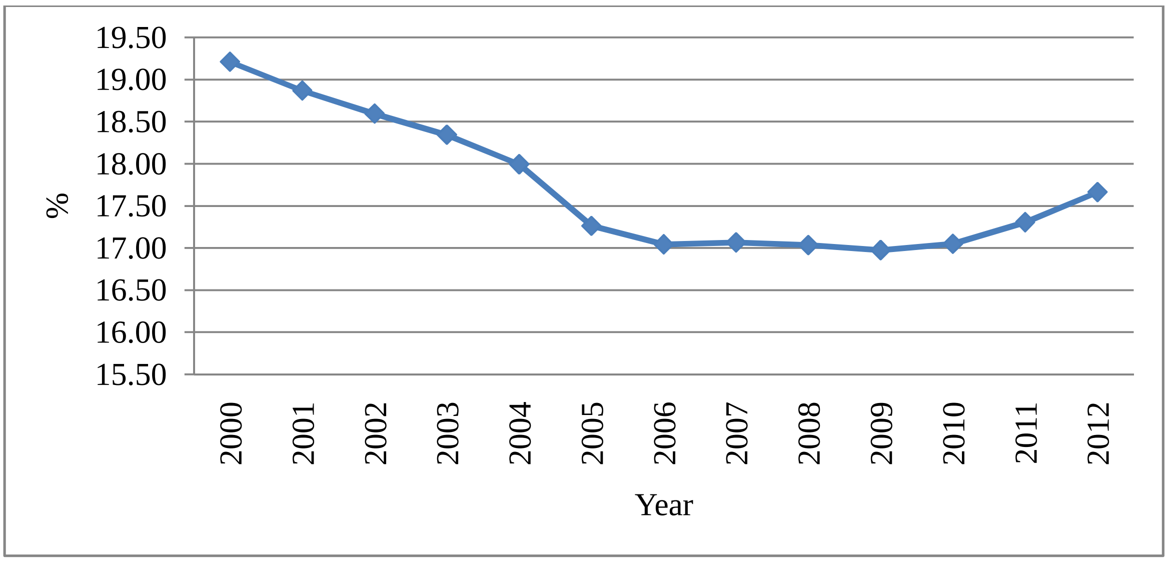

Figure 4.5: Social integration in EAC: 2000-2012

Source: Derived from the collected data

When interpreting social integration, it is important to remember that social integration shows the difference between the average EAC individual partner states demography and that of the EAC. Therefore, a higher value represents a lower level of social integration. Given this understanding, there was a sharp increase in social integration in the EAC for the period 2000 to 2006. This is because social integration declined from 19.21 per cent in 2000 to 17.04 per cent in 2006. In the period 2006 to 2010, social integration remained almost unchanged. However, social integration started to decrease from 2010 to 2012. The implication is that demographic differences among the EAC partner states started to rise and so the social differences. A rise in social integration indicator can be considered as social disintegration. Social integration would be ideal for the EAC to create a homogeneous society.

Even though to a great extent the process of regional integration in EAC is an economic one, the long-term sustainability of the envisaged monetary union will not be dependent upon economic aggregates alone, social and other dimensions have also to be taken into account. Three reasons can be advanced in support of social integration in EAC. First, it will create a balance once the single market is completed so as to avoid social competition among the EAC partner states. Second, in the event of an asymmetric shock, action at the EAC level may be desirable and this will require broad-based support. Finally, developing social integration will increase support of the EAC citizens towards the process of integration.

According to Figure 4.6 (social integration data is graphed against political integration), from year 2000 to 2003, social integration was associated with an increase in political integration.

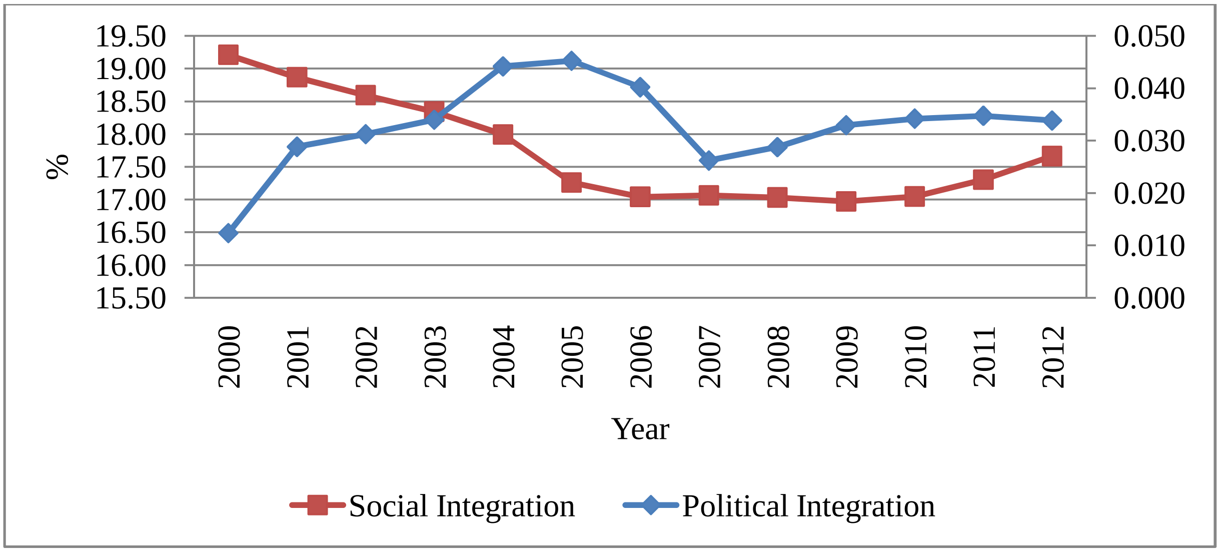

Figure 4.6: Social and political integration in EAC: 2000-2012

Note: Social integration is on primary axis and political integration is on the secondary axis.
Source: Derived from the collected data

In period 2005 and 2007, political integration declined with an increase in social integration. In the year 2007-2012, it appears that social integration and political integration were moving in the opposite direction but approaching convergence. A decrease in social integration being associated with an increase in social integration goes against a priori expectation. This could mean that social integration in EAC is not strong enough to enhance political integration. This contradicts the findings of Kingsolver (2011) who established that it was social integration and not economic interconnectedness that was causing political integration in the EMU. Kingsolver (2011) finding about social integration underlines its importance in the context of regional integration.

4.4.4.3 Economic interconnectedness and its effect on political integration in EAC

The economic integration efforts being pursued in the EAC is of functional approach. In this approach, economic integration is seen as a gradualistic and pragmatic cooperation with EAC partner states in technical and economic sectors. At the initial stage, intra-EAC trade barriers are reduced and those related to economic activities are gradually removed. Just like the EMU, the EAMU's fiscal and other economic policies are a preserve of each partner state. In the absence of a political union, harmonizing fiscal and other economic policies may prove to be challenging. However, this reality does not reduce the importance of economic factors in entering into a monetary union.

To calculate economic interconnectedness in the EAC, import and export data for all the partners states was averaged to find the mean of each partner states' imports received from other partners. The average of partner states exports to other partners' within the EAC was also computed. To obtain the level of economic interconnectedness, an average mean of imports and exports was compiled and then divided by EAC's average GDP for each year multiplied by one hundred. This constitutes the economic interconnectedness in this study. A percentage increase implies that the level of economic interconnectedness between the partner states has increased. Figure 4.7 illustrates economic interconnectedness in the EAC for the 2000 to 2012 period. Data used to generate Figure 4.7 is presented in Appendix 7.

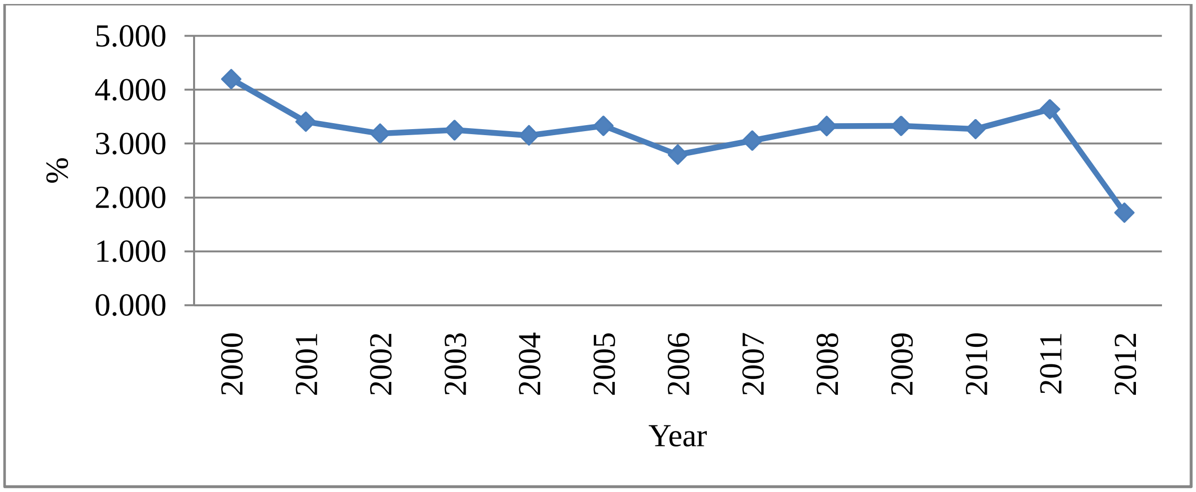

Figure 4.7: Economic interconnectedness in EAC: 2000-2012

Source: Derived from the collected data

According to Figure 4.7, economic interconnectedness remained largely stagnant for a period of 11 years from the year 2001 to 2011 but declined sharply between 2011 and 2012. The level of economic interconnectedness in the EAC was still low owing to the small percentages recorded. Kingsolver (2011) found economic interconnectedness of more than 60 per cent for the years considered in the study. Year 2000 had the highest level of economic interconnectedness of 4.20 per cent. A possible explanation for low level of political interconnectedness is the low intra-EAC trade arising from supply-side constraints and similarities in comparative advantage.

One of the guiding principles of the EAC integration has been the development of internal market between the partner states. The EAC has made efforts to increase intra-regional trade by adopting different strategies. Some of the strategies include reduction of trade barriers including tariff and non-tariff barriers, improvement in customs administration, and construction of link roads connecting the partner states. However, even with these efforts, intra-regional trade has not increased fundamentally to increase economic interconnectedness.

Like other REC projects in other regions of the world, the EAC is essentially an economic project and is embodied in various stages including the formation of an FTA, customs union, the common market and, now the envisaged monetary union and political federation. It, therefore, follows that citizens in EAC would largely evaluate the EAC integration in economic terms. Testing the traditional economic voting hypothesis, Eichenberg and Dalton (1993), finds that integration support for the EU was a function of economic variables such as economic growth, inflation and unemployment.

To a great extent, political integration and economic interconnectedness have been moving in the opposite direction as Figure 4.8 illustrates. However, it is difficult to precisely ascertain the strength of this relationship. In the year 2000 and 2001, for example political integration and interconnectedness moved in different direction. The nature of this relationship is, however mixed.

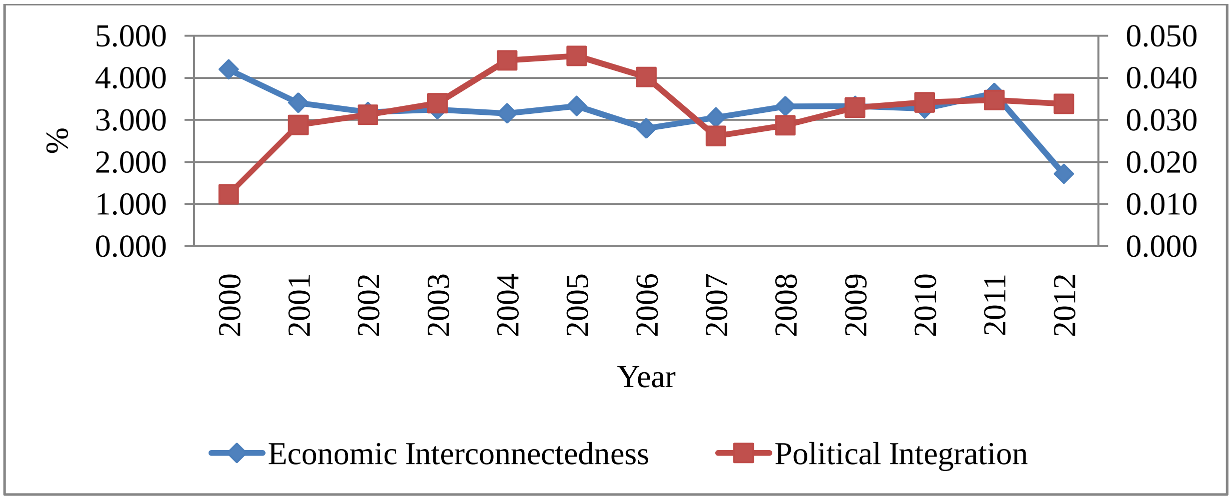

Figure 4.8: Political integration and economic interconnectedness in EAC: 2000-2012
Note: Economic interconnectedness is on primary axis and political integration on secondary axis.
Source: Derived from the collected data

The *apriori* expectation is that improving economic links by the EAC partner states will support political integration. According to the neofunctionalist spillover theory by Haas (1958), economic integration should cause social, cultural and political integration. This argument is similar to endogenous theory of the optimum currency areas where conditions of entry into a monetary union if not met at the initial stages, will be attained *ex-post*. Economic integration in the EAC viewed in terms of trade should put pressure on the partner states to politically integrate.

To further assess the relationship between political integration and factors influencing it, a correlation analysis was undertaken and findings are presented in Table 4.9. Even though a causal link may not be established, it can give the direction of the relationship and the degree of association.

Table 4.9: Correlation matrix of political integration and factors influencing it

	Political Integration	**Institutional Distance**	**Social Integration**	**Economic Interconnectedness**
Political Integration	1.00			
Institutional Distance	0.35	1.00		
Social Integration	-0.48	-0.76	1.00	
Economic Interconnectedness	-0.42	0.00	0.33	1.00

Source: Derived from the collected data

Table 4.9 indicates a weak positive linear relationship between political integration and institutional distance. The findings showed a negative and moderate relationship between political integration and social integration and economic interconnectedness. These results are almost similar to the graphical analysis of political integration and factors influencing it in Figures 4.4, 4.6 and 4.8.

In summary, political integration has been computed and related to measures of institutional distance, social integration and economic interconnectedness. This is to give an indication of the status of political integration and factors influencing it in the EAC. However, these determinants: institutional distance, social integration, and economic interconnectedness appear to be weakly related to political integration. They are therefore not strong enough to put pressure on the EAC to politically integrate. It can be argued from these results that the institutional foundation of the EAC monetary union is weak.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter provides a summary of the study, conclusions and policy implications. It also presents suggested areas for further research.

5.2 Summary

The EAC partner states are in the process of forming a monetary union and it is expected to be complete by the year 2023. The idea of a monetary union is not new in East Africa, this is because, Kenya, Uganda and Tanzania already had a monetary union during the British colonial administration under EACB. These countries had the East African shilling as a common currency. However, after attaining independence the East African countries have been unable to form a monetary union in the absence of a political federation. The main objective of this study was to determine the levels of real economic convergence and political integration necessary for the establishment of a monetary in the East Africa.

This study relied on OCA theory as the core theoretical framework. There are two OCA theories: traditional and new. Traditional OCA theory stresses the importance of convergence of real variables while the new one convergence of nominal variables. A major shortcoming of the OCA theory is that it does not provide a single algorithm that can indicate whether a country should join a monetary union or not. The OCA theory does not also capture political integration due to difficulties of measuring political will. This study operationalized OCA theory by applying the concept of economic convergence which has income and cyclical convergence and political integration in relation to the envisaged EAMU. Empirical literature review revealed that determination of suitability of EAC partner states in forming a monetary union had not been comprehensively undertaken. Assessment of income convergence, business cycle synchronization and political integration had not been considered when analyzing the prospects of EAMU. These three issues were investigated in this study.

The first objective of this study was to assess the state of income convergence in the EAC, necessary for the establishment of a monetary union. Income convergence comprises both unconditional and conditional convergence. Unconditional convergence occurs when economies converge to the same long-run level of GDP per capita income. This was empirically investigated by undertaking an OLS regression of per capita GDP growth rate and the initial per capita income. Results failed to support unconditional convergence hypothesis for the EAC partner states. This is because the coefficient of initial per capita GDP had a positive sign and was not statistically significant implying that disparities in income remained the same, that is, no effect was detected. It also implies that the determinants of the long-run level of output differ among the EAC partner states. Thus, the catching-up process of the EAC partner states could be conditional and not unconditional.

Conditional convergence occurs when economies that have similar fundamentals such as institutions, policies and such considerations converge to their long-term per capita incomes. To estimate conditional convergence, per capita GDP growth rate was regressed against initial per capita income and a set of control variables. The explanatory variables included were physical and human capital, labour force participation rate, population growth, inflation rate, debt to GDP ratio, nominal exchange rate and trade openness. Given that the study had a long time dimension of 23 years, panel units root tests were done to verify the order of integration of the variables. Panel unit root tests indicated that the variables were either I (0) or I (1) suggesting that ARDL model of cointegration test had to be implemented in this study. Cointegration test was based on MG and PMG estimators. Hausman test revealed that PMG was the most efficient estimator.

Empirical findings showed that conditional convergence hypothesis applies for the EAC partner states because the coefficient of the initial per capita income was negative as predicted by theory. The coefficient of the initial per capita GDP was -0.05 indicating a conditional rate of convergence of 0.05 per cent per year. Physical and human capital variables were found to be important factors in explaining per capita income convergence in the EAC. A one per cent increase in physical capital with cause a per capita GDP growth rate of 0.06 per cent per year.

However, human capital was found to be inversely related to per capita income growth. A one per cent increase in human capital will cause a 9.97 per cent reduction in per capita GDP growth rate. This finding is inconsistent with theoretical expectation, which envisages a positive relationship. The most probable explanation for this finding is measurement error for index of human capital per person, based on years of schooling

(Barro/Lee, 2012) and returns to education (Psacharopoulos, 1994). Availability of accurate data for such variables is a major challenge for countries in the developing world.

Inflation rate was negatively related to per capita GDP growth and therefore consistent with theoretical expectations. A one per cent increase in inflation will reduce per capita GDP growth by 0.12 per cent. High inflation can be expected to increase the cost and the risk of productive capital and lead to misallocation of resources and consequently have growth reducing effects. Nominal exchange rate had positive and important relation with per capita GDP growth rate as theoretically expected. Thus, nominal exchange rate depreciation makes exports more competitive and hence per capita GDP growth. The error correction coefficient was negative in accordance with theoretical expectation and statistically significant at one per cent level.

The second objective of the study was to determine how closer economic ties among the EAC countries have contributed to business cycle synchronization, necessary for the establishment of a monetary union. Business cycle synchronization determines whether the EAC economies are moving together or not. Trade integration and sectoral specialization were hypothesized as the factors driving business cycle synchronization in EAC. To achieve this objective, the study employed a system of simultaneous equations and examined the relationship between trade integration, sectoral specialization and business cycle synchronization. A 3SLS regression method was used to deal with endogeneity and simultaneity bias in the model. Empirical findings showed that trade integration had a direct positive effect on business cycle synchronization and consistent with theoretical prediction. The implication is that, holding other factors constant, trade integration contributed to business cycle synchronization in the EAC. Another finding was that sectoral specialization had a direct inverse relationship with business cycle synchronization. This suggests that EAC partner states with highly specialized industrial structures had less correlated business cycles. In addition, the empirical findings revealed that trade integration had an indirect negative effect on business cycle synchronization in EAC via sectoral specialization. This can be taken to mean that higher trade integration does not result to higher sectoral specialization.

The third objective of the study was to establish the level of political integration in the EAC, necessary for the establishment of a monetary union. A measure of political integration was developed and computed as the average amount each EAC partner state sends to the Secretariat as a proportion of average total revenue of individual state for a given year of the study. Results after computation showed that the level of political integration was still low given that at no given time of the study period did the level reach one per cent.

The fourth objective of the study was to ascertain factors influencing political integration in the EAC, necessary for the establishment of a monetary union. Factors that were hypothesized to have an influence on political integration included institutional distance, social integration and economic interconnectedness. World governance indicators of the World Bank, demographic breakdown of each EAC partner state, intra-EAC trade statistics and GDP figures were used to compute institutional distance, social integration and economic interconnectedness, respectively. Graphical analysis and a correlation matrix approaches were used to examine the relationship between political integration and hypothesized influencing factors. The study established that the link between political integration in the EAC and institutional distance, social integration and economic interconnectedness was weak.

5.3 Conclusions

The first objective of the study sought to assess the state of income convergence in EAC, necessary for the establishment of a monetary union. This is to determine whether there has been catching up process in EAC. Conditional and not unconditional convergence was supported. It can therefore be concluded that the catching-up process in EAC is conditional and not unconditional. This suggests that income difference between the EAC countries has been diminishing over time after controlling for differences in steady states. Conditional convergence in EAC is supported by physical capital and depreciation of the exchange rate but negatively affected by human capital and inflation rate.

The second objective of the study was to determine whether closer economic ties among the EAC countries contributed to business cycle synchronization, necessary for the establishment of a monetary union. Trade integration and sectoral specialization were used to gauge closeness of the EAC partner states economies in relation to business cycle synchronization. From the empirical findings, it can be concluded that trade integration promotes business cycle synchronization while sectoral specialization does not promote business cycle synchronization in the EAC.

The third objective of the study was to establish the level of political integration in EAC, necessary for the establishment of a monetary union. Empirical findings indicate a low level of political integration among the partner states and this raises doubt of entering into a monetary union. This is because some decisions such as common fiscal policies can only be made by countries that are politically integrated.

The fourth objective of the study was ascertaining factors influencing political integration in EAC, necessary for the establishment of a monetary union. Factors that were hypothesized to have an influence on political integration are institutional distance, social integration and economic interconnectedness. All these factors had a weak influence on political integration in EAC and therefore unable enhance the desired political integration.

In the overall, the study aimed at determining the levels of real economic convergence and political integration necessary for the establishment of the EAC monetary union. Empirical results supported conditional convergence positively supported by physical capital and exchange rate depreciation but negatively affected by human capital and inflation rate. Trade integration promoted business cycle synchronization in EAC while sectoral specialization did not. Level political was low and weakly related and was not enhanced by reduction in institutional distance, social integration and economic interconnectedness. From the foregoing, low level of political integration in EAC appear to be the weakest point as the partner states make efforts to form a monetary union..

5.4 Policy implications

Empirical findings for the first objective on the state of income convergence in EAC, necessary for the establishment of a monetary union have indicated that income convergence in the EAC is conditional and not unconditional. This implies differences among the partner states matter for income convergence. From the study findings, physical capital and exchange rate depreciation enhance reduction of income differences among the partner states. Thus, improvement of physical capital such as infrastructure is crucial to reduce income difference in EAC. Further, maintaining an exchange rate regime that enhances competitiveness of exports is equally important. Care should also be taken to maintain low inflationary pressures among the EAC partner states. Thus, controlling inflation will create a stable macroeconomic environment to promote per capita GDP growth.

The second objective of the study was to determine whether closer economic ties among the EAC countries contributed to business cycle synchronization, necessary for the establishment of a monetary union. The study findings showed that promoting trade integration in EAC will foster business cycle synchronization and thus reduce susceptibility of the region to asymmetric economic shocks. Thus, increased intra-EAC trade for example through reduction of tariff and non-tariff barrier is desirable. This is because trade integration was promoting synchronization of business cycles in EAC. The EAC partner states should also jointly develop a common sectoral policy that would reduce structural differences of their economies and promote development of more or less similar industries to foster business cycle synchronization. This might involve harmonizing their development plans. This arises from the fact that sectoral specialization had a negative effect of business cycle synchronization.

The third objective of the study was to establish the level of political integration in EAC, necessary for the establishment of a monetary union and empirical findings indicated that there is low level of political integration. This implies that political integration can be enhanced by strengthening the EAC Secretariat to enable it to make decisions that are binding. A starting point could be to increase its budgetary allocation. Partner states can then agree on some of the powers they can transfer to the Secretariat to strengthen it as an institution. However, this will only be a stop-gap measure as the countries works towards a fully-fledged political union where common fiscal and monetary policies will be implemented.

The fourth objective of the study was ascertaining factors influencing political integration in EAC, necessary for the establishment of a monetary union. Institutional distance, social integration and economic interconnectedness were hypothesized to have an influence on political integration; but it was established that the link between these factors and political integration was weak. This implies that political integration can be enhanced through reduction of institutional distance, increased social integration and economic interconnectedness (for example through increased intra-EAC trade).

5.5 Areas for further research

Qualitative variables such as corruption perception indices, rule of law, social capital, formal and informal rule and their implication on income convergence in EAC can be researched in future once data become available. That should provide further insights in the speed of conditional convergence after their inclusion in per capita GDP growth equation.

The global financial crisis of 2007 demonstrated that countries have become integrated through various channels such as financial systems such that disturbances in one country spill-over to other countries. Therefore, in analyzing business cycle synchronization, the degree of financial integration can be included. This is after comprehensive and longtime dimension data becomes available.

With regards to political integration, effect of social factors such as culture, values, norms and language and their implication on political integration in EAC can be investigated by future studies.

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APPENDIX

Appendix 1: Data for income convergence in EAC

Country	ID	Year	Per capita GDP growth rate (%)	Initial per capita GDP (US$)	Physical Capital (US$)	Human capital	Labour force participation rate (%)	Population growth (%)	Inflation rate (%)	Debt to GDP ratio (%)	Nominal exchange rate	Trade openness (%)
Burundi	1	1990	0.57	218.06	590.7567	48.0	91.50	2.87	6.99	83.48	171.26	35.65
Burundi	1	1991	2.33	218.06	604.2834	47.8	91.00	2.57	9.01	83.93	181.51	38.42
Burundi	1	1992	-1.32	218.06	600.4335	47.7	90.50	2.33	5.33	93.30	208.30	38.23
Burundi	1	1993	-8.18	218.06	581.8421	47.9	89.90	2.09	9.71	111.86	242.78	36.54
Burundi	1	1994	-5.62	218.06	535.7973	48.2	89.30	1.88	14.71	97.38	252.66	38.75
Burundi	1	1995	-9.47	218.06	459.8731	48.8	88.50	1.70	19.36	95.34	249.76	40.20
Burundi	1	1996	-9.37	218.06	421.7086	49.5	87.80	1.50	26.42	113.48	302.75	21.57
Burundi	1	1997	-2.92	218.06	402.9515	50.1	86.90	1.36	31.06	99.96	352.35	24.28
Burundi	1	1998	3.28	218.06	418.0211	50.7	86.00	1.42	12.47	113.04	447.77	27.44
Burundi	1	1999	-2.68	218.06	399.3142	51.2	85.70	1.70	3.52	122.73	563.56	23.54
Burundi	1	2000	-2.96	218.06	389.4156	51.5	85.30	2.14	25.52	136.41	720.67	22.55
Burundi	1	2001	-0.58	218.06	384.2315	51.7	84.90	2.62	7.87	127.37	830.35	20.96
Burundi	1	2002	1.34	218.06	396.1658	51.9	84.50	3.02	-1.26	159.07	930.75	21.67
Burundi	1	2003	-4.44	218.06	377.929	52.2	84.10	3.31	10.57	171.95	1082.62	27.38
Burundi	1	2004	1.27	218.06	378.7366	52.4	83.80	3.46	8.18	152.82	1100.90	31.58
Burundi	1	2005	-2.57	218.06	372.5992	52.7	83.50	3.50	13.25	120.99	1081.58	41.65
Burundi	1	2006	1.74	218.06	375.5602	53.1	83.30	3.52	2.74	112.68	1028.68	54.15
Burundi	1	2007	1.14	218.06	393.6108	53.5	83.20	3.54	8.41	129.62	1081.87	41.48
Burundi	1	2008	1.39	218.06	398.4095	53.9	83.10	3.54	24.41	102.53	1185.69	47.42
Burundi	1	2009	-0.11	218.06	396.1289	54.4	83.10	3.52	10.56	25.55	1230.18	49.93
Burundi	1	2010	0.24	218.06	395.8912	54.8	83.10	3.48	6.50	39.78	1230.75	48.10
Burundi	1	2011	0.69	218.06		55.3	83.30	3.42	9.58	36.96	1261.07	47.02

Country	ID	Year	Per capita GDP growth rate (%)	Initial per capita GDP (US$)	Physical Capital (US$)	Human capital	Labour force participation rate (%)	Population growth (%)	Inflation rate (%)	Debt to GDP ratio (%)	Nominal exchange rate	Trade openness (%)
Burundi	1	2012	0.58	218.06		55.8	83.50	3.36	18.18	35.72	715.36	46.42
Kenya	2	1990	0.73	555.33	1179.768	57.5	75.10	3.37	17.78	50.03	22.91	57.02
Kenya	2	1991	-1.86	555.33	1159.544	56.9	74.40	3.31	20.08	57.31	27.51	55.60
Kenya	2	1992	-3.95	555.33	1104.935	56.2	73.70	3.23	27.33	54.81	32.22	52.93
Kenya	2	1993	-2.74	555.33	1084.265	55.5	73.10	3.13	45.98	82.09	58.00	72.86
Kenya	2	1994	-0.39	555.33	1100.971	54.7	72.40	2.99	28.81	75.92	56.05	71.27
Kenya	2	1995	1.49	555.33	1121.289	53.9	71.70	2.83	1.55	69.36	51.43	71.75
Kenya	2	1996	1.39	555.33	1135.641	53.2	71.00	2.68	8.86	60.79	57.11	57.31
Kenya	2	1997	-2.05	555.33	1089.567	52.6	70.30	2.55	11.36	50.55	58.73	54.06
Kenya	2	1998	0.77	555.33	1111.829	52.1	69.70	2.47	6.31	58.83	60.37	48.90
Kenya	2	1999	-0.18	555.33	1132.762	51.8	69.00	2.46	4.98	57.82	70.33	48.19
Kenya	2	2000	-1.88	555.33	1112.455	51.7	68.30	2.49	7.77	56.64	76.18	53.31
Kenya	2	2001	1.18	555.33	1093.819	52.0	67.70	2.53	5.82	56.50	78.56	55.95
Kenya	2	2002	-2.00	555.33	1104.033	52.5	67.10	2.57	2.16	59.99	78.75	55.17
Kenya	2	2003	0.30	555.33	1132.186	53.4	66.50	2.59	5.98	63.01	75.94	54.13
Kenya	2	2004	2.40	555.33	1126.352	54.5	65.90	2.61	8.38	57.14	79.17	59.48
Kenya	2	2005	3.18	555.33	1143.731	55.8	65.50	2.61	7.82	50.84	75.55	64.48
Kenya	2	2006	3.72	555.33	1160.695	57.2	65.70	2.62	6.04	46.76	72.10	55.24
Kenya	2	2007	4.08	555.33	1203.753	58.7	66.00	2.62	4.27	46.01	67.32	53.89
Kenya	2	2008	-2.37	555.33	1168.778	60.2	66.40	2.63	15.10	45.56	69.18	57.58
Kenya	2	2009	0.61	555.33	1160.937	61.6	66.70	2.65	10.55	47.53	77.35	50.86
Kenya	2	2010	5.56	555.33	1246.296	62.9	67.00	2.66	4.31	49.79	79.23	54.23
Kenya	2	2011	3.31	555.33		64.0	67.30	2.67	14.02	48.17	88.81	60.45
Kenya	2	2012	1.79	555.33		64.9	67.60	2.68	9.38	48.69	64.22	55.22
Rwanda	3	1990	-2.68	239.20	714.9327	34.2	89.60	0.28	4.20	36.72	83.70	19.68
Rwanda	3	1991	0.08	239.20	768.0567	30.4	89.40	-2.63	19.60	49.83	125.16	25.37

Country	ID	Year	Per capita GDP growth rate (%)	Initial per capita GDP (US$)	Physical Capital (US$)	Human capital	Labour force participation rate (%)	Population growth (%)	Inflation rate (%)	Debt to GDP ratio (%)	Nominal exchange rate	Trade openness (%)
Rwanda	3	1992	11.53	239.20	817.4913	28.1	89.20	-5.20	9.50	52.03	133.94	23.83
Rwanda	3	1993	-2.09	239.20	681.4411	27.6	88.90	-6.34	12.47	56.28	144.24	25.68
Rwanda	3	1994	-47.72	239.20	335.4099	29.0	88.60	-4.95	21.00	99.30	140.70	71.10
Rwanda	3	1995	37.13	239.20	616.2014	32.0	88.30	-1.40	55.97	120.75	262.18	30.97
Rwanda	3	1996	9.33	239.20	619.5933	35.9	88.00	3.08	13.19	100.01	306.82	32.23
Rwanda	3	1997	6.70	239.20	568.494	40.0	87.90	6.48	11.76	86.56	301.53	33.47
Rwanda	3	1998	0.50	239.20	591.6527	43.6	87.70	7.99	6.46	84.01	312.31	28.79
Rwanda	3	1999	-0.05	239.20	618.0607	46.4	87.50	7.36	-2.42	93.92	333.94	30.75
Rwanda	3	2000	2.42	239.20	632.5137	48.4	87.10	5.60	3.91	103.57	389.70	31.20
Rwanda	3	2001	4.66	239.20	663.1888	49.7	86.70	3.76	3.36	99.60	442.99	32.75
Rwanda	3	2002	10.72	239.20	732.1441	50.9	86.50	2.49	1.98	109.29	475.37	30.75
Rwanda	3	2003	-0.27	239.20	734.822	52.2	86.20	1.71	7.45	102.26	537.65	32.00
Rwanda	3	2004	5.22	239.20	765.9501	53.7	86.10	1.63	11.98	92.44	577.45	35.88
Rwanda	3	2005	4.78	239.20	813.8928	55.4	86.10	2.01	9.12	72.28	557.82	36.67
Rwanda	3	2006	6.60	239.20	862.2639	57.2	86.30	2.44	8.83	27.22	551.71	37.59
Rwanda	3	2007	4.77	239.20	887.6968	58.9	86.60	2.67	9.08	27.62	546.96	40.34
Rwanda	3	2008	8.09	239.20	944.8541	60.5	87.00	2.80	15.44	21.76	546.85	40.56
Rwanda	3	2009	3.36	239.20	981.2475	61.9	87.30	2.77	10.35	22.86	568.28	38.71
Rwanda	3	2010	4.51	239.20	1025.138	63.1	87.50	2.65	2.31	23.06	583.13	40.05
Rwanda	3	2011	5.17	239.20		64.0	87.50	2.52	5.67	23.92	600.31	44.05
Rwanda	3	2012	6.16	239.20		64.8	87.30	2.44	6.29	24.11	387.40	46.09
Tanzania	4	1990	3.71	357.84	744.952	50.2	90.40	3.17	36.40	136.94	195.06	50.08
Tanzania	4	1991	-1.22	357.84	751.1091	49.9	90.40	3.28	25.20	116.40	219.16	43.90
Tanzania	4	1992	-2.72	357.84	730.86	49.7	90.40	3.35	20.70	128.73	297.71	51.80
Tanzania	4	1993	-2.09	357.84	712.5773	49.5	90.40	3.32	26.10	142.16	405.27	65.69
Tanzania	4	1994	-1.60	357.84	683.8627	49.4	90.40	3.18	37.90	138.36	509.63	64.24

Country	ID	Year	Per capita GDP growth rate (%)	Initial per capita GDP (US$)	Physical Capital (US$)	Human capital	Labour force participation rate (%)	Population growth (%)	Inflation rate (%)	Debt to GDP ratio (%)	Nominal exchange rate	Trade openness (%)
Tanzania	4	1995	0.55	357.84	671.6988	49.4	90.30	2.96	26.77	115.13	574.76	65.58
Tanzania	4	1996	1.73	357.84	664.2631	49.6	90.30	2.74	21.05	99.02	579.98	51.88
Tanzania	4	1997	0.91	357.84	669.5485	49.9	90.30	2.57	16.14	78.53	612.12	41.91
Tanzania	4	1998	1.18	357.84	694.4247	50.3	90.30	2.47	12.78	74.63	664.67	37.42
Tanzania	4	1999	2.28	357.84	709.9738	50.8	90.20	2.48	7.89	75.01	744.76	35.38
Tanzania	4	2000	2.30	357.84	724.6402	51.5	90.20	2.55	5.96	65.91	800.41	33.49
Tanzania	4	2001	3.25	357.84	751.6925	52.2	90.20	2.63	5.15	57.96	876.41	38.29
Tanzania	4	2002	4.31	357.84	790.2494	53.1	90.40	2.70	4.56	58.76	966.58	37.42
Tanzania	4	2003	3.96	357.84	833.8583	54.1	90.60	2.78	4.43	75.07	1038.42	41.37
Tanzania	4	2004	4.79	357.84	882.226	55.1	90.80	2.86	4.14	56.02	1089.33	45.72
Tanzania	4	2005	5.05	357.84	931.7556	56.2	90.80	2.94	4.36	55.97	1128.93	39.08
Tanzania	4	2006	1.56	357.84	974.996	57.2	90.80	3.01	7.25	42.65	1251.90	42.11
Tanzania	4	2007	5.18	357.84	1028	58.2	90.80	3.08	7.03	28.45	1245.04	50.60
Tanzania	4	2008	2.31	357.84	1084.7	59.1	90.70	3.14	10.28	29.16	1196.31	49.44
Tanzania	4	2009	2.11	357.84	1128.389	60.0	90.70	3.16	12.14	32.57	1320.31	43.65
Tanzania	4	2010	3.04	357.84	1177.702	60.9	90.60	3.17	7.19	37.66	1409.27	47.88
Tanzania	4	2011	4.53	357.84		61.7	90.60	3.18	12.69	40.62	1572.12	56.80
Tanzania	4	2012	1.86	546.20		62.5	90.60	3.18	16.00	40.78	849.92	54.40
Uganda	5	1990	2.91	546.20	568.8769	45.6	199.35	3.41	45.40	65.54	428.85	26.61
Uganda	5	1991	2.09	546.20	582.4866	45.1	203.53	3.33	20.82	119.02	734.01	29.40
Uganda	5	1992	0.09	546.20	582.7467	44.7	203.70	3.27	66.31	106.00	1133.83	33.05
Uganda	5	1993	4.90	546.20	608.5278	44.5	213.69	3.21	23.43	99.09	1195.02	28.24
Uganda	5	1994	3.10	546.20	725.0106	44.3	220.33	3.15	2.59	78.31	979.45	27.84
Uganda	5	1995	8.13	546.20	706.5924	44.3	238.23	3.09	9.63	75.70	968.92	32.62
Uganda	5	1996	5.81	546.20	739.2806	44.5	252.08	3.03	8.29	79.12	1046.08	35.39
Uganda	5	1997	2.01	546.20	765.3086	44.8	257.14	2.99	8.00	75.51	1083.01	34.16

Country	ID	Year	Per capita GDP growth rate (%)	Initial per capita GDP (US$)	Physical Capital (US$)	Human capital	Labour force participation rate (%)	Population growth (%)	Inflation rate (%)	Debt to GDP ratio (%)	Nominal exchange rate	Trade openness (%)
Uganda	5	1998	1.82	546.20	791.2624	45.4	261.82	2.99	0.88	76.02	1240.31	30.04
Uganda	5	1999	4.82	546.20	830.2132	46.1	274.43	3.04	5.76	77.58	1454.83	36.02
Uganda	5	2000	-0.03	546.20	843.5321	47.1	274.34	3.13	3.38	81.47	1644.48	32.75
Uganda	5	2001	1.85	546.20	860.8992	48.1	279.42	3.22	1.92	89.69	1755.66	35.33
Uganda	5	2002	5.21	546.20	884.3847	49.2	293.98	3.29	-0.30	90.70	1797.55	36.28
Uganda	5	2003	2.97	546.20	902.4614	50.3	302.72	3.34	8.71	69.25	1963.72	36.59
Uganda	5	2004	3.27	546.20	917.3659	51.5	312.64	3.36	3.67	58.99	1810.30	35.46
Uganda	5	2005	2.81	546.20	963.9258	52.6	321.44	3.36	8.60	56.55	1780.67	38.99
Uganda	5	2006	7.12	546.20	992.9674	53.6	344.33	3.36	7.21	18.46	1831.45	43.63
Uganda	5	2007	4.83	546.20	1024.157	54.6	360.96	3.36	6.07	19.59	1723.49	46.78
Uganda	5	2008	5.12	546.20	1092.521	55.5	379.46	3.35	12.04	19.91	1720.44	56.26
Uganda	5	2009	3.73	546.20	1106.114	56.3	393.62	3.34	13.07	26.71	2030.49	49.70
Uganda	5	2010	1.74	546.20	1101.527	57.1	400.45	3.32	3.97	28.91	2177.56	45.73
Uganda	5	2011	6.12	546.20		57.7	424.95	3.30	18.68	29.72	2522.75	52.71
Uganda	5	2012	1.05	546.20		58.3	429.40	3.27	14.02	65.54	1501.04	53.10

Appendix 2: Business cycle synchronization dataset

Country	Year	ID	Business cycle synchronization	Trade Integration	Industrial specialization	Contiguity	GPD gap (US$)	GDP product (US$)	Population (million)	Product of surface area (KM^2)
Burundi	1990	1	0.81	35.65	-0.02	0.00	11.05	13.78	5.46	16,151,697,100
Burundi	1991	1	0.81	38.42	-0.02	0.00	10.33	13.42	5.62	16,151,697,100
Burundi	1992	1	0.81	38.23	-0.02	0.00	10.25	12.26	5.78	16,151,697,100
Burundi	1993	1	0.81	36.54	-0.02	0.00	6.93	7.38	5.77	16,151,697,100
Burundi	1994	1	0.81	38.75	-0.02	0.00	8.50	8.71	5.87	16,151,697,100
Burundi	1995	1	0.81	40.20	-0.02	0.00	10.94	11.94	5.98	16,151,697,100
Burundi	1996	1	0.81	21.57	-0.02	0.00	12.70	11.77	6.09	16,151,697,100
Burundi	1997	1	0.81	24.28	-0.02	0.00	12.77	13.36	6.19	16,151,697,100
Burundi	1998	1	0.81	27.44	-0.02	0.00	14.83	14.04	6.30	16,151,697,100
Burundi	1999	1	0.81	23.54	-0.02	0.00	13.49	12.43	6.30	16,151,697,100
Burundi	2000	1	0.81	22.55	-0.02	0.00	13.27	12.30	6.43	16,151,697,100
Burundi	2001	1	0.81	20.96	-0.02	0.00	13.65	12.74	6.75	16,151,697,100
Burundi	2002	1	0.81	21.67	-0.02	0.00	13.94	12.18	7.00	16,151,697,100
Burundi	2003	1	0.81	27.38	-0.02	0.00	16.01	13.18	7.20	16,151,697,100
Burundi	2004	1	0.81	31.58	-0.02	0.00	17.15	16.53	7.34	16,151,697,100
Burundi	2005	1	0.81	41.65	-0.02	0.00	19.88	23.46	7.49	16,151,697,100
Burundi	2006	1	0.81	54.15	-0.02	0.00	24.55	32.88	7.64	16,151,697,100
Burundi	2007	1	0.81	41.48	-0.02	0.00	30.60	43.34	7.79	16,151,697,100
Burundi	2008	1	0.81	47.42	-0.02	0.00	34.28	57.86	7.98	16,151,697,100
Burundi	2009	1	0.81	49.93	-0.02	0.00	35.25	65.71	8.17	16,151,697,100
Burundi	2010	1	0.81	48.10	-0.02	0.00	37.97	81.28	8.37	16,151,697,100
Burundi	2011	1	0.81	47.02	-0.02	0.00	39.58	99.47	8.57	16,151,697,100
Burundi	2012	1	0.81	46.42	-0.02	0.00	47.90	126.53	8.78	16,151,697,100
Rwanda	1990	2	0.92	19.68	-0.12	0.00	9.69	30.34	6.45	15,286,945,800
Rwanda	1991	2	0.92	25.37	-0.12	0.00	9.66	21.13	6.65	15,286,945,800

Country	Year	ID	Business cycle synchronization	Trade Integration	Industrial specialization	Contiguity	GPD gap (US$)	GDP product (US$)	Population (million)	Product of surface area (KM^2)
Rwanda	1992	2	0.92	23.83	-0.12	0.00	9.38	22.09	6.66	15,286,945,800
Rwanda	1993	2	0.92	25.68	-0.12	0.00	5.99	14.80	6.25	15,286,945,800
Rwanda	1994	2	0.92	71.10	-0.12	0.00	8.23	11.26	5.79	15,286,945,800
Rwanda	1995	2	0.92	30.97	-0.12	0.00	10.71	14.80	5.47	15,286,945,800
Rwanda	1996	2	0.92	32.23	-0.12	0.00	12.22	18.22	5.41	15,286,945,800
Rwanda	1997	2	0.92	33.47	-0.12	0.00	11.93	24.85	5.66	15,286,945,800
Rwanda	1998	2	0.92	28.79	-0.12	0.00	13.80	30.35	6.18	15,286,945,800
Rwanda	1999	2	0.92	30.75	-0.12	0.00	12.56	25.79	6.84	15,286,945,800
Rwanda	2000	2	0.92	31.20	-0.12	0.00	12.42	24.29	7.50	15,286,945,800
Rwanda	2001	2	0.92	32.75	-0.12	0.00	12.86	24.34	8.01	15,286,945,800
Rwanda	2002	2	0.92	30.75	-0.12	0.00	13.10	24.64	8.36	15,286,945,800
Rwanda	2003	2	0.92	32.00	-0.12	0.00	14.96	30.82	8.58	15,286,945,800
Rwanda	2004	2	0.92	35.88	-0.12	0.00	15.97	37.77	8.71	15,286,945,800
Rwanda	2005	2	0.92	36.67	-0.12	0.00	18.42	54.27	8.83	15,286,945,800
Rwanda	2006	2	0.92	37.59	-0.12	0.00	22.72	80.34	9.00	15,286,945,800
Rwanda	2007	2	0.92	40.34	-0.12	0.00	28.18	120.67	9.20	15,286,945,800
Rwanda	2008	2	0.92	40.56	-0.12	0.00	31.10	172.26	9.50	15,286,945,800
Rwanda	2009	2	0.92	38.71	-0.12	0.00	31.71	196.55	9.70	15,286,945,800
Rwanda	2010	2	0.92	40.05	-0.12	0.00	34.30	227.92	10.00	15,286,945,800
Rwanda	2011	2	0.92	44.05	-0.12	0.00	35.55	268.75	10.20	15,286,945,800
Rwanda	2012	2	0.92	46.09	-0.12	0.00	43.19	364.11	10.50	15,286,945,800
Tanzania	1990	3	0.99	50.08	-0.04	1.00	8.75	41.78	24.72	549,784,501,000
Tanzania	1991	3	0.99	43.90	-0.04	1.00	7.47	46.36	25.53	549,784,501,000
Tanzania	1992	3	0.99	51.80	-0.04	1.00	7.63	41.91	26.34	549,784,501,000
Tanzania	1993	3	0.99	65.69	-0.04	1.00	4.46	26.85	27.15	549,784,501,000
Tanzania	1994	3	0.99	64.24	-0.04	1.00	5.80	34.17	27.96	549,784,501,000

Country	Year	ID	Business cycle synchronization	Trade Integration	Industrial specialization	Contiguity	GPD gap (US$)	GDP product (US$)	Population (million)	Product of surface area (KM^2)
Tanzania	1995	3	0.99	65.58	-0.04	1.00	7.69	50.77	28.77	549,784,501,000
Tanzania	1996	3	0.99	51.88	-0.04	1.00	8.25	72.04	29.58	549,784,501,000
Tanzania	1997	3	0.99	41.91	-0.04	1.00	7.33	88.15	30.39	549,784,501,000
Tanzania	1998	3	0.99	37.42	-0.04	1.00	6.27	148.67	31.20	549,784,501,000
Tanzania	1999	3	0.99	35.38	-0.04	1.00	2.73	166.84	32.01	549,784,501,000
Tanzania	2000	3	0.99	33.49	-0.04	1.00	1.71	175.61	32.82	549,784,501,000
Tanzania	2001	3	0.99	38.29	-0.04	1.00	1.79	185.17	33.63	549,784,501,000
Tanzania	2002	3	0.99	37.42	-0.04	1.00	1.55	195.12	34.44	549,784,501,000
Tanzania	2003	3	0.99	41.37	-0.04	1.00	2.62	238.13	35.49	549,784,501,000
Tanzania	2004	3	0.99	45.72	-0.04	1.00	2.52	280.84	36.54	549,784,501,000
Tanzania	2005	3	0.99	39.08	-0.04	1.00	4.07	355.55	37.59	549,784,501,000
Tanzania	2006	3	0.99	42.11	-0.04	1.00	7.22	480.62	38.64	549,784,501,000
Tanzania	2007	3	0.99	50.60	-0.04	1.00	10.46	687.16	39.69	549,784,501,000
Tanzania	2008	3	0.99	49.44	-0.04	1.00	8.53	982.37	40.74	549,784,501,000
Tanzania	2009	3	0.99	43.65	-0.04	1.00	8.45	1057.87	41.78	549,784,501,000
Tanzania	2010	3	0.99	47.88	-0.04	1.00	8.91	1243.44	42.83	549,784,501,000
Tanzania	2011	3	0.99	56.80	-0.04	1.00	8.37	1408.91	43.88	549,784,501,000
Tanzania	2012	3	0.99	54.40	-0.04	1.00	11.32	1970.43	44.93	549,784,501,000
Uganda	1990	4	1.00	26.61	-0.10	1.00	6.66	67.29	17.58	140,188,373,500
Uganda	1991	4	1.00	29.40	-0.10	1.00	9.29	25.39	18.20	140,188,373,500
Uganda	1992	4	1.00	33.05	-0.10	1.00	8.01	37.55	18.80	140,188,373,500
Uganda	1993	4	1.00	28.24	-0.10	1.00	4.14	29.34	19.40	140,188,373,500
Uganda	1994	4	1.00	27.84	-0.10	1.00	4.82	43.36	20.10	140,188,373,500
Uganda	1995	4	1.00	32.62	-0.10	1.00	5.23	80.19	20.70	140,188,373,500
Uganda	1996	4	1.00	35.39	-0.10	1.00	6.49	96.03	21.40	140,188,373,500
Uganda	1997	4	1.00	34.16	-0.10	1.00	6.38	101.24	22.10	140,188,373,500

Country	Year	ID	Business cycle synchronization	Trade Integration	Industrial specialization	Contiguity	GPD gap (US$)	GDP product (US$)	Population (million)	Product of surface area (KM^2)
Uganda	1998	4	1.00	30.04	-0.10	1.00	7.82	124.39	22.80	140,188,373,500
Uganda	1999	4	1.00	36.02	-0.10	1.00	7.13	103.70	23.50	140,188,373,500
Uganda	2000	4	1.00	32.75	-0.10	1.00	7.28	96.86	24.30	140,188,373,500
Uganda	2001	4	1.00	35.33	-0.10	1.00	7.61	100.58	25.10	140,188,373,500
Uganda	2002	4	1.00	36.28	-0.10	1.00	7.32	109.89	25.90	140,188,373,500
Uganda	2003	4	1.00	36.59	-0.10	1.00	9.09	129.46	26.80	140,188,373,500
Uganda	2004	4	1.00	35.46	-0.10	1.00	8.57	171.55	27.80	140,188,373,500
Uganda	2005	4	1.00	38.99	-0.10	1.00	9.99	231.16	28.70	140,188,373,500
Uganda	2006	4	1.00	43.63	-0.10	1.00	13.50	318.31	29.70	140,188,373,500
Uganda	2007	4	1.00	46.78	-0.10	1.00	16.76	485.76	30.70	140,188,373,500
Uganda	2008	4	1.00	56.26	-0.10	1.00	17.71	652.86	31.80	140,188,373,500
Uganda	2009	4	1.00	49.70	-0.10	1.00	18.44	687.83	32.90	140,188,373,500
Uganda	2010	4	1.00	45.73	-0.10	1.00	19.79	808.48	34.00	140,188,373,500
Uganda	2011	4	1.00	52.71	-0.10	1.00	20.85	885.54	35.10	140,188,373,500
Uganda	2012	4	1.00	53.10	-0.10	1.00	25.79	1241.09	36.30	140,188,373,500

Appendix 3: EAC Partner States Annual Contribution to the Secretariat (US$)

Year	Kenya	Tanzania	Uganda	Rwanda	Burundi	EAC Total
2000	701,000	701,000	701,000	0	0	2,103,000
2001	1,653,721	1,653,721	1,653,721	0	0	4,961,163
2002	1,743,886	1,743,886	1,743,886	0	0	5,231,658
2003	2,132,793	2,132,793	2,132,793	0	0	6,398,379
2004	3,027,143	3,027,143	3,027,143	0	0	9,081,429
2005	3,690,997	3,690,997	3,690,997	0	0	11,072,991
2006	4,054,973	4,054,973	4,054,973	0	0	12,164,919
2007	4,296,531	4,296,531	4,296,531	4,296,531	1,000,000	18,186,124
2008	5,604,733	5,604,733	5,604,733	5,604,733	1,000,000	23,418,932
2009	5,593,340	5,593,340	5,593,340	5,593,340	5,593,340	27,966,700
2010	6,149,674	6,149,674	6,149,674	6,149,674	6,149,674	30,748,370
2011	6,733,340	6,733,340	6,733,340	6,733,340	6,733,340	33,666,700
2012	7,075,144	7,075,144	7,075,144	7,075,144	7,075,144	35,375,722
2013	7,614,698	7,614,698	7,614,698	7,614,698	7,614,698	38,073,492

Appendix 4: Data used to calculate political integration

Gross national expenditure (US$)								
	Burundi	**Kenya**	**Rwanda**	**Tanzania**	**Uganda**	**EAC Total**	**Total contribution to the Secretariat**	**% shares**
2000	956,801,578	13,992,897,900	2,056,917,353	10,874,450,757	6,902,138,942	34,783,206,530	2,103,000	0.006
2001	969,784,426	14,295,458,001	1,939,249,787	10,827,678,773	6,558,524,219	34,590,695,208	4,961,163	0.014
2002	926,936,338	13,854,654,881	1,957,231,868	11,049,761,256	7,034,370,864	34,822,955,207	5,231,658	0.015
2003	899,319,772	15,792,609,055	2,124,596,688	12,154,458,768	7,211,938,320	38,182,922,604	6,398,379	0.017
2004	1,076,988,982	17,102,323,207	2,374,062,576	13,648,516,865	8,739,665,355	42,941,556,984	9,081,429	0.021
2005	1,399,269,587	20,135,893,376	2,937,313,548	15,401,707,487	9,972,445,470	49,846,629,468	11,072,991	0.022
2006	1,777,203,490	24,916,723,288	3,553,786,050	16,213,655,595	11,282,473,504	57,743,841,927	12,164,919	0.021
2007	1,721,749,884	30,211,180,022	4,276,253,095	19,661,982,042	13,504,100,693	69,375,265,735	18,186,124	0.026
2008	2,069,892,868	34,773,601,429	5,453,201,956	23,541,579,064	15,552,038,611	81,390,313,928	23,418,932	0.029
2009	2,371,690,303	34,654,922,611	6,271,292,269	23,916,157,404	17,607,403,273	84,821,465,860	27,966,700	0.033
2010	2,640,242,454	36,144,277,217	6,779,872,804	25,374,915,137	18,943,551,607	89,882,859,218	30,748,370	0.034
2011	3,022,579,179	39,305,568,858	7,458,105,355	28,447,879,915	18,644,670,717	96,878,804,023	33,666,700	0.035
2012	3,177,477,435	47,695,279,715	8,554,453,003	33,260,152,169	11,829,443,465	104,516,805,787	35,375,722	0.034

Appendix 5: Data used to calculate institutional distance

Year	Voice and Accountability	Political Stability and Absence of Violence/Terrorism	Government Effectiveness	Regulatory Quality	Rule of Law	Control of Corruption	Total	Average
2000	5.23	5.66	4.61	5.00	4.24	5.25	29.99	5.00
2002	5.35	4.40	4.24	6.93	4.11	5.76	30.79	5.13
2003	9.45	4.41	4.21	5.77	4.09	3.95	31.87	5.31
2004	11.23	4.75	4.36	5.49	3.97	5.02	34.82	5.80
2005	8.64	4.52	4.32	7.06	4.70	11.07	40.32	6.72
2006	8.29	4.92	4.12	7.25	7.48	5.91	37.98	6.33
2007	6.77	7.87	4.05	6.66	7.85	5.80	39.00	6.50
2008	6.28	7.15	4.08	7.03	9.31	7.14	40.99	6.83
2009	5.87	8.92	4.00	6.52	8.37	7.19	40.88	6.81
2010	7.22	5.52	4.03	6.73	7.30	5.38	36.18	6.03
2011	7.09	5.46	4.05	5.08	7.28	5.26	34.21	5.70
2012	7.00	5.03	4.23	4.36	6.26	4.93	31.79	5.30

Appendix 6: Data used to calculate social integration

Year	Deviations from the mean			Social Integration
	0-14	15-64	65 and above	
2000	9.47	9.28	0.45	19.21
2001	9.32	9.08	0.47	18.87
2002	9.21	8.93	0.45	18.60
2003	9.09	8.79	0.47	18.34
2004	8.85	8.54	0.61	17.99
2005	8.42	8.10	0.74	17.26
2006	8.29	7.92	0.83	17.04
2007	8.24	7.94	0.89	17.07
2008	8.08	8.02	0.94	17.04
2009	7.90	8.08	1.00	16.97
2010	7.76	8.22	1.07	17.05
2011	7.70	8.46	1.14	17.31
2012	7.68	8.77	1.22	17.66

Appendix 6: Data used to calculate economic interconnectedness

	Intra-EAC Exports (US$ millions)							Intra-EAC Imports (US$ million							
	Burundi	TZ	UG	Kenya	Rwanda	EAC total		Burundi	Uganda	TZ	Kenya	Rwanda	EAC total	EAC GDP	Economic interconnectedness
2000	8.72	202.63	356.83	448.59	23.89	1040.67		103.00	518.32	191.75	18.50	109.98	941.55	7199.80	4.20
2001	8.72	58.60	87.16	622.47	164.20	941.16		103.00	288.60	107.75	17.04	105.93	622.32	7349.60	3.41
2002	8.72	57.08	86.00	667.25	35.13	854.18		103.00	414.96	97.87	19.08	74.62	709.54	7583.40	3.19
2003	8.72	102.38	114.70	710.50	29.04	965.35		103.00	414.86	124.20	31.69	80.71	754.47	8260.40	3.25
2004	5.42	123.80	132.00	810.12	24.98	1096.32		54.13	416.31	137.82	38.44	68.92	715.62	9222.80	3.15
2005	4.00	128.90	144.70	974.30	34.86	1286.76		59.10	551.46	160.53	61.52	99.10	931.71	10527.80	3.33
2006	5.50	157.78	296.27	735.77	32.99	1228.31		60.90	499.00	175.50	84.12	143.38	962.89	12229.00	2.80
2007	5.30	205.90	476.90	952.23	39.98	1680.31		79.50	560.60	110.10	191.60	207.05	1148.84	14758.40	3.06
2008	6.60	259.90	654.68	1213.38	46.20	2180.77		84.70	617.36	205.00	181.99	394.20	1483.25	17572.40	3.33
2009	6.00	323.46	666.17	1167.22	47.30	2210.15		129.20	597.39	316.92	162.15	449.65	1655.32	18251.80	3.33
2010	12.55	394.30	616.86	1278.65	54.16	2356.52		89.39	619.52	295.50	256.84	503.58	1764.83	19805.60	3.27
2011	24.40	416.84	649.73	1544.36	70.80	2706.13		267.11	721.49	378.02	302.88	589.30	2258.80	21084.20	3.64
2012	8.72	202.63	356.83	927.07	50.29	1545.55		103.00	518.32	191.75	113.82	235.53	1162.43	24770.20	1.72