**Progression and Evaluation of Financial Integration in the European Union**

by

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Established in 1957 by the Treaty of Rome, the European Union is now made up of 27 members and, as of 2009, accounted for about 30 percent of the gross world product.[1] It began as a customs union between six countries, in an effort to rebuild and unite a war-torn Europe. Today it is an economic and monetary union with ambitions to become a political union. One of the key steps towards that level of unification is the free movement of capital across national borders. To that end the leaders of the EU have put large amounts of resources towards financially integrating the member states.

This paper seeks to measure the level of financial integration of the long term government bond markets from 2002 to 2009. A market can be considered financially integrated if similar participants: first, follow a single set of rules when dealing with financial goods and services; second, have equal access to those goods and services; and third, are not discriminated against when they are participating in the market.[2] Using the yields on the German bonds as a bench mark, yield spreads per quarter from 2002 to 2009 are calculated along with the variance of the yield spreads. The correlations between countries from 2002 to 2009 are also calculated to see how correlation changed over time.

Countries that use the Euro were found to be the most integrated, followed by the countries with pegged currencies, and then the countries with free-floating currencies. Within each subsample, integration either increased or remained static from 2002 to 2006; after 2007, integration decreased.

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[1] CIA World Fact Book (2010)
[2] Baele (2004)

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## INTRODUCTION

Established in 1957 by the Treaty of Rome, the European Union (EU) is now made up of 27 member states and in 2009 had a gross domestic product (purchasing power parity) of $14.51 trillion3, making it the largest trading bloc in the world.4  It began as a customs union—a free trade area with a common external tariff—between six countries, in an effort to rebuild and unite a war-torn Europe.   Its end goal is to create a political union between the EU's member states similar to that found in the United States.  Along that path, the EU has faced numerous obstacles and still continues to face hurdles in today's global environment.

To that end, the first part of this paper charts the EU's path of economic integration from before 1945 through the present.  Looking at this historical progression offers two advantages—first, it shows all of the ground that the EU has covered in more than 50 years and second, it provides a background for the second, more technical part of this paper.

The second part of this paper seeks to measure the level of financial integration of the markets within the EU.  One of the key themes of economic integration is the free movement of labor and capital.  Financial integration deals specifically with the free movement of capital.  There are many steps in this process.  The first step is to define financial integration.  This paper will use the following definition of financial integration.  A market can be considered financially integrated if similar participants: first, follow a single set of rules when dealing with financial goods and services; second, have equal access to those goods and services; and third, are not discriminated against when they are participating in the market.[5]

The next steps include explaining why financial integration is important to the EU's development and laying out the costs and benefits of financial integration to the countries

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[3] CIA World Fact Book (2010)
[4] CIA World Fact Book (2010)
[5] Baele (2004)

involved. Financial integration is important to the development of the EU in several ways. As mentioned, one is for higher levels of unification capital needs to move freely across borders. Also, more integrated financial environments will allows for smoother transmission of monetary and fiscal policy across the EU. Finally, it has been shown that higher levels of integration have been linked to increased economic growth.

The last step in the process is to determine how to measure the integration. This paper will employ a price-based method using the yields on the long-term government bonds. Using these numbers, the spread between the yields on the government bonds and a benchmark asset will be calculated. Then, using the yields spreads the variance in those spreads will be determined. The spreads and variances for the nine year period from 2000 to 2006 and 2007 to 2009 will be calculated. The reason for this division of the nine years is to isolate the effects of the global financial crisis on integration for the overall trends integration prior to the crash. Also for these calculations, the EU has been divided into two groups, the Euro Area and the EU-12, the countries that do not use the Euro. The separation was necessary as the use of a single currency dramatically increases financial integration. This method of determining integration should provide a decent measure of financial integration in the EU's government bond markets.

The final portion of this paper will detail the author's conclusions about the outlook for financial integration in the European Union.

# 1.0    PROGRESSION OF ECONOMIC INTEGRATION

The first section of this paper charts the progression of integration of the European countries that would eventually form the European Union from right before 1945 through the present day. First, the different levels of economic integration will be defined and organized into a pyramid. [6] The paper will then use this integration pyramid as a guide while following the evolution of integration and the development of the EU.

## 1.1    LEVELS OF ECONOMIC INTEGRATION

In the integration pyramid each of the following described levels of integration builds upon the properties of its preceding levels. While it is not necessary that a group of countries follow a linear progression from the lowest level to the highest, this is most often the case. This is because the properties of the higher levels are difficult to maintain if the prerequisites of the lower levels have not yet been met. Also, not all groups of countries seeking to integrate want to reach the final level of integration. Many groups of countries aim to integrate up to a certain level but no farther.

       The lowest level of integration is a preferential trade area (PTA). A PTA is a trade agreement under which one country gives favored status to specific goods or services from another country. The favored status most often takes the form of reduced tariffs or increased quota amounts—however, it does not completely eliminate those barriers to trade. The banana trade wars are largely a result of PTA. For example, France, at the end of WWII, imposed

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[6] McCormick (2008)

import quotas on bananas. However, bananas from former French colonies, though they were subject to tariffs, were given preferential status. England did much of the same with bananas from former British colonies. The Lome Convention of 1975 cemented the preferences of the individual member states. Under Lome, the EU gives special preference to bananas from African, Caribbean, and Pacific (ACP) countries, which guarantees traditional advantages that the ACP countries have enjoyed.[7]

The next level of integration is a free trade agreement (FTA). Under an FTA, members coordinate their internal trade policies to eventually remove tariffs, quotas, subsidies, and other barriers to trade. Removing those barriers will increase trade between members as it is less expensive to trade with members as opposed to non-members. Increased trade (and savings) will lead to the members specializing—each country produces goods and services in industries in which is it comparatively more efficient and trades for other goods and services it needs. This should result in an aggregate net increase of the wealth of the members. However, even if an FTA is successful, some parties will still suffer as the distribution of wealth is not equal across the members. First, industries that had previously enjoyed a protected status prior to the FTA will, all other factors being held equal, probably become comparatively disadvantaged. Second, individuals may have to deal with job loss. For example, assume Member A specializes in Industry X and Member B specializes in Industry Y. The workers of Member A who worked in Industry Y will probably lose their jobs as those jobs will have moved to Member B. The same is true for workers of Member B who worked in Industry X. One of the best examples of an FTA is the North American Free Trade Agreement (NAFTA). Under NAFTA the US, Canada, and Mexico have agreed to eliminate internal barriers to trade. Whether or not NAFTA has been successful is debatable. It is important to note that while the members of FTAs coordinate their internal trade policies, they still determine their own external trade policies towards non-members.

A customs union has the same properties as an FTA except members share a common external trade policy as well. This strengthens the bonds between the member countries—they must negotiate terms of external trade that are mutually beneficial to all the members. Having a common external trade policy also gives the members greater clout when dealing with non-

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[7] European Union European Commission (2010)

member trading partners—those partners must now deal with the countries of the customs union as a trading bloc as opposed to individual countries. This gives the customs union the ability to negotiate better terms of trade. An example of a customs union is the Andean Pact between Bolivia, Colombia, Ecuador, and Peru. [8] Individually each country has limited power in trade negotiations, but as a group that power is increased.

While a customs union strengthens the members' external trade position, a common market, the next level of integration, focuses on deepening the internal relationships between members. In a common market, factors of production, like labor and capital, move freely across borders when and where they are needed. This is achieved through common policies on product regulation, immigration, and enterprise. As a result, markets become more efficient and productive, increasing overall economic growth and wealth. A single market is often regarded as a more advanced form of a common market, though it is not recognized as a separate level of integration. In a single market, more effort is dedicated to removing physical borders to trade, coordinating technical product standards, and harmonizing tax regimes. Like with a common market, the goal is to further increase the mobility of factors of production. Even though a single market is not its own level of integration, it is an important step towards the next level of integration, especially because it coordinates tax regimes. An example of a common market/single market is the Caribbean Community (Caricom). Caricom is made up of 15 members and works to increase economic coordination and integration of its members. [9]

The penultimate level of integration is an economic union. In an economic union the members further coordinate regulations, policies, and standards relating to the movement of labor and capital. However, the main focus of an economic union is the coordination of economic policies, specifically macroeconomic and regulatory policies. Members try to harmonize their monetary and fiscal policies. Also in this stage of integration more supra-national organizations are created or formalized in order to properly run the union.

The terms economic union and monetary union are often used interchangeably. They are both considered to be the fifth level of economic integration. However, there is a difference. Sometimes when countries form an economic union, they concurrently create a monetary union as well. Unlike countries that are just in an economic union, members in a monetary union share

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[8] Communidad Andina Secretariat General (2010)
[9] Caribbean Community Secretariat (2010)

a common currency. In order to share a currency the members must have a common monetary policy and similar fiscal policies. There are several advantages to a monetary union among countries. First, a common currency really cements a single market in place—the markets become more efficient as everything is priced the same denomination. Second, having a common currency eliminates many currency exchange rate risks among members and between members and the rest of their trading partners. A single currency also greatly reduces the transaction costs of doing business. In 2009 companies in the EU spent an estimated $30 billion USD a year on foreign exchange transactions and exchange rate hedging[10]. Prior to the introduction of the Euro, companies spent twice that on foreign exchange transactions and exchange rate hedging[11]. Avoiding excessive transaction costs is particularly helpful to smaller businesses who cannot afford these costs. With the saved money, business should become more efficient and production should increase across the members. This should lead to an increase in the EU's GDP. However, there are disadvantages to a monetary union. Depending on the diversity of the economies of the countries united by the monetary, serious problems can emerge. The problems are exacerbated when there large differences between the fundamental structures of the economies, their relative efficiencies of production, and their inflation rates. Also, being a part of a monetary union means governments give up part of their sovereignty and can no longer use monetary policy or exchange rate policies to devalue its currency when necessary. Similarly, although the governments do retain control of fiscal policy, they cannot pursue a fiscal policy drastically different from those of the other members without causing conflict and instability. Basically, this leaves the governments with few options to boost their economies in periods of recession. The European Union (EU) is one of the best examples of countries gradually forming a monetary union. This process will be discussed later in the paper.

All the previous levels of integration have mainly focused on economically and legally integrating a group of countries. In doing so, the members create organizations to regulate and enforce cooperation in the group. Eventually, these organizations start acting as de facto common government. The last level of integration, a political union, formalizes this common government and defines the roles of the common government in relationship to the individual governments of each member. On a global level, the political union acts as a single bargaining

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[10] European Union Europa (2010)
[11] European Union Europa (2010)

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entity and is usually represented by a single individual with ties to the common government as opposed to the government of any one member. One of the best known examples of a political union is the United States. The states share a federal government with an administrative bureaucracy, representative governing body, and court of law. The US constitution defines relationships between the federal and state governments—it outlines when the federal government takes precedence over the state governments and vice versa. The states also share several federal organizations and public goods like Central Intelligence Agency and a national defense force, respectively. Finally, President of the US acts as the representative for all the states in international affairs.

Integrating a group of countries to any level can be a lengthy, complicated, and very expensive process. Consequently, there are many arguments for and against economically integrating any group of countries. The most prevalent argument for integration is increased economic wealth for the group members. By opening their borders, members increase the number of companies competing in any given market. In order to stay competitive in more dynamic business environments, companies have to distinguish their products from those of their competitors—among other options companies can take advantage of economies of scale, specialize, lower prices through increased efficiency throughout the supply chain, and regular innovation. This translates into a favorable purchasing environment for consumers. The aggregate effect of these events stimulates the economies of the member countries. Integration serves a social function as well. Since the countries are economically dependent on one another, they are more likely to negotiate and cooperate when a conflict arises between them as opposed to fighting.

On the other side of the issue, opponents of integration often use a few key arguments. First, is the idea of transmitting shocks. If Country A and Country B do not trade with one another, meaning there is not a high level of integration, then an economic shock in Country A, a shortage of apples, will not affect Country B. The more integrated the two countries are, the more the shortage of apples in Country A will affect Country B. If a group of countries is more integrated, then the shocks will be more easily transmitted from one country to the next. The second argument is that of national sovereignty. As a group of countries becomes more integrated, each country must give up some of its powers. For example, members of an FTA give up the power to set their own internal trade policies. Members of a customs union give up

the power to set their own external trade policies. Opponents fear losing too much national sovereignty when a group of countries begin to integrate.

The next section of this paper will use the framework of the integration pyramid to chart the progression of integration of the European Union.

## 1.2    HISTORY OF ECONMIC INTEGRATION

### 1.2.1    The Idea of a United Europe

While the idea of creating a United Europe repeatedly resurfaced, it never took root. In order to accomplish any sort of unification, leaders had to overcome the diverse and often conflicting histories, languages, and cultures of the European countries. Take for example France and Germany. Both nations consist of proud peoples who were often in conflict with each other for contested land and resources. Up through the 19th and 20th century they fought a series of costly wars against each other. Throughout history, Franco-German relations were almost always strained. Prior to 1945 there was no driving force for the countries to put aside their pasts and cooperate to create a united Europe. And no attempt at a United Europe could truly succeed without both countries' participation as they represent the two economic and political powerhouses of Continental Europe.

Another obstacle was that from the 15th century through the 18th century mercantilism was the main school of thought when it came to international trade. Under mercantilism the wealth of a country is determined by its supply of gold or silver specie. In order to increase its supply of capital, a country should maintain a positive balance of trade. Exports minus imports should always be greater than zero—meaning a country should encourage exports. At the same time it should discourage imports, most often through tariffs and quotas. Another key assumption of mercantilism is that international trade is a zero-sum game and the total sum of gold and silver remains constant. The result was that countries constantly vied to increase their supply of gold and silver through exports and protectionist trade policies. It also resulted in competition among the European powers to acquire colonies. Colonies were seen as means to

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increasing the balance of trade—countries could acquire raw material cheaply from their colonies, refine those materials into finished goods, and then sell then finished goods back to the colonies at much higher prices.  Uniting Europe would mean taking down these barriers, ending the competition, and forgoing the popular economic theory of the time. It was not until the end of World War II that there was a real impetus for unification.

## 1.2.2   The Creation of a Customs Union

World War II left Europe in shambles—the death toll was over 15 million[12] in Europe and the continent's economies were devastated.  This tragedy, however, provided the driving force to create as Winston Churchill said, "a kind of United States of Europe."[13]  Tying the European countries together was the best way to first, ensure lasting peace and prosperity, and second, to facilitate post-war reconstructions.

Two key figures in the post-war reconstruction planning, Jean Monnet and Robert Schuman, both agreed that the best starting point was finding a resolution to the Franco-German tensions.  Doing so would require rebuilding Germany under the supervision of other European countries, but also allowing Germany to play an active role in creating this new united Europe. Six countries—France, Germany, Italy, Belgium, Luxembourg, and the Netherlands—started negotiations.  In 1951 they signed the Treaty of Paris and created the European Coal and Steel Community (ECSC).[14]

The ECSC was a supranational organization that created a limited union between its six members based around coal and steel.  It had several aims including reducing tariffs and eliminating subsidies on coal and steel; banning restrictive trade practices; fixing coal and steel prices under certain circumstances to help stabilize prices; harmonizing the members' external trade policies on coal and steel; imposing levies on steel and coal production to raise money for reconstruction; and developing employment and raising the standard of living for its citizens.[15] The ECSC was governed by the nine-member High Authority.  Germany, France, and Italy each

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[12] European Union Europa (2010)
[13] Churchill (1946)
[14] Suder (2008)
[15] McCormick (2008)

had two representatives, while Belgium, Luxembourg, and the Netherlands each had one representative. These eight representatives then elected the ninth member, who was the President of the High Authority. All the members had to swear to act in the best interests of the community, not their home countries.

There were a few reasons for creating this community around only coal and steel. Opening up and unifying the coal and steel industries allowed the materials to be better allocated across the six members. It also increased competition among suppliers, forcing them to be more efficient in their production. This in turn meant lower prices which caused large increases in trade volumes of coal and steel. Because these materials were so important—they were the physical building blocks needs to rebuild the countries—the members were dependent on trade from one another—increasing the chances of negotiation when a conflict arose as opposed to going to war.

By 1952 the new organization began producing tangible results. Coal and steel trade between the six members increased 129 percent over the first five years[16]. In addition, the High Authority issued 280 modernization loans to steel and coal manufacturing companies[17]. This helped to increase output and reduce production costs. Costs were further reduced by the fact that members no longer had to import steel and coal from the US and the elimination of internal tariffs. The ECSC also made large welfare reforms. Many mines were maintained through government subsidies, which in turn maintained employment levels. Over fifteen years the ECSC built over 112,000 homes for miners who had lived in extremely poor housing[18]. Each house cost USD$1,770. When steel and coal facilities began to close, the ECSC paid for half of the occupational redeployment costs. In total, the ECSC spent USD$150 million in welfare programs[19]. All of these improvements, from the modernization loans to the homes built for miners, were jointly funded by the members of the ECSC. But the ECSC's greatest achievement was that it proved two things: that uniting Europe was indeed feasible and that shared economic endeavors could establish and maintain peace on the continent.

Despite its moderate success, the ECSC began to falter—it was becoming increasingly hard to develop the coal and steel industries. Innovations in technology had led to the

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[16] Suder (2008)
[17] Suder (2008)
[18] Suder (2008)
[19] Suder (2008)

development of other building materials than steel and power sources more efficient and desirable than coal.  As trade of these two materials decreased, the bonds between the members began to weaken.  At the same time, the Cold War between the US and the Soviet Union was steadily escalating.  The US asked Germany and the rest of Western Europe to assume a greater role in defending themselves.  However, if Germany was to be rearmed, then the other European leaders wanted to be able to control that process.  Under the Pleven Plan of 1950, proposed by French Premier Rene Pleven, the ECSC would establish a European Defense Community (EDC).[20]  The EDC would be a supranational defense force, although it would be divided into national components.  Troops from Italy, France, Belgium, Luxembourg, and the Netherlands would report to their respective governments; German troops would serve under a European defense minister, who in turn would answer to the ECSC.  The attempt failed because the EDC was not ratified when it went to the French Assembly in 1954.[21]  The reasons most often cited for this are the differences between the original Pleven Plan and the one that was sent to the French Assembly for ratification, fears of encroachment on French Sovereignty, and the absence of Great Britain's participation (since it had the largest and strongest military in Europe at the time).  Another reason for the failure is that the leaders of the ECSC tried to jump prematurely from the limited goals of a customs union to the higher goals of a political union—without meeting any of the requirements of the middle levels of integration.  Building a strong house means first building a strong foundation.

In June 1955, encouraged by the achievements of the ECSC and given the global political situation, the foreign ministers of the six countries met to further deepen the economic unity between members.  Two years later on March 25, 1957 they signed the Treaty of Rome. The treaty provided for the creation of two new pan-European groups: the European Economic Community (EEC), which was merged with the ECSC; and the European Atomic Energy Community (Euratom), which aimed to encourage and regulate the nuclear energy market. [22] The three communities, collectively referred to as the EEC, shared the same Courts and Assembly.  In addition, a 142 member Parliament was created to oversee the EEC.

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[20] Suder (2008)
[21] Suder (2008)
[22] McCormick (2008)

### 1.2.3    Enlarging the EEC via Piecemeal Integration


It is important to note that the EEC was still only comprised of its six founding members.  Other countries in Europe, while supportive of the EEC, had made no move to join the organization.  The most obvious absentee was Great Britain.  Though it supported the ECC, Great Britain did not make a move to join. The island nation has a long history of standing alone as an imperial power.  Also, its postwar reconstructions and economy were doing quite well.  As a result, Great Britain saw little benefit from joining the EEC.  However, that changed after the Suez Canal crisis.

The tensions came to a head on May 16th, 1956 when, in a move to further align the country with the Soviet Union, Egyptian President Gamal Abdul Nasser officially recognized the People's Republic of China.  As the US recognized and backed Taiwan, on July 19th, 1956 President Eisenhower withdrew the US offer to finance the Aswan Dam.[23]  This led President Nasser to announce on July 26[th,] 1956, that Egypt was going to nationalize the Suez Canal.[24]  All the Suez Canal Company's assets were to be frozen.  Great Britain saw this as a direct threat to its power base in the country, as it owned the controlling interest in the canal.  However, despite asking several times, Great Britain found no backing from the US government.  So in a secret meeting in October 1956 France, Israel, and Great Britain put together an invasion task force.  By the beginning of November, they essentially had control of the Egypt. While the operation was a military success, it was a diplomatic disaster.  The US received a lot of international criticism when two of its biggest European allies and Israel, a country it helped create, invaded Egypt.  The US forced France and Britain to withdraw from Egypt by the end of 1956 by refusing to sell them the oil they needed (Saudi Arabia had put an oil embargo on the two countries when they invaded Egypt).   By the end of December France and Britain and removed their troops.  Israel withdrew in March 1957.[25]

The conclusion of the Suez Canal Crisis saw a shift in global power bases—by the end it was clear that the US and the Soviet Union were the superpowers.  It was also clear that Britain was no longer the power it had been.  As a result, newly elected Prime Minister Harold

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[23] Fromkin (2006)
[24] Fromkin (2006)
[25] Fromkin (2006)

Macmillan emphasized honoring the country's imperialist past but at the same time rapidly decolonizing. He also stressed that Britain's foreign policy be aimed at European co-operation instead of acting as an imperial power or relying on the US to support Britain foreign policies.

With this in mind, Britain took two actions. First, it helped create the European Free Trade Area (EFTA) in July 1959.[26] Austria, Denmark, Norway, Portugal, Sweden, and Switzerland were the other founding members. EFTA, like all other free trade agreements, provided for common internal policies aimed at reducing barriers to trade. It called for the eventual elimination of custom duties on industrial products. Members of the EFTA also had bilateral free trade agreements with the EEC, although they were negotiated separately. EFTA achieved great results—foreign trade volume increased among members almost 140 percent from 1959 and 1967.[27]

The second thing Great Britain did was to apply for admission to the EEC in 1961, along with Denmark. However, its first application was vetoed by the EEC members. The EEC, and more specifically France, was nervous about Great Britain's close relationship with the US. They did not want the US to have influence within the EEC. Denmark's application was rejected as well. Six years later, Great Britain and Denmark reapplied. This time they were accepted. In 1973 Great Britain and Denmark left the EFTA and became members of the EEC.[28]

What is interesting to note is the role of this piece-meal economic integration. While the countries in the EEC and many in the EFTA would eventually become a part of EU, at this point they were in two separate levels of integration—the EEC was a customs union and EFTA was a free trade agreement. This two tiered integration approach was and still is very beneficial to European integration. EFTA acted as a launching point for countries looking to eventual join the EEC and later the EU. Spain, as an example joined EFTA in 1979. Complying with EFTA meant focusing on reducing barriers to trade. By the time Spain joined the EEC in 1986, a strong foundation had already been built. Being a member of EFTA lessens the economic shocks to a country that is going from a lower level of integration to a higher level of integration over a relatively short period of time. Austria, Finland, Portugal, and Sweden all followed this path to joining the EEC and later EU. In addition, many countries like the Czech Republic, Slovakia,

[26] Suder (2008)
[27] European Free Trade Association (2009)
[28] McCormick (2008)

Slovenia, and Poland had free trade agreements with the EFTA and the EEC. These agreements performed the same role as the EFTA—they acted as launching points for countries looking to eventually join the EU. Once the countries did ascend into the EU, these free trade agreements disappeared.

### 1.2.4 Creating an Economic and Monetary Union—the First Attempt

In 1971 the Bretton Woods System collapsed. The system had been created to stabilize exchange rates after WWII—it tied the US dollar to a fixed amount of gold and then tied other major currencies to the US dollar. It failed when heavy speculation against the dollar led President Nixon to take the US off the gold standard. In an effort to minimize exchange rate volatility, the EEC members agreed to maintain exchange rate fluctuations within a 2.25 percent band (or a 6 percent band for the weaker currencies).[29] The exchange rate of a member was calculated in relation to the other members' individual currencies. This new system was used until it 1979 it was replaced by the European Monetary System (EMS).[30]

The main goal of the EMS was the monetary integration of the EEC. The main difference between the EMS and its precursor was that under EMS the exchange rates were no longer calculated in relation to the other members' individual currencies. Instead rates were calculated in relation to the European Currency Unit (ECU)—a basket of the difference currencies of the EEC's member countries.[31] The initial composition ratios of the basket were based on the economic strength of each member as measured by gross national product (GNP). The ECU was also used as the unit of account for the EEC's budgets. The EMS also provided for the Exchange Rate Mechanism (ERM) and the European Monetary Fund (Fecom). Discipline in the system was ensured by the German central bank, the Bundesbank.

The EMS and ECU represent the EEC's first real step towards building an economic union. Because each member had to keep its exchange rate within a certain band, the members all had to have relatively similar monetary policies. However, due to the financial pressures of

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[29] McCormick (2008)
[30] McCormick (2008)
[31] McCormick (2008)

the time, the pegged exchange rate was frequently changed. The system was further strained because of the increasingly different economic conditions and polices of each member. By 1993, exchange rates were allowed to fluctuate with a 15 percent band.[32] The EMS was important because it laid down the ground work for a European monetary union. And like EFTA it would eventually act as a launching point for countries that eventually wanted to join the Euro zone.

The 1980's saw various steps taken towards expanding and increasing the integration of the EEC. Greece, in 1981, and Spain and Portugal, in 1986, became members of the EEC. In 1985 most of the EEC members singed the Schengen Agreement.[33] It allowed people to move freely throughout the Schengen countries without needing passport. However, during the 1980's feelings of discontent between the members started to grow stronger. Although the European Community (EC)[34] had undertaken many projects towards building a common market, few of these projects were ever fully implemented. The greatest reason for this was that any implementation required a unanimous decision by the Council, which was difficult to achieve. As a result, in 1985 the British Commissioner Arthur Cockfield wrote a report outlining numerous steps that could be taken to create a common market. It was from these recommendations that the Single European Act (SEA) was born.[35]

The SEA came into effect on July 1st 1987. Its ultimate goal was to create a true single market by December 31st, 1992. In that light, the SEA increased the power and scope of the EC's governing bodies.[36] First, it allowed the Council to pass decisions by qualified majority voting instead of requiring a unanimous vote. This increased the speed by which the Council could pass regulation regarding the creation of the single market. The only issues that still require a unanimous vote to pass were issues that involve taxation, immigration, and employee rights. Second, the SEA increased the powers of the European Parliament—it clarified that the powers of implementation of the regulations of the Council lay with Parliament. For the majority of legislation the Parliament is responsible for implementation. Only in specific situations does the Council implement passed legislation. Third, new powers and responsibilities

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[32] McCormick (2008)
[33] Suder (2008)
[34] In 1986 the EEC underwent a name change and became the European Community (EC). The change was made in hopes to promote other forms of integration, like social and political integration, along with economic integration.
[35] Suder (2008)
[36] Suder (2008)

were given to the Commission, the Court of Justice, and the EC as a whole.  Finally, the treaty set down regulations relating to foreign and security policy shared by the members.

Recall that a common market focuses on deepening the internal relationships between the group members by removing barriers to trade.  Also recall that a single market is an advanced form of a common market, with emphasis on harmonization of laws, product and quality standards, and the removal of physical barriers to trade.  The SEA improved the mechanisms by which legislations relating to the single market could be passed by giving the Council, Parliament, and Commission more power and scope.

Once the SEA went into effect, business and political leaders were eager to begin harmonizing laws and regulations. It was expected that consumers would begin buying more goods from other members as opposed to those from their home country.  However, when these non-tariff barriers to trade were removed consumption of other members' goods did not increase as expected.  It soon became clear that market segmentation was not due to economic or legal barriers to trade but to social and cultural barriers.[37]  The Germans had to import beer that did not meet their centuries-old quality standards.  The French had to import wine that did not meet their standards as well.  The Italians had to accept pasta that was made from the wrong kinds of wheat.  Barriers of this kind are only really removed with time.

Despite this, the successes of the SEA are clear.  The act marked the first big movement of the EC in a direction of increased liberalization.  That in turn, through increased competition, created wealth and started closing the gap between the richer and poorer member.  The treaty also made the EC more efficient and stronger because it gave the governing bodies more muscle.  Finally, the SEA set the stage for the most important treaty in the history of the EU, the Maastricht Treaty.

### 1.2.5  Going from Community to Union

The start of the 1990's made several things clear—the EC was not going to make its deadline for creating a single market by the end of 1992; its attempt at a monetary union with the ECU had started to stagnate; internally, the members wanted to somehow restart the momentum that had

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[37] McCormick (2008)

begun with the SEA and move it towards social issues; and externally, the fall of communism in the Eastern European countries and the promise of a German reunification led to a desire for the EC members to strengthen their international relations.[38] These factors prompted the EC members to convene two inter-governmental conferences starting in December 1990. The first conference dealt with the current monetary union and the second with cementing a political union. The culmination of these conferences was the Treaty of the European Union, or the Maastricht Treaty, signed on February 7th, 1992.[39]

Though the structure of the Maastricht Treaty is quite complicated, it can be broken down into three fundamental sections, the first of which set down a three step plan to create a single currency.[40] The first phase began in 1990 before the treaty was signed. It called for the liberalization of capital movement which had happened, to a certain degree, because of the EMS and ECU. The second phase, which was slated to start in 1994, called for the convergence of the members' economic policies, paving the way for the third phase. This is essential because without a common monetary policy and similar fiscal policies a single currency would not be sustainable. To be started no later than 1999, the third phase was to actually create a single currency and a European Central Bank (ECB) with which to manage the new currency.

The second section of the Maastricht Treaty dealt with the creation of the European Union (EU). The EU is made up of three pillars. Each pillar tries to strike a balance between national, supranational, and intergovernmental powers. The first pillar is concerned with the EU's economic, social, and environmental policies. It encompasses the previously established communities including the EC, the ECSC, and Euratom. It amended several parts EU legislation and created new policies in the following six areas: trans-European networks (like railways and highways), consumer protections, youth, education, culture, and industrial policy.[41] Normally in this pillar a proposal will come from the European Commission which will then be rejected or adopted the Council and the Parliament. The Court of Justice is responsible for monitoring and enforcing compliance with EU law. In most cases unanimity is not required.

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[38] Suder (2008)
[39] Suder (2008)
[40] Suder (2008)
[41] European Union Europa (2010)

The second pillar created the common foreign and security policy (CFSP).[42] It allows for EU members to take joint action in international affairs. The foreign policies were mostly concerned with peacekeeping, human rights, democracy, and aid to non-member countries. The security policies dealt with the European Security and Defense Policies (ESDP), the financial aspects of defense, disarmament, and creating and maintaining EU battle groups.[43] This pillar is the domain of the Council, though the Commission and Parliament do have some influence. All decisions in this pillar require unanimity.

The third pillar of the EU concerns cooperation in justice and home affair (JHA). It calls for the cooperation between national and supranational judicial bodies in civil and criminal laws. It also calls for cooperation in fighting drug trade, weapons smuggling, organized crime, human trafficking, terrorism, bribery, and corruption.[44] The decision making process in this pillar mostly involves intergovernmental powers unlike the other two pillars.

The third and final section of the Maastricht Treaty relates to new powers given to the EU institutions. For example, it set down the cooperation and consent procedures which allow Parliament to approve legislation in conjunction with the Council. It also expanded the role Parliament plays in the selection and confirmation of the members of the Commission. The qualified majority voting rules, set down in the SEA, were extended to cover a larger number of decision areas. Finally in the third section, the treaty formally recognized the roles of European political parties in the EU's governing structure—that they increase awareness and represent the political will of the citizens of the EU.[45]

The Maastricht Treaty accomplished more for European integration that any of its predecessor treaties. It helped further the single market by increasing the mobility of labor with policies like EU citizenship, which allows for people of one member country to reside and move freely in all other member countries. It also cemented the EU members' resolve to create a single currency and therefore a monetary union with the three phase plan. Finally, the Maastricht Treaty really started to push the EU members towards a political union by extending the integration process to political and social areas.

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[42] European Union Europa (2010)
[43] European Union Europa (2010)
[44] European Union Europa (2010)
[45] European Union Europa (2010)

## 1.2.6   The Euro Area

Following the schedule laid out in the Maastricht Treaty for the creation of a single currency, in 1993 the EU passed the Copenhagen Criteria. The Criteria are the formal set of requirements needed for a country to become a member of the EU. Politically, the country must have a society based on the rule of law, stable governmental institutions to guarantee democracy, and respect and protect human and minority rights. Economically, the country must be able to compete in the single market and follow the monetary and fiscal guidelines set down in the Stability and Growth Pact.[46]  Under this pact a country looking to join the EMU needs to fulfill four conditions: first, it must achieve exchange rate stability as defined by the ERM II[47]; second, it must attain price stability by ensuring that its inflation rates are no more than 1.5 percent above the average inflation of the three members with the lowest national inflation rates; third, the country has to maintain a restrictive fiscal policy with the a maximum ratio of government debt to GDP of 60 percent and a maximum ratio of government deficit to GDP of 3 percent; and fourth, the country's nominal long-term interest rates cannot be more than 2 percent higher than the average of the nominal long-term interest rates of the countries with the lowest inflation rate.[48]  Finally, the country must accept the goals and objectives of the EU and abide by pre-existing EU legislation. In 1995, Sweden, Finland, and Austria followed these criteria and ascended into the EU.

On December 31st, 1998 the Council determined the exchange rates for Euro. It was essentially computed as a composite average of the members' currency, weight being given to economically strong countries.[49]  The Euro exchange rates were also influenced by the closing prices of non-euro country's currencies like the pound sterling. By January 1st, 1999 the Euro replaced the ECU as the EU's accounting unit and was used the intergovernmental bodies and the banking system (one Euro was equal to one ECU).[50]  It was also introduced in non-physical forms such as traveler's checks and money transfers. Finally, on January 1st, 2002, the EU

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[46] McCormick (2008)
[47] The Maastricht Treaty replaced ERM with ERM II. Under ERM II a central exchange rate is calculated between the Euro and another currency and the currency is allowed to fluctuate 15 percent above and below the central rate.
[48] McCormick (2008)
[49] Suder (2008)
[50] European Union Europa (2010)

achieved its goal of creating a single currency with the introduction of Euro notes and coins into circulation.[51] Non-Euro currencies were phased out over a period of six months. Today 16 out of the 27 EU countries use the Euro, the most recent adopters being Slovenia, Cyprus, Malta, and Slovakia.

The EU members can be divided into three distinct groups based on how their currencies relate to the Euro. The first group of countries is made up of the 16 countries that use the Euro as their only currency. Within this group 12 members joined the Euro Area before notes and coins were put into circulation. Cyprus, Malta, Slovakia, and Slovenia all joined after 2002 and had to first comply with the ERM II. Before a country can join the Euro Area it must first meet the convergence criteria which include complying with ERM II for two years. During this period, the ECB in conjunction with the country's national bank can intervene if it appears that the exchange rate will move outside of the allowed band. If after two years the non-Euro country has complied with the convergence criteria and ERM II it is qualified to join the Euro Area.

The currencies of the second group of countries are all pegged to Euro. This group includes Bulgaria, Estonia, Latvia, and Lithuania. Estonia, Latvia, and Lithuania belong to ERM II. Of these three countries, Estonia is expected to join the Euro Area earliest. It should qualify to join the Euro Area during 2010 and adopt the Euro in 2011. It is unclear when Latvia and Lithuania will qualify to join the Euro Area. The most optimistic estimates say they will join by 2013. Bulgaria, though not a part of ERM II, pegged its currency to the Euro soon after joining the EU in 2007.

The last group of countries includes those whose currencies are free-floating—Denmark, the Czech Republic, Hungary, Poland, Romania, Sweden, and the United Kingdom. Denmark and the U.K. obtained special exemptions which legally exempt the countries from having to join the Euro Area. In light of the recent financial downturn, Denmark is expected to hold a referendum in 2010 on the adoption of the Euro. It is expected that the issue will pass and Denmark will eventually join the Euro Area. Sweden, even though it has met the convergence criteria, has not joined the ERM II. So even though it does not have a special exemption, Sweden does not have to join the Euro Area. The Czech Republic, Hungary, Poland, and Romania are required to join the Euro Area—though when they will try has not been determined.

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[51] European Union Europa (2010)

### 1.2.7   Union and Beyond—the Future of the European Union

The Maastricht Treaty was amended twice, first, with the Treaty of Amsterdam in 1997 and second, with the Treaty of Nice in 2001.  The Treaty of Amsterdam made modest structural changes to the EU institutions and was aimed at enhancing the relationships between the members, its citizens, and the supra-national organizations.  The Treaty of Nice simplified the many of the EU's decision making process in order to increase transparency.  In 2004 the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia all joined the EU, bringing the total number of members to 25.  Then in 2007 Bulgaria and Romania joined the EU, bringing it to its current level of 27 member countires.[52]

By the end of 2007, the EU had met the requirements of a monetary union.  A common currency, the Euro, was accepted by most members[53] and used as the only form of currency in more than half of them.  The Maastricht Treaty and the Copenhagen Criteria had established guidelines for the members' fiscal and monetary policies.   The Maastricht Treaty also harmonized the laws, procedures, and institutions of the EU.  By all measures, the EU had accomplished what it had set out to do—integrate a large, diverse group of countries.

However, earlier steps towards the final level of integration, a political union, had failed. In 2004, policymakers had drafted the Treaty Establishing a Constitution for Europe (also known as the European Constitution).[54]   The European Constitution was intended to replace and consolidate the previous, fundamental EU treaties.  It was signed by all 25 members in October 2004 and then went back to the individual countries to be voted upon by their respective legislatures.  If it was approved by the legislatures or was approved in a special referendum, the constitution would be ratified and put into effect.

It soon became clear that this version of a European Constitution was not going to be ratified.  Although eventually 18 members would ratify the treaty, it was struck down by the French and Netherlands' rejections in referenda held in May and June 2005, respectively.  The countries said that the proposed European Constitution infringed too much on national

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[52] European Union Europa (2010)

[53] Denmark and the UK are not a part of the EMU as they were a part of the EU before joining the EU became a requirement of membership in the EU.

[54] European Union Europa (2010)

sovereignty.[55]  Unsure if the EU was ready for a unifying constitution, the member states entered a "period of reflection" to decide whether or not to continue creating a constitution.

This "period of reflection" ended in 2007 when policymakers began drafting a new treaty. In December 2007 the Treaty of Lisbon was signed and it went into effect on December 1, 2009.[56]  The overall goal of the treaty was to refine and clarify the powers and roles of the national parliaments, supra-national governing bodies, and citizens of the EU.[57]

Structurally the big difference between the original European constitution and the Treaty of Lisbon is that the former was intended to replace the Maastricht Treaty and the Treaty of Rome, while the latter only amends them.[58]  However, the treaty did implement many of the reforms proposed in the constitution.  For example, it changed the term limit of the President of the European Council.  Previously it was a six month rotating position, but now presidents will serve for two and a half year terms (though Presidents still only serve one term).  The treaty also created the position of the High Representative by combining the responsibilities of the Foreign Affairs and External Affairs Commissioners.[59]  Other amendments include: provisions for decreasing the size of the Commission from 2014 onwards; giving the Council and Parliament equal power in most legislative decisions; giving new powers to all of the supra-national bodies in the areas of justice and domestic affairs; increasing the number of qualified voting majority issues; and removing national veto power in some areas.  Interestingly, the treaty also contains an amendment that pertains to withdrawal from the EU—for the first time there is a recognized and set down procedures for a country to leave the EU.[60]

In addition to restructuring the EU's legislative structure, the treaty also annexed protocols onto the charter treaties pertaining to a number of issues.  For instance, the jurisdictions of the EU government and the members' governments are explicitly defined in three classes, exclusive competence, shared competence, and supported competence.[61]  Under exclusive competence the EU government has the sole right to make decisions and laws pertaining to the EU.  Areas covered by exclusive competence include maintenance of the EU

[55] European Union Europa (2010)
[56] European Union Europa (2010)
[57] European Union (2007)
[58] BBB"Q&A: The Lisbon Treaty" (2010)
[59] BBB"Q&A: The Lisbon Treaty" (2010)
[60] BBB"Q&A: The Lisbon Treaty" (2010)
[61] European Union Europa (2010)

customs union, regulation of the Euro, and protection of competition in the internal markets. If the member and the EU pass laws covering the same issue, shared competence states that the EU law will take precedence. It covers areas such as social policy, consumer protection and trans-European networks. Finally, supporting competence states that the EU can only pass legislation to support and supplement legislation passes by member governments. Areas of shared competence include healthcare, education, culture, and tourism. The other protocols introduced in the Treaty of Lisbon cover everything from citizens' rights and the Charter of Fundamental Rights to the Citizens' Initiative, which gives over a million EU citizens a direct voice in the government.[62]

The Treaty of Lisbon took the EU from being a monetary union and moved it towards becoming a political union. First, it streamlined the numerous EU governing bodies, making easier for them to work in conjunction. Second, as stated it defined the jurisdictions of the EU government and the members' governments. Finally, it unified the EU's international representation into one position, the High Representative. This fulfills some of conditions for being a political union stated in the definition earlier in this paper.

Unfortunately, the three months the treaty has been in effect have not produced stellar results. In early 2010, US President Barak Obama declined an invitation to the EU for an US-EU summit.[63] It was unclear who he would have met had he made the trip,—the President of the Commission, the President of the European Council, or the new High Representative—where the summit would have been held, and what would have been discussed. Critics highlight this as a prime example of how the treaty has done nothing to make the EU's bureaucracy and legislature more manageable. If anything it has made them more unwieldy and confusing. Supporters of the treaty say the incident with President Obama is merely a setback since the treaty just went into effect. Once out of the transitional phase, the treaty will make the EU a more efficient internally and more influential externally. Time will tell whether the treaty was a success or just further complicated the EU.

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[62] European Union (2007)
[63] BBC "EU Summit Scrapped After Obama "Snub"" (2010)

## 2.0      MEASURING FINANCIAL INTEGRATION IN THE EUROPEAN UNION

The first part of this paper dealt with the history of the overall integration of the EU. The second part of this paper deals with measuring financial integration in the EU. First, financial integration will be defined and how it fits in to the big picture of economic integration will be laid out. Next, the paper will discuss the benefits and costs of financial integration to the member countries. Third, it will describe the methods used to measure financial integration. Finally, the paper will discuss results and conclusions drawn from the applications of the methods.

## 2.1      EMPIRICAL DESIGN

### 2.1.1    Defining Financial Integration

Using the ECB's Occasional Paper No. 14 as a guide, a market can be considered perfectly integrated if similar participants: first, follow a single set of rules when dealing with financial infrastructures; second, have equal access to those infrastructures; and third, are not discriminated against when they are participating in the market.[64]

     The financial infrastructure of a country includes all financial intermediaries, specific markets, institutions, and clearing and settlement platforms.[65] Unless the two countries were built in concert from the start, it is unlikely the financial infrastructure of one county would be

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[64] Baele (2004)
[65] Baele (2004)

the same as that of another country. And even after the two countries integrate it is unlikely that their respective financial infrastructures will change dramatically to mirror one another. However, it is necessary as a group of countries integrates that the financial rules and regulations converge. That is why the first part of the definition is included—so financial integration is mutually exclusive of financial infrastructure and is instead dependent on the synchronization of financial rules and regulations like tax codes, bankruptcy laws, and the incorporation laws for companies.

The second part of the definition deals with market participants' access to financial services. The aim of financial integration is not to remove all barriers to the movement of capital from a given market. Instead the aim it is equalize the barriers across the group of integrated countries—that is all the participants in the given market, regardless of their geographical location, face the same barriers to access of financial services. For example, suppose Country A and Country B are integrated countries but use different languages when doing business. Both countries use a settlement platform located in the other country. If the settlement platform in Country B uses the language of Country B, then the firms in Country A face a barrier that firms in Country B do not face. The same is true for firms in Country B using settlement platforms in Country A. Under the current definition of financial integration, these two countries are not considered integrated because the firms are treated asymmetrically in a supposedly integrated market. However, if the settlement platforms conducted business in a third language, foreign to both Country A and Country B, then firms in both countries face equal barriers to financial services. Both firms incur the costs associated with translating into their respective languages.

Market participants can be broadly classified as either demanding investment opportunities or supplying investment opportunities. For example, a firm that requires capital supplies an investment opportunity to an investor (who demands an instrument in which to invest). Under the third part of the definition, in a financially integrated market both classes of participants will be treated equally—that is they will have the same access to the financial infrastructures, goods, and services for the entire duration of time they are active in the market.

One of the key themes of economic integration is allowing for the free movement of labor and capital across borders. Financial integration is chiefly concerned with removing the barriers to movement that affect capital. However, the process really becomes important when a group of countries integrate to the point of being a monetary union. Recall that under a monetary

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union, members have similar fiscal policies and identical monetary policies. Monetary policy is decided by the European Central Bank and transmitted though the financial systems of the members—transmitting those policies is easier when the financial systems of the group are coordinated. Also, as countries financially integrate, their financial systems will undergo some degree of change. This change may affect the financial stability of individual members or of the entire group. Thus studying and measuring financial integration is beneficial to policymakers, regulators, and central banks.

Financially integrating a group of countries has other benefits. First, it allows for greater risk diversification.[66] The risk of an asset is comprised of systematic risk and nonsystematic risk. The former refers to risks that are faced by all assets in the market and the latter refers to risks that are unique to a specific asset. Systematic risk cannot be eliminated through diversification; unsystematic risk can be eliminated through diversification. As markets integrate, the numbers and types of financial instruments available to investors will increase. Investors can use these new instruments, which are located in different countries, to further diversify away unsystematic risk. This means for the same risk level investors earn a higher rate of return compared to what they could earn before the markets integrated. Next, financial integration provides investors with deeper and broader markets.[67] The advantage of these stronger markets is that they allow investors to choose the investment vehicles that they believe will be the most productive and efficient. Similarly, firms can make use of the financial infrastructures that they believe are the most productive and efficient. All this allows for better allocation of capital. The last advantage of financial integration is closely related to the first two advantages: financial integration seems to be correlated with economic growth.[68] In the last decade many studies have tried to measure whether or not increased integration is linked to increased economic growth. Rousseau (2006) finds that there is a positive correlation between integration and growth— integrated markets allow for more efficient allocation of capital which stimulates investment and business.[69] Bekaert, Harvey, and Lundblad (2005) study equity markets in which domestic investors have the ability to trade in foreign securities and foreign investors have the ability to trade in domestic securities, both without discrimination. The result is an increase in average

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[66] Fonteyne (2006)
[67] Fonteyne (2006)
[68] Fonteyne (2006)
[69] Rousseau (2006)

annual economic growth.[70]  Both studies indicate that as markets integrate and develop, there seems to be a corresponding increase in economic growth.  However, as is the case with economic integration, the distribution of the gains from growth will not be equal.  The less developed members of the group will most likely experience the greatest gains—funds from the other group members, in combination with increased openness in the financial systems, should increase competition and the resources available in the less developed markets.  That should increase market efficiency making the markets more attractive places in which to invest, thereby increasing the funds flowing into the member's financial system.[71]

There also certain costs associated with financial integration.  First, integrating a group of countries is an expensive and complex process.  Next, while it is supposed to increase competition, one of the potential costs of financial integration is a decrease in competition due to consolidation.  As an example, take the banking sector.  In October 2008 Banco Santander, originally a Spanish bank, acquired Alliance & Leicester, a bank from the UK.  This was the latest in a long string of acquisitions of European banks for Banco Santander—it owned portions of the Dutch bank ABN AMRO, the Italian bank Banca Antoniana, and a UK savings bank Bradford & Bingley.[72]  One of the concerns surrounding Banco Santander's acquisitions was through mass consolidation it would create a monopoly.  This illustrates another reason why governments monitor financial integration.  As the barriers between countries financial systems are removed, it is important to make sure fair and legal business practices and standards are followed.  Finally, members of EU often fear losing national sovereignty when they hand over power to make financial decisions to the EU government and organizations.

### 2.1.2   Price-Based Measure of Integration

This paper will use a price-based method to examine financial integration.  Price-based measures seek to identify discrepancies in the prices of identical assets located in different countries.  However, finding identical assets across different countries is difficult.  This paper uses the

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[70] Bekaert et al. (2005)
[71] Baele (2004)
[72] Grupo Santander (2010)

yields on long term government bonds, with maturities of 10 years, in its analysis.[73]    The underlying bonds are not identical assets.  This arises from the fact that the yields on the bonds include both a risk-free rate and a default premium.  In a perfectly integrated market the risk free rate and default premium of one government bond would be equal those of another government bond.  It is outside of the scope of this paper to separate the risk-free rate and the default premium.  However, there is still a utility to using the government bond yields. The default premiums for each government bond will vary because of differences in credit worthiness of each government.  Although they do not have the same credit ratings, it is unlikely that any one government will default on its debt obligations.  In the event that one did default, the other EU countries are supposed come to its aid.  Consider the situation in Greece as an example.  It is expected that in 2010 Greece's deficit will be nearly 30 percent of its GDP and it will have to refinance more than €40 billion in debt.[74]  Because of serious concerns over Greece's solvency, the EU is bailing out the country.  Germany and France are expected to shoulder the greatest portions of the more than €30 billion rescue plan.[75]  In that sense the default risks of the EU governments are at least related. Even though the default premiums are different, as long as the risk-free portion of the yield remains the same from bond to bond, the market can be considered more integrated.

In order to use a price based measure, two inputs are needed: the prices of identical assets and the price of a benchmark to which the other prices are compared.  The benchmark price should be representative of the price that would prevail if the markets were perfectly integrated. This price is unobservable.  This paper will use the yields on the bonds of the German government as a proxy.  Other papers that have studied financial integration[76,77] often use the German government bond as the bench-mark because much of the monetary policy in the EU is influenced by Bundesbank, the German national bank. (Before the creation of the ECB, the Bundesbank was considered to be the de facto central bank for the EU.)

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[73] The markets for these government bonds are sufficiently deep— the bonds are regularly traded— so a lack of liquidity should not affect the bond yields.
[74] Mollenkamp (2010)
[75] Mollenkamp (2010)
[76] Adam, Jappelli, Menichini, Padula, and Pagano (2002) and  Adjaoute and Danthine (2003) both used German bonds as benchmarks in their reports on the status of integration in the European financial system.
[77] Baele (2004)

The first step in measuring financial integration is to calculate the spreads between the government bonds of all the countries and German government bond using the following formula:

$$Spread_{i,t} = Yield_{i,t} - Yield_{German,t}$$

**Figure 1.** Formula for the spread of a government bond of country i at time t

where i,t is a country i at time t.[78] This is calculated for each country for every quarter in the study. Using the calculated spreads, the next step is to calculate the variance of those spreads using the following formula:

$$\sigma_t = \sqrt{\frac{\sum_{i=1}^{I}(Spread_{i,t})^2}{I}}$$

**Figure 2.** Formula for the variance of spreads of all countries at time t

where $\sigma_t$ is the variance at time t and I is the total number of counties in the study.[79] This is the average variance of all the individual country variances for one quarter. This variance is calculated for every quarter in the study. All averages are calculated as simple averages, giving each country an equal weight. As Germany, France, and Great Britain represent more than 50 percent of the EU's GDP, using a weighted average would skew the results too much towards the three countries.[80]

Next, a covariance matrix of yields will also be calculated. Observing how the covariances change across time and between groups of countries should provide insights into the levels on integration present in the EU.

Two summary statistics are used, the t-test and the Spearman test. The t-tests are two-tailed t-tests of whether the spreads or variances from one period or group of countries are statistically different from those of another period of group of countries. The Spearman test was used to determine the significance level of the individual covariance in the covariance matrices.

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[78] Baltzer (2008)
[79] Baltzer (2008)
[80] CIA World Fact Book (2010)

## 2.1.3 Data and Hypotheses

All the yields of long term government bonds per country are obtained from the International Financial Statistics database published by the International Monetary Fund. Data are collected from Q1 2002 through Q4 2009 for the 26 countries in the in study[81]. This results in a total of 832 observations or about 32 observations per country. Quarterly data are used as they provide a large number of data points with which to work. At the same time there is less noise than there would have been with monthly data, which smoothes out the data providing a clearer picture of the inherent trends.

The countries and data are divided into the following subsamples. For a list of country abbreviations please see Exhibit 1 in Appendix A.

**Table 1.** Subsample Descriptions

| Subsample | Description | Countries |
|-----------|-------------|-----------|
| A | Joined the Euro Area before 2002 | AT,BE,FI,DE,EL,IR,IT,LU,NL,PT,ES |
| B | Joined the Euro Area after 2002 | CY,MT,SI,SK |
| C | Currencies are pegged to the Euro | BG,EE,LV,LT |
| D | Currencies are free-floating | CZ,DK,HU,PL,RO,SE,UK |

Subsample A includes all the countries that joined the Euro Area before Euro notes and coins were issued in 2002. Subsample B includes the countries that joined the Euro Area after 2002. Of this group, Slovenia was the first to join the Euro Area in 2007. Subsample C includes those countries that have pegged their national currencies to the Euro. With exception of Bulgaria, all of these countries are a part of ERM II. It is expected that one day they will join the Euro Area. Subsample D includes the countries whose currencies are free-floating. While some of the members of this group are eventually expected to join the Euro Area, as of now none of them have made any official moves to do so.

Yield spreads and variances are calculated from 2002 to 2009. This time period is split into three sections. The first time period is from 2002 to 2004, the second is from 2004 to 2006,

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[81] Romania is not included in the study because of a lack of consistent data over the time period.

and the third is from 2007 to 2009.  The first two time periods represent the years prior to the financial downturn and the last time period represents the years after the financial downturn.

This paper hypothesizes to see a few trends emerge from the data.  First, if the law of one price holds true and the government bond market is perfectly integrated the yield spreads and yield variances will equal zero.  It is unclear what the sum of correlations would be under perfect integration.  However, it is unlikely that the market is perfectly integrated.  So as a group of countries becomes more integrated, it is expected that the yield spreads and variances will decrease.  The sum of correlations should increase.  As the countries become more integrated, the correlations between countries should move close to one.  Similarly, as group of countries becomes less integrated the yield spreads and variances will increase and the sum of correlations should decrease.  This paper also expects that from 2002 to 2009 integration will change.  Over this time period, the EU grew in size, implemented new measures to increase overall integration, adopted a single currency, and experienced a large financial downturn.  It is likely that these events had some affect on financial integration.  Finally, it is hypothesized that integration will differ across the various subsamples of data due to the differences in their characteristics.  These hypotheses have been summarized in the following table where n represents the $n^{th}$ quarter and K represents the $K^{th}$ subsample of data.

**Table 2.** Table of Hypotheses

|  | Yield Spread | Yield Variance | Sum of Correlations |
|---|---|---|---|
| Perfect Integration | 0 | 0 | ? |
| More Integration | - | - | + |
| Less Integration | + | + | - |
| Over Time | Spread(t)≠Spread(t+1)≠....Spread(t+n) | σ(t)≠σ(t+1)≠...σ(t+n) | corr(t)≠corr(t+1)≠...corr(t+n) |
| Across Subsamples | Spread(A)≠Spread(B)≠...Spread(K) | σ(A)≠σ(B)≠...σ(K) | corr(A)≠corr(B)≠...corr(K) |

Inherent in the empirical design of this analysis is the hypothesis that the underlying assets used are identical.  This means that all calculations test a joint hypothesis: that the underlying assets used are identical and the other hypothesis being considered.  Recall, that the government bonds are not identical assets—they fail the first hypothesis.  As such, results of the analysis can be interpreted in different ways.  For example, suppose that yields diverge over a

time period, resulting in larger yield spreads. The divergent yields can be explained by either a decrease in integration among the countries or as an increase in default premiums on their bonds. For a timeline of events from 2001 to 2009, please see Exhibit 2 in Appendix A.

## 2.2    RESULTS AND ANALYSIS

Country level yield spreads from 2002 to 2009 are given in Table 4 in Appendix C. The following are the summary statistics for the average subsample spreads:

**Table 3.** Average Subsample Spread Summary Statistics

| Average Subsample Spreads 2002 to 2006 | | | | Average Subsample Spreads 2007 to 2009 | | | |
|---|---|---|---|---|---|---|---|
| | **t-stat** | **p-value** | **Direction** | | **t-stat** | **p-value** | **Direction** |
| Subsample A | 2.395 | 0.040 | - | Subsample A | -3.915 | 0.002 | + |
| Subsample B | 3.026 | 0.029 | - | Subsample B | n/a | n/a | **n/a** |
| Subsample C | 1.089 | 0.326 | - | Subsample C | -3.472 | 0.005 | + |
| Subsample D | -2.467 | 0.036 | + | Subsample D | -0.718 | 0.487 | + |

### 2.2.1   Subsample A: Original Euro Area Countries

As seen in Figure 3 in Appendix B, from 2002 to 2006 the countries in subsample A gradually become more integrated. The increase in integration is most likely due to the introduction of the Euro into circulation in 2002. As is consistent with increasing integration, the average yield spreads over the four years decrease as a result of country-level yields moving towards the German benchmark.[82] Also consistent with increases in integration, the average-yield variances decrease from 2002 to 2006 as seen in Table 3, reflecting the convergence of yield spreads.

However, from 2007 to 2009, the countries in subsample A become less integrated.[83] Over these 12 quarters, country-level yields move away from the German benchmark, causing

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[82] Greece, Italy, Luxembourg, and Portugal do not have a statistically significant decrease in yield spreads from 2002 to 2006.
[83] Standards and Poors. (2010)

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the average yield spreads to increase. In addition, the average-yield variances also behave as is expected when countries are less integrated—from 2007 to 2009, variances decrease.

Recall that countries can still be considered integrated if the risk free portion of their bond yields remains constant, even if the default premiums change. In order to try and mitigate the effects of different default premiums on yield spreads, the countries with AAA in the Euro Area ratings are graphed together in Figure 4. All other countries in the Euro Area with various A ratings are also graphed together in Figure 5. A complete list of country credit ratings is included in Exhibit 3 in Appendix A. The yield spreads for AAA rated countries and the other A rated countries from before 2007 are statistically different from the spreads from after 2007. This suggests that the increase in spreads and variances is not be caused by an increase in default premiums—rather that from 2007 to 2009, in a time of financial distress, the Euro Area became less integrated.

### 2.2.2   Subsample B: Later Adopters of the Euro

All of the countries in this subsample joined the EU in 2004 and later adopted the Euro. The spreads for this subsample are graphed in Figure 6. As seen in Table 3 and Figure 6, from 2004 to 2006, there is not a meaningful change in country-level yield spreads[84]—over these three years, the countries in subsample B do not become any more or less integrated with the rest of the EU. But when yield spreads from before and after these four countries joined the EU in 2004 are compared, there is a meaningful decrease in yield spreads. By joining the EU, and therefore meeting the Convergence Criteria set out in the Maastricht Treaty, Cyprus, Malta, Slovakia, and Slovenia's become more integrated with the EU. Similarly, from 2004 to 2006 average-yield variances for subsample B decrease; from before and after 2004, variances decrease. The movement in variances is consistent with the idea that once the countries in subsample B joined the EU, they became more integrated with the EU.

Unlike the other subsamples, the yield spreads of subsample B from before 2007 are not tested against those from after 2007. This is because by 2008 there is only one country,

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[84] Slovenia did have a meaningful decrease in yield spreads and variances.

Slovakia, in this subsample; there are no countries by 2009. There are not enough data points on which to run a test.

### 2.2.3 Subsample C: Countries with Currencies Pegged to the Euro

Similar to subsample B, countries in subsample C become more integrated with the EU when they joined the union, shown in Table 3 and Figure 7.[85] After they joined the EU and since they did not join the Euro Area, the spreads of subsample C remained stable as there was no further impetus for integration. The yield spreads and variances act accordingly. There is significant decrease in spreads and variances from 2002 through 2004; after 2004 there is no significant change in spreads or variances.

From 2007 onwards, subsample C becomes less integrated—there is a meaningful increase in yield spreads and average-yield variances due to yields moving farther away from the German benchmark. In this period of financial distress, some of the countries subsample C have indicated they are moving towards less integration with the EU. For example, because of the financial pressures on their governments, Estonia and Latvia approached the IMF for monetary aid. If they chose to accept aid from the IMF, both countries would have to un-peg their currencies from the Euro—making them less integrated with the rest of the EU.

### 2.2.4 Subsample D: Countries with Free-Floating Currencies

In Figure 8, Denmark, Sweden, and the UK are the only countries in subsample D prior to 2004. From 2002 through 2006, these three countries become more integrated. Yield spreads and average-yield variances both decrease. In 2004, the Czech Republic, Hungary, and Poland joined the EU and subsample D. Although the Czech Republic, Hungary, and Poland must ultimately join the Euro Area, none of them have made any official moves towards that end.

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[85] Estonia, Latvia, and Lithuania joined in 2004; Bulgaria joined in 2007.

From 2004 to 2006, integration also increases for the countries that joined in 2004, as shown by decreases in yield spreads and average-yield variances in Table 3.

Unlike what happened in the other subsamples, after 2007 subsample D's level of integration with the rest of the EU does not change. Yield spreads and average-yield variances do not meaningfully change. Subsample D is integrated with the countries in the other subsamples because they are all EU members.

In Figure 9, the average yield spreads of the first four subsamples are graphed together. The associated summary statistics are given in Table 5 and Table 6 in Appendix C. Figure 10 graphs the average-spread variances are graphed together. Table 7 in Appendix C lists the variances per quarter for the subsamples from 2002 to 2009; Table 8 contains the summary statistics. The relative positions of the subsamples in the graphs are interesting to note. Subsamples A and D represent the two ends of integration in present in the EU. Subsample A, whose members all use the Euro, are the most integrated—its spreads and variances form the lower boundaries in Figures 9 and 10, respectively. Similarly, subsample D, whose members have free-floating currencies, are the least integrated with the rest of the EU. Its spreads and variances form the upper boundaries in both charts (until 2008, when the spreads and variances for subsample C dramatically increase as discussed earlier). Within the upper and lower boundaries formed by the spreads and variances of subsamples A and D, subsamples C and D's spreads and variances fluctuate. From 2004 to 2007 subsample C is appears to be more integrated with lower spreads and variances. However, in 2007, when countries in subsample B start adopting the Euro, subsample B becomes more integrated than subsample C—subsample B's spreads and variances fall below those of subsample C. The graph for subsample B ends prematurely because by the beginning of 2009, all of the countries in subsample B had adopted the Euro and become a part of subsample A.

### 2.2.5 Correlation Matrix of Yields

Table 9 shows the sum of correlations for various cross sections of the EU for three time periods, 2002 to 2004, 2004 to 2006, and 2007 to 2009. It also includes the number of countries in each calculation and the summary statistics.

For the EU as a whole, integration remains constant from 2002 to 2006. There is no meaningful change in sum of correlations over the four years. Also, the percentage of countries with significant correlations also remained similar. However, from 2007 to 2009 integration in the EU decreases. The sum of correlations decreases from 2007 to 2009 and is significantly different from the sum of correlations from the previous four years.

Even when Cyprus, Malta, Slovakia, and Slovenia are not included in the EU, the results are similar to those for all the EU members. Integration remains constant from 2002 to 2006. The sum of correlations does not significantly change between 2002 to 2004 and 2004 to 2006. But from 2007 to 2009, integration between the countries decreases, demonstrated by a smaller sum of correlations.

The Euro Area also follows a similar pattern. From 2002 to 2006, integration is static. The sum of correlations does not change between 2002 to 2004 and 2004 to 2006. However, from 2007 to 2009, integration decreases. The sum of correlations from 2007 to 2009 is meaningfully different than those from 2002 to 2004 and 2004 to 2006.

Unlike the Euro Area, countries with pegged currencies (subsample C) integration remained constant from 2002 to 2009. There are no differences between the sum of correlations between the three time periods. This is inconsistent with the results from the yield spreads and variances. The yield spreads and variances indicated that after 2007 the countries in this group became less integrated.

Finally, integration in countries with free floating currencies (subsample D) gradually decreased from 2002 to 2009. There are no meaningful differences between the sum of correlations from 2002 to 2004 and 2004 to 2006; the same is true for the sum of correlations from 2004 to 2006 and 2007 to 2009. But when the sums of correlations from 2002 to 2004 are compared to those from 2002 to 2009, there is a meaningful difference.

The bottom portion of Table 9 compares the correlations between countries for the different subsamples. The subsamples all have different levels of integration with one another as shown by the meaningful differences between the correlations of each subsample. The subsamples have unique characteristics, like how their currencies relate to the Euro and country credit ratings, which affect integration and therefore correlations.

# 3.0    CONCLUSION

This paper has two goals: first, to understand the progression of integration in the European Union and second, to measure financial integration in the government bond markets. To that end, the first section of this paper defines six levels of integration including preferential trade agreements, free trade agreements, a customs union, common and single markets, economic and monetary unions, and a political union. Using these as a guideline, this paper tracks how the EU has moved through these levels. It started out as a limited customs union with the creation of the European Coal and Steel Community after World War II. From there the union moved towards common market with the Single European Act in 1986 and the Treaty of Maastricht in 1992. Though EU's first attempt at a monetary union with the European Monetary System was not successful, they achieved that goal with the successful introduction and adoption of the Euro in 16 of the 27 member states. Along the way, the members have also passed legislation pertaining to economic and social policies making it an economic union. Finally, when the EU ratified the Treaty of Lisbon in 2009 it became a political union. However, since the treaty was passed it has come under a lot of criticism for making the governing structure of the EU to unwieldy and inefficient.

The second part of this paper looks more specifically at financial integration in the EU. It starts with a definition of financial integration—that a market can be considered perfectly integrated if similar participants first, follow a single set of rules when dealing with financial goods and services, second, have equal access to those goods and services, and third, are not discriminated against when they are participating in the market.[86] Next, the benefits and costs of financial integration are discussed along with why it is important to the overall development of the EU. Financial integration reduces risk, increases diversification opportunities, and provides

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[86] Baele

deeper and broader markets for market participants. It is also though that increase financial integration is linked with increase economic growth and wealth. On the down side, many countries also fear that more integration could decrease competition in the markets through mass consolidation.

The next step is to measure financial integration in the long-term bond markets. Using the yields on the German government's long term bonds as a benchmark, yield spreads per country from 2002 to 2009 are found. The countries are divided into four sub-samples. The first group includes all of the countries in the Euro Area before 2002. The second group includes those countries that later adopted the Euro. The third group includes those countries whose currencies are pegged to the Euro. The final group includes the countries whose currencies are free-floating. Variances in yield spreads per quarter and a matrix of country correlations are also calculated.

In relation to the German benchmark, countries that used the Euro are the most integrated, followed by the countries with pegged currencies, then the countries with free-floating currencies. Within each subsample, integration either increases or remains static from 2002 to 2006; after 2007, integration decreases.

The financial crisis has the biggest impact on integration in the EU. Up until 2007, integration in the EU increases. The process is helped along by many factors—the introduction of the Euro into circulation, countries pegging their currencies to the Euro, and a generally stable financial environment. The act of joining the EU alone has increased many countries' level of integration with the rest of the EU. However, after 2007, integration in the EU decreases. This move away from integration can most likely be attributed to the recent financial crisis. For some countries in the EU the costs of being financially integrated or even in the union are high. Estonia and Latvia are seeking monetary aid from the IMF which would require the countries to un-peg their currencies from the Euro. So far, both countries are still negotiating with the IMF— un-pegging their currencies does not seem to be a nonnegotiable issue. Next, although Germany will eventually fund the Greek bailout, "the the sharp rhetoric and foot-dragging from Berlin has also raised doubts that Europe's bailout money will arrive in time for a May 19 for Greece to pay."[87] If the EU wants to continue on its path of increasing integration, maintaining the bonds

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[87] Rising (2010).

between its members during the downturn will be paramount. Once members' economies recover, it is likely that integration in the EU will increase again.

# APPENDIX A

## EXHIBITS

## Exhibit 1: EU Member Country Abbreviations

| | | | |
|---|---|---|---|
| **AT** | Austria | **IT** | Italy |
| **BE** | Belgium | **LT** | Lithuania |
| **BG** | Bulgaria | **LU** | Luxembourg |
| **CY** | Cyprus | **LV** | Latvia |
| **CZ** | Czech Republic | **MT** | Malta |
| **DE** | Germany | **NL** | Netherlands |
| **DK** | Denmark | **PL** | Poland |
| **EE** | Estonia | **PT** | Portugal |
| **ES** | Spain | **RO** | Romania |
| **FI** | Finland | **SE** | Sweden |
| **FR** | France | **SI** | Slovenia |
| **EL** | Greece | **SK** | Slovakia |
| **HU** | Hungary | **UK** | United Kingdom |
| **IR** | Ireland | | |

## Exhibit 2: Timeline of Events from 2001 to 2009

**December 31st, 1998:** The Euro exchange rate is calculated.

**January 1st, 1999:** The Euro replaces the ECU was the EU's unit of account. It is also introduced in non-physical forms such as traveler's checks and money transfers.

**2001:** Greece joins the Euro Area, bringing the total number of countries in the Euro Area to 12.

**January 1st, 2002:** Euro notes and coins are introduced into circulation.  There is a six month period in which to phase out the old national currencies of the countries.

**2004:** The Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia all join the EU, bringing the total number of members to 25.

**2006:** Slovenia qualifies to join the Euro Area

**January 1st, 2007:** Slovenia joins the Euro Area.

**2007:** Bulgaria and Romania join the EU, bringing the total number of members to 27.

**2007:** Cyprus and Malta qualify to join the Euro Area

**January 1st, 2008:** Cyprus and Malta join the Euro Area.

**2008:** Slovakia qualifies to join the Euro Area

**January 1st, 2009:** Slovakia joins the Euro Area

**December 1st, 2009:** The Treaty of Lisbon goes into effect.


**Exhibit 3: Country Credit Ratings**

| Country | Rating | Country | Rating |
|---|---|---|---|
| Austria | AAA | Italy | A+ |
| Belgium | AA+ | Lithuania | BBB |
| Bulgaria | BBB | Luxembourg | AAA |
| Cyprus | A+ | Latvia | BB |
| Czech Republic | A+ | Malta | A |
| Germany | AAA | Netherlands | AAA |
| Denmark | AAA | Poland | A |
| Estonia | BBB | Portugal | A+ |
| Spain | AA+ | Romania | BBB |
| Finland | AAA | Sweden | AAA |
| France | AAA | Slovenia | AAA |
| Greece | N/A | Slovakia | A+ |
| Hungary | BBB | United Kingdom | AAA |
| Ireland | AA | | |

Ratings are from Standard&Poor's Sovereigns Rating List 2009.

**APPENDIX B**

**FIGURES**

**Figure 3: Euro Area (subsample A) Average Spreads from 2002-2009**
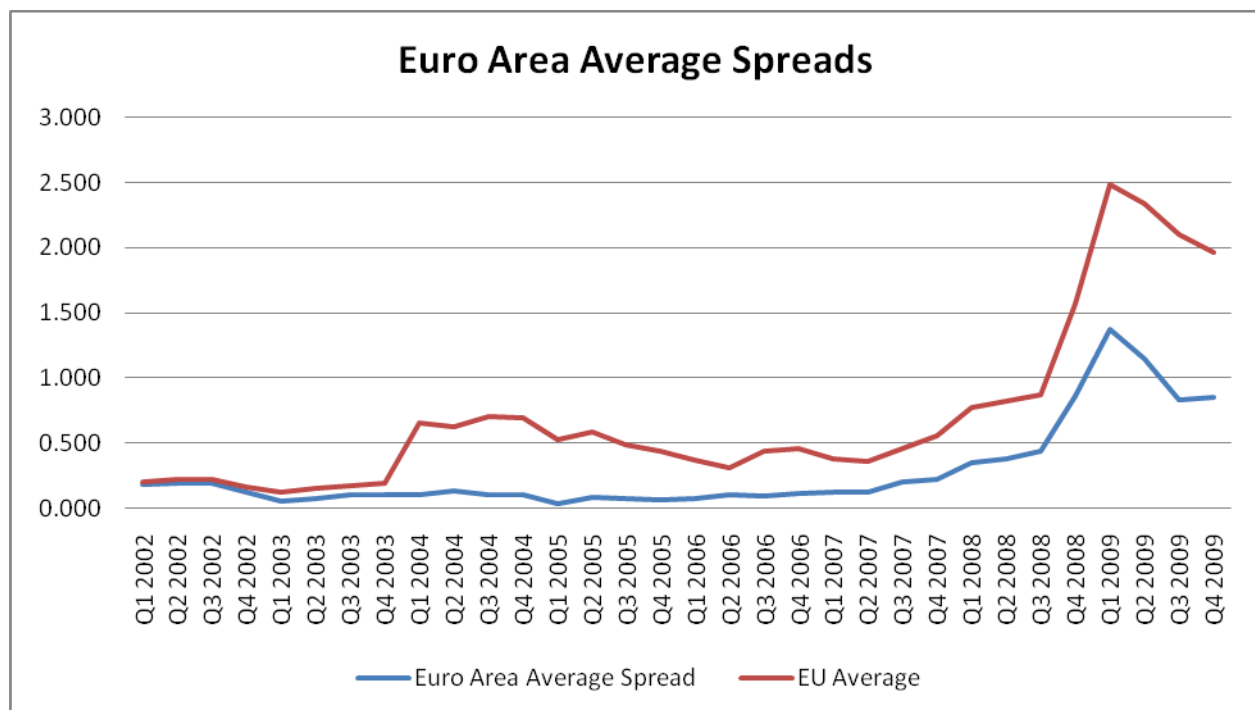
**Figure 4: Average Spreads of Countries with AAA rating in Euro Area**
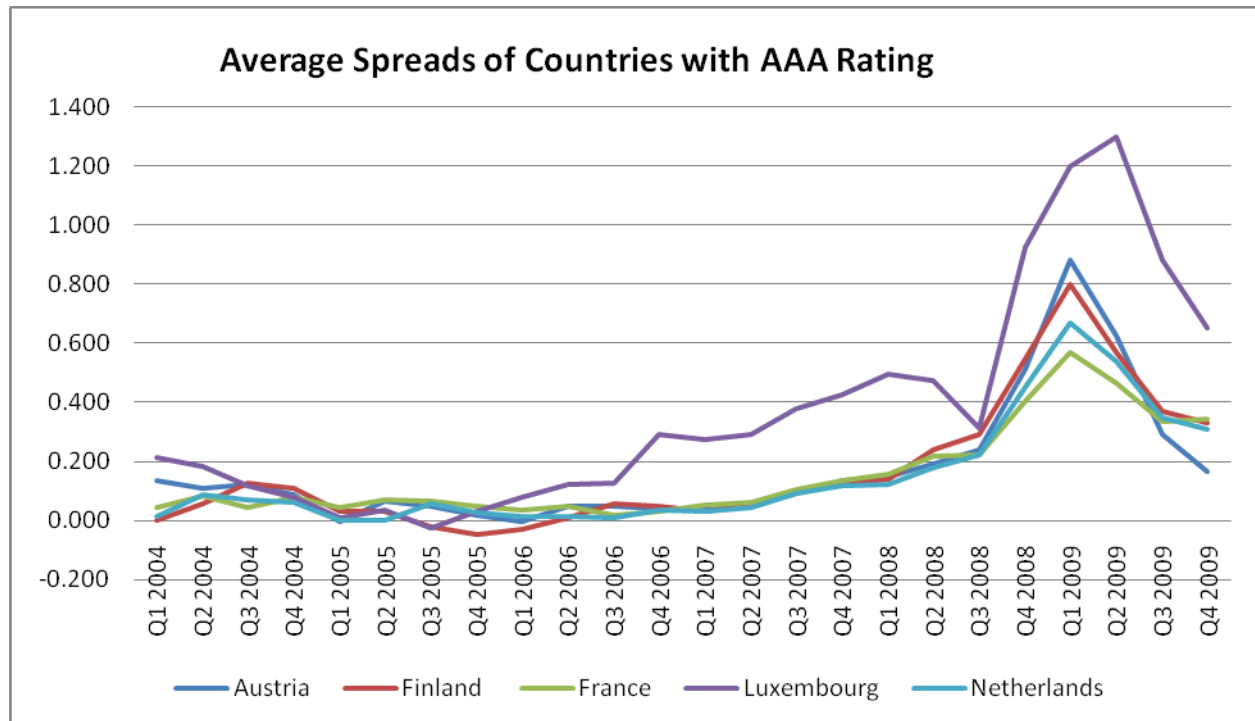


**Figure 5: Average Spreads of Countries with other A Ratings in Euro Area**
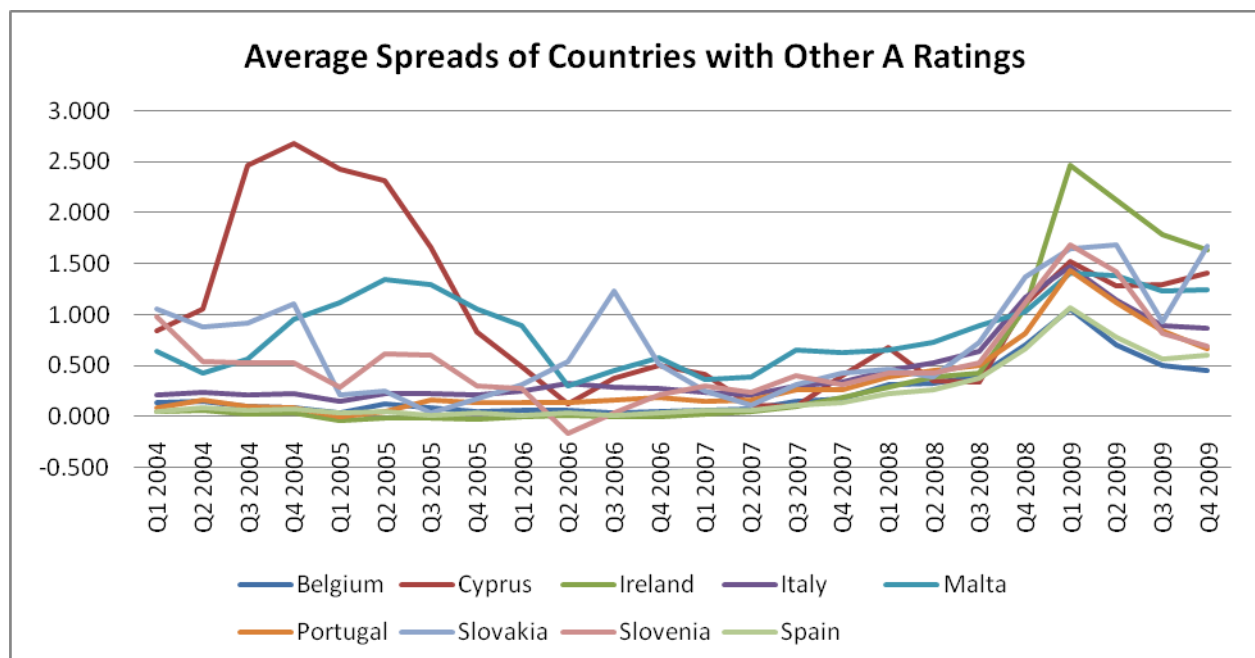
**Figure 6: Late Euro Adopters (subsample B) Average Spreads from 2004-2008**
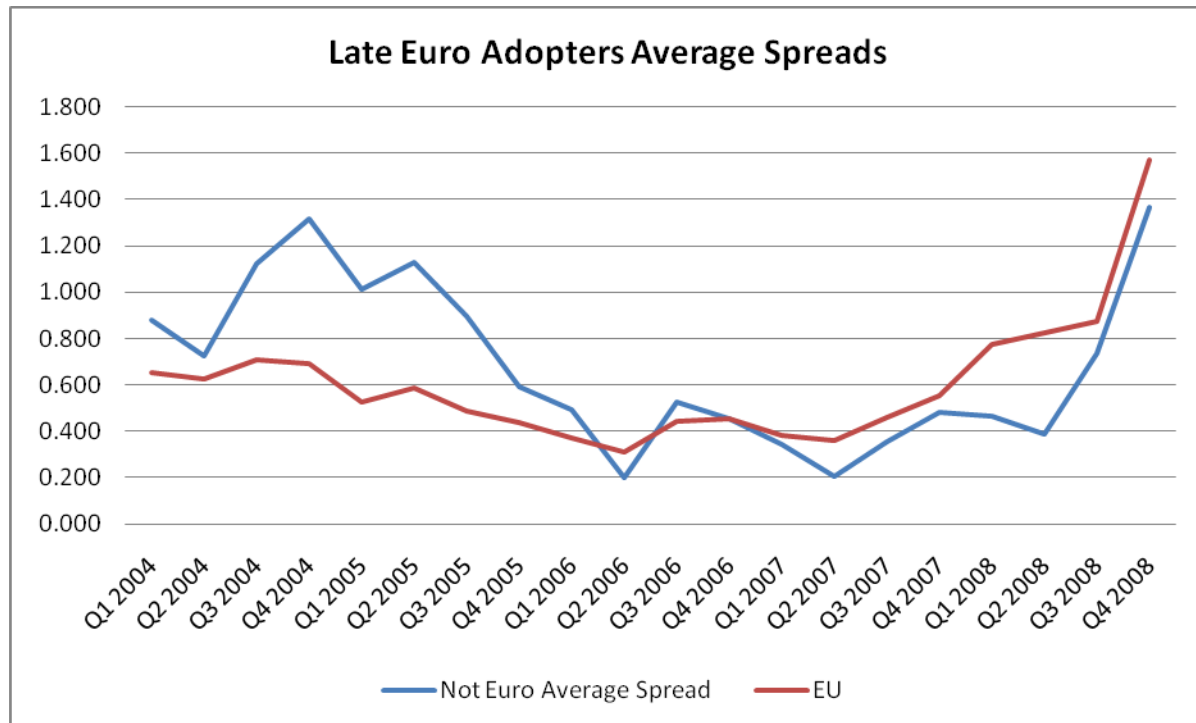


**Figure 7: Countries with Pegged Currencies (subsampleC) Average Spreads 2004-2009**
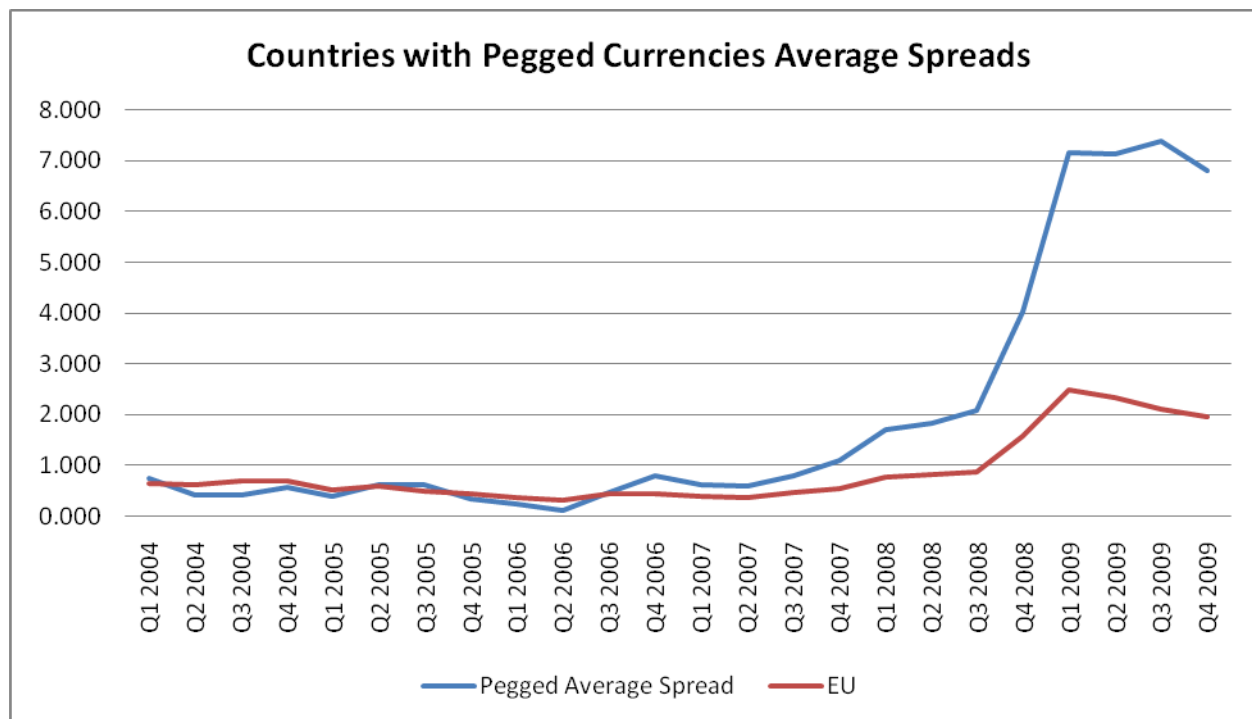
**Figure 8: Free Floating Countries (subsampleD) Avearge Spreads from 2002-2009**



**Figure 9: Average Spreads of All Subsamples from 2004 to 2009**
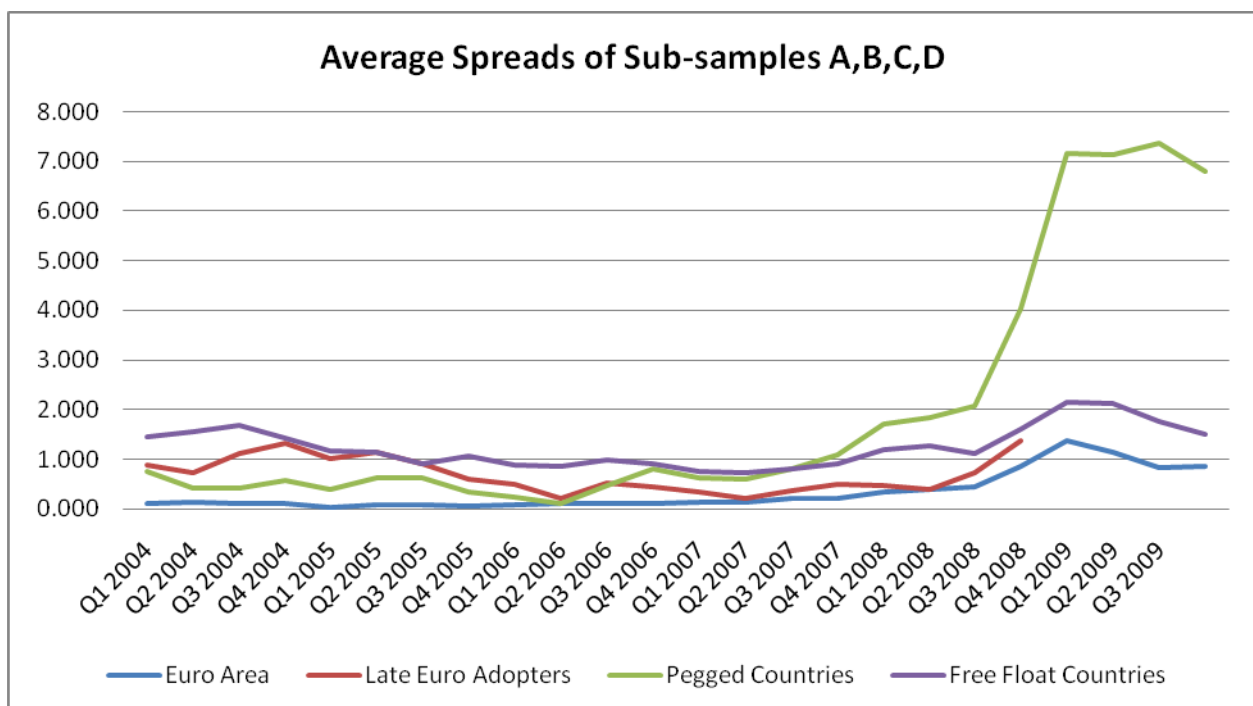
**Figure 10: Average-Spread Variances for All Subsamples from 2004 to 2009**
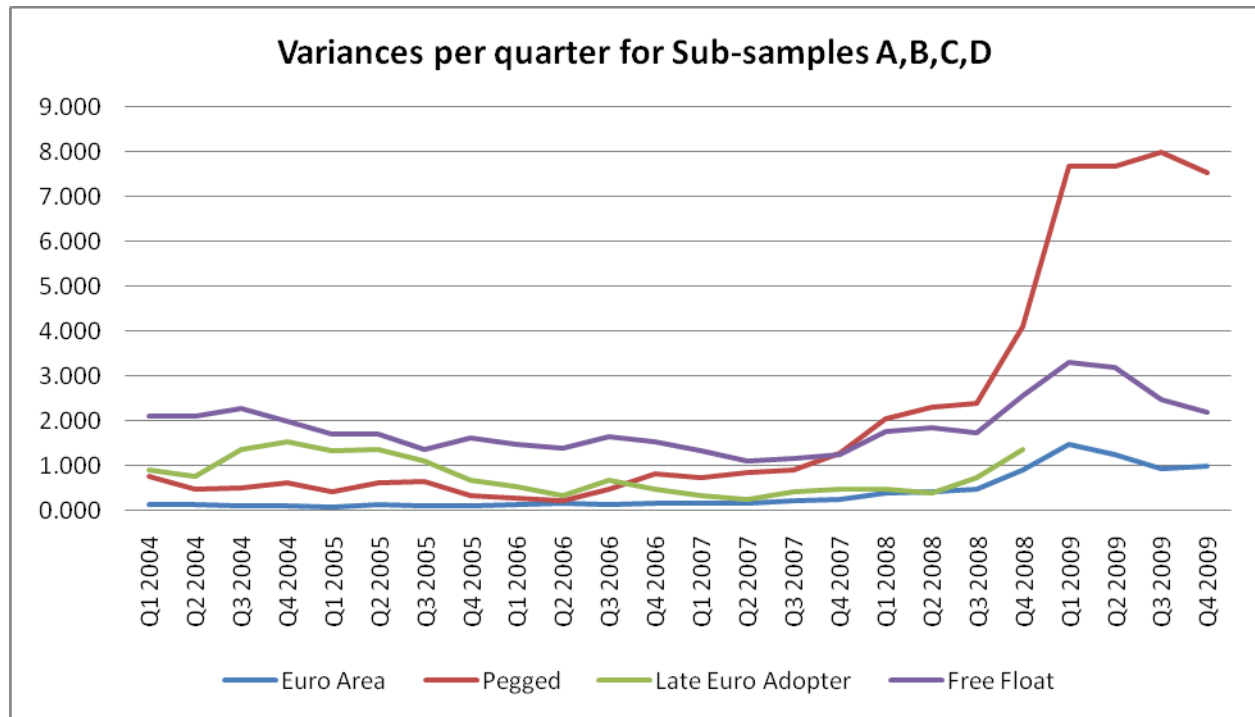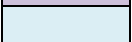
TABLES

## C.1    YIELD SPREADS

**Table 4: Yield Spreads per Country per Quarter 2002 to 2009**

**Key**

| | | | | | |
|---|---|---|---|---|---|
| ■ | German Yield | ■ | Subsample C | ■ | Not an EU member |
| ■ | Subsample A | ■ | Subsample D | ■ | EU Total |
| ■ | Subsample B | | | | |

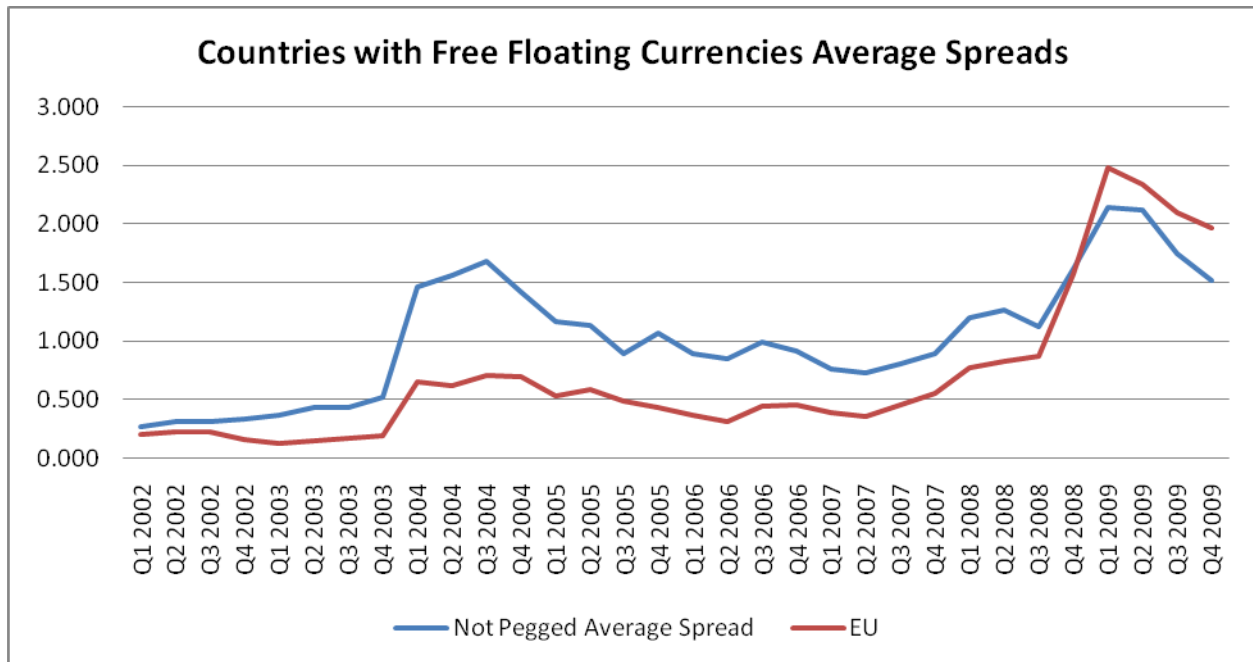| | Q1 2002 | Q2 2002 | Q3 2002 | Q4 2002 | Q1 2003 | Q2 2003 | Q3 2003 | Q4 2003 |
|---|---|---|---|---|---|---|---|---|
| Germany Yield | 4.980 | 5.113 | 4.613 | 4.423 | 4.043 | 3.863 | 4.090 | 4.287 |
| Austria | 0.183 | 0.200 | 0.200 | 0.153 | 0.077 | 0.057 | 0.097 | 0.100 |
| Belgium | 0.220 | 0.217 | 0.217 | 0.163 | 0.137 | 0.130 | 0.087 | 0.087 |
| Finland | 0.180 | 0.213 | 0.227 | 0.173 | 0.090 | 0.083 | 0.040 | 0.040 |
| France | 0.073 | 0.090 | 0.083 | 0.063 | 0.067 | 0.070 | 0.043 | 0.057 |
| Greece | 0.370 | 0.353 | 0.350 | 0.287 | 0.267 | 0.207 | 0.153 | 0.160 |
| Ireland | 0.233 | 0.243 | 0.247 | 0.187 | 0.097 | 0.070 | 0.033 | 0.047 |
| Italy | 0.270 | 0.243 | 0.240 | 0.260 | 0.197 | 0.193 | 0.153 | 0.163 |
| Luxembourg | -0.010 | 0.030 | 0.020 | -0.360 | -0.470 | -0.203 | 0.267 | 0.247 |
| Netherlands | 0.107 | 0.123 | 0.120 | 0.077 | 0.013 | 0.090 | 0.053 | 0.050 |
| Portugal | 0.227 | 0.237 | 0.253 | 0.180 | 0.087 | 0.090 | 0.127 | 0.127 |
| Spain | 0.187 | 0.197 | 0.193 | 0.127 | 0.053 | 0.057 | 0.053 | 0.050 |
| Average Spread | 0.185 | 0.195 | 0.195 | 0.119 | 0.056 | 0.077 | 0.101 | 0.102 |
| Cyprus | 1.697 | 0.257 | 0.757 | 0.947 | 0.940 | 0.823 | 0.500 | 0.427 |

| | Q1 2004 | Q2 2004 | Q3 2004 | Q4 2004 | Q1 2005 | Q2 2005 | Q3 2005 | Q4 2005 |
|---|---|---|---|---|---|---|---|---|
| Malta | 1.133 | 0.740 | 1.137 | 1.137 | 1.440 | 1.303 | 0.730 | 0.410 |
| Slovakia | 2.387 | 2.547 | 2.547 | 1.130 | 0.927 | 0.910 | 0.823 | 1.000 |
| Slovenia | 4.562 | 4.197 | 4.363 | 3.127 | 2.607 | 2.787 | 2.560 | 1.370 |
| Average Spread | 2.445 | 1.935 | 2.201 | 1.585 | 1.478 | 1.456 | 1.153 | 0.802 |
| Bulgaria | 1.783 | 1.890 | 2.293 | 1.887 | 2.977 | 2.920 | 1.833 | 1.773 |
| Estonia | 2.687 | 3.890 | 4.813 | 3.153 | 2.093 | 1.257 | 0.800 | 0.550 |
| Latvia | 1.063 | 0.470 | 0.660 | 0.310 | 0.750 | 1.080 | 0.757 | 0.733 |
| Lithuania | 1.293 | 1.020 | 1.360 | 1.447 | 1.683 | 1.730 | 1.063 | 0.527 |
| Average Spread | 1.707 | 1.818 | 2.282 | 1.699 | 1.876 | 1.747 | 1.113 | 0.896 |
| Czech Republic | 0.570 | 0.017 | -0.133 | -0.273 | -0.293 | -0.373 | 0.170 | 0.533 |
| Denmark | 0.227 | 0.250 | 0.303 | 0.313 | 0.257 | 0.253 | 0.217 | 0.223 |
| Hungary | 1.863 | 2.050 | 2.897 | 2.400 | 2.317 | 2.347 | 2.920 | 3.427 |
| Poland | 3.327 | 2.813 | 2.597 | 1.557 | 1.570 | 1.323 | 1.547 | 2.387 |
| Sweden | 0.440 | 0.520 | 0.543 | 0.580 | 0.537 | 0.567 | 0.557 | 0.610 |
| United Kingdom | 0.153 | 0.177 | 0.100 | 0.100 | 0.293 | 0.490 | 0.533 | 0.713 |
| Average Spread | 0.273 | 0.316 | 0.316 | 0.331 | 0.362 | 0.437 | 0.436 | 0.516 |
| **Total Average** | **0.204** | **0.221** | **0.221** | **0.165** | **0.121** | **0.154** | **0.172** | **0.191** |

| | Q1 2004 | Q2 2004 | Q3 2004 | Q4 2004 | Q1 2005 | Q2 2005 | Q3 2005 | Q4 2005 |
|---|---|---|---|---|---|---|---|---|
| Germany Yield | 4.063 | 4.220 | 4.113 | 3.750 | 3.600 | 3.303 | 3.167 | 3.343 |
| Austria | 0.137 | 0.110 | 0.123 | 0.087 | -0.003 | 0.067 | 0.050 | 0.020 |
| Belgium | 0.133 | 0.153 | 0.097 | 0.080 | 0.040 | 0.127 | 0.083 | 0.050 |
| Finland | 0.000 | 0.057 | 0.127 | 0.110 | 0.030 | 0.030 | -0.020 | -0.047 |
| France | 0.043 | 0.083 | 0.043 | 0.077 | 0.043 | 0.070 | 0.067 | 0.047 |
| Greece | 0.233 | 0.243 | 0.200 | 0.200 | 0.167 | 0.297 | 0.243 | 0.220 |
| Ireland | 0.043 | 0.067 | 0.020 | 0.030 | -0.037 | -0.013 | -0.020 | -0.027 |
| Italy | 0.213 | 0.240 | 0.210 | 0.223 | 0.143 | 0.230 | 0.227 | 0.207 |
| Luxembourg | 0.213 | 0.183 | 0.117 | 0.080 | 0.010 | 0.037 | -0.027 | 0.030 |
| Netherlands | 0.013 | 0.087 | 0.070 | 0.060 | 0.000 | 0.000 | 0.057 | 0.027 |
| Portugal | 0.083 | 0.160 | 0.103 | 0.080 | 0.003 | 0.043 | 0.157 | 0.133 |
| Spain | 0.050 | 0.087 | 0.057 | 0.070 | 0.037 | 0.053 | 0.013 | 0.033 |
| Average Spread | 0.106 | 0.134 | 0.106 | 0.100 | 0.039 | 0.085 | 0.075 | 0.063 |
| Cyprus | 0.840 | 1.057 | 2.467 | 2.680 | 2.427 | 2.310 | 1.663 | 0.833 |
| Malta | 0.640 | 0.430 | 0.570 | 0.953 | 1.117 | 1.340 | 1.297 | 1.053 |
| Slovakia | 1.057 | 0.873 | 0.917 | 1.110 | 0.213 | 0.250 | 0.030 | 0.180 |
| Slovenia | 0.983 | 0.543 | 0.530 | 0.530 | 0.290 | 0.620 | 0.603 | 0.300 |
| Average Spread | 0.880 | 0.726 | 1.121 | 1.318 | 1.012 | 1.130 | 0.898 | 0.592 |
| Bulgaria | 1.630 | 1.100 | 1.187 | 1.377 | 0.687 | 0.770 | 0.480 | 0.147 |
| Estonia | 0.610 | 0.287 | 0.060 | 0.450 | 0.520 | 0.787 | 0.807 | 0.403 |
| Latvia | 0.967 | 0.703 | 0.767 | 0.847 | 0.487 | 0.567 | 0.703 | 0.330 |
| Lithuania | 0.690 | 0.273 | 0.457 | 0.443 | 0.193 | 0.520 | 0.370 | 0.297 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Average Spread | 0.756 | 0.421 | 0.428 | 0.580 | 0.400 | 0.624 | 0.627 | 0.343 |
| Czech Republic | 0.437 | 0.800 | 0.907 | 0.300 | 0.020 | 0.007 | 0.093 | 0.267 |
| Denmark | 0.187 | 0.210 | 0.370 | 0.307 | 0.133 | 0.073 | -0.003 | 0.000 |
| Hungary | 4.287 | 4.010 | 4.383 | 3.930 | 3.360 | 3.530 | 2.707 | 3.387 |
| Poland | 2.650 | 2.983 | 3.140 | 2.667 | 2.150 | 1.947 | 1.557 | 1.807 |
| Sweden | 0.440 | 0.430 | 0.340 | 0.343 | 0.220 | 0.040 | -0.107 | -0.033 |
| United Kingdom | 0.763 | 0.907 | 0.927 | 0.960 | 1.110 | 1.173 | 1.133 | 1.003 |
| Average Spread | 1.461 | 1.557 | 1.678 | 1.418 | 1.166 | 1.128 | 0.897 | 1.072 |
| **Total Average** | **0.655** | **0.624** | **0.708** | **0.692** | **0.528** | **0.588** | **0.487** | **0.438** |

| | Q1 2006 | Q2 2006 | Q3 2006 | Q4 2006 | Q1 2007 | Q2 2007 | Q3 2007 | Q4 2007 |
|---|---|---|---|---|---|---|---|---|
| Germany Yield | 3.477 | 3.937 | 3.880 | 3.757 | 4.003 | 4.330 | 4.340 | 4.193 |
| Austria | -0.003 | 0.050 | 0.050 | 0.040 | 0.037 | 0.050 | 0.093 | 0.133 |
| Belgium | 0.060 | 0.067 | 0.037 | 0.047 | 0.057 | 0.070 | 0.143 | 0.177 |
| Finland | -0.030 | 0.010 | 0.057 | 0.047 | 0.033 | 0.052 | 0.099 | 0.120 |
| France | 0.037 | 0.050 | 0.020 | 0.030 | 0.053 | 0.060 | 0.103 | 0.133 |
| Greece | 0.297 | 0.343 | 0.313 | 0.277 | 0.257 | 0.240 | 0.317 | 0.320 |
| Ireland | 0.003 | 0.010 | 0.000 | -0.003 | 0.023 | 0.047 | 0.097 | 0.190 |
| Italy | 0.243 | 0.330 | 0.293 | 0.270 | 0.237 | 0.214 | 0.299 | 0.333 |
| Luxembourg | 0.077 | 0.123 | 0.127 | 0.293 | 0.273 | 0.293 | 0.380 | 0.427 |
| Netherlands | 0.013 | 0.013 | 0.010 | 0.037 | 0.030 | 0.043 | 0.090 | 0.117 |
| Portugal | 0.130 | 0.130 | 0.163 | 0.187 | 0.153 | 0.163 | 0.257 | 0.257 |
| Spain | 0.013 | 0.030 | 0.010 | 0.037 | 0.057 | 0.060 | 0.113 | 0.133 |
| Average Spread | 0.076 | 0.105 | 0.098 | 0.115 | 0.126 | 0.127 | 0.199 | 0.221 |
| Cyprus | 0.487 | 0.120 | 0.377 | 0.503 | 0.413 | 0.110 | 0.103 | 0.407 |
| Malta | 0.897 | 0.297 | 0.450 | 0.580 | 0.363 | 0.393 | 0.650 | 0.623 |
| Slovakia | 0.307 | 0.540 | 1.233 | 0.517 | 0.253 | 0.110 | 0.313 | 0.420 |
| Slovenia | 0.273 | -0.163 | 0.040 | 0.213 | 0.300 | 0.233 | 0.400 | 0.317 |
| Average Spread | 0.491 | 0.198 | 0.525 | 0.453 | 0.343 | 0.204 | 0.356 | 0.483 |
| Bulgaria | 0.270 | 0.280 | 0.617 | 0.517 | 0.240 | 0.040 | 0.333 | 0.677 |
| Estonia | 0.443 | 0.310 | 0.563 | 0.847 | 0.953 | 0.950 | 1.487 | 2.257 |
| Latvia | 0.123 | -0.157 | 0.473 | 1.043 | 1.040 | 1.393 | 0.930 | 0.900 |
| Lithuania | 0.157 | 0.193 | 0.400 | 0.523 | 0.263 | 0.040 | 0.463 | 0.550 |
| Average Spread | 0.241 | 0.116 | 0.479 | 0.804 | 0.624 | 0.606 | 0.803 | 1.096 |
| Czech Republic | 0.093 | 0.113 | 0.020 | -0.077 | -0.243 | 0.200 | 0.200 | 0.457 |
| Denmark | 0.020 | 0.073 | 0.047 | 0.057 | 0.000 | 0.057 | 0.103 | 0.117 |
| Hungary | 3.313 | 3.100 | 3.660 | 3.340 | 2.900 | 2.300 | 2.343 | 2.567 |
| Poland | 1.367 | 1.347 | 1.673 | 1.490 | 1.180 | 1.033 | 1.317 | 1.540 |
| Sweden | -0.043 | -0.050 | -0.047 | -0.090 | -0.130 | -0.120 | -0.033 | 0.087 |
| United Kingdom | 0.593 | 0.517 | 0.593 | 0.743 | 0.860 | 0.913 | 0.893 | 0.620 |
| Average Spread | 0.891 | 0.850 | 0.991 | 0.911 | 0.761 | 0.731 | 0.804 | 0.898 |

| | Total Average | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **0.370** | **0.308** | **0.440** | **0.456** | **0.384** | **0.358** | **0.460** | **0.555** |

| | Q1 2008 | Q2 2008 | Q3 2008 | Q4 2008 | Q1 2009 | Q2 2009 | Q3 2009 | Q4 2009 |
|---|---|---|---|---|---|---|---|---|
| Germany Yield | 3.927 | 4.253 | 4.263 | 3.497 | 3.073 | 3.323 | 3.303 | 3.190 |
| Austria | 0.150 | 0.193 | 0.240 | 0.513 | 0.883 | 0.627 | 0.293 | 0.163 |
| Belgium | 0.310 | 0.320 | 0.400 | 0.700 | 1.060 | 0.703 | 0.500 | 0.453 |
| Finland | 0.140 | 0.239 | 0.291 | 0.548 | 0.798 | 0.568 | 0.372 | 0.330 |
| France | 0.157 | 0.217 | 0.220 | 0.403 | 0.570 | 0.463 | 0.333 | 0.343 |
| Greece | 0.467 | 0.563 | 0.703 | 1.537 | 2.650 | 2.027 | 1.353 | 1.777 |
| Ireland | 0.283 | 0.390 | 0.427 | 1.063 | 2.463 | 2.123 | 1.790 | 1.633 |
| Italy | 0.450 | 0.527 | 0.637 | 1.167 | 1.467 | 1.140 | 0.890 | 0.867 |
| Luxembourg | 0.493 | 0.473 | 0.312 | 0.927 | 1.197 | 1.297 | 0.880 | 0.650 |
| Netherlands | 0.123 | 0.177 | 0.220 | 0.450 | 0.667 | 0.537 | 0.347 | 0.307 |
| Portugal | 0.387 | 0.450 | 0.503 | 0.810 | 1.433 | 1.117 | 0.844 | 0.663 |
| Spain | 0.223 | 0.260 | 0.380 | 0.660 | 1.073 | 0.783 | 0.567 | 0.603 |
| Average Spread | 0.352 | 0.379 | 0.435 | 0.859 | 1.369 | 1.144 | 0.829 | 0.854 |
| Cyprus | 0.673 | 0.347 | 0.337 | 1.103 | 1.527 | 1.277 | 1.297 | 1.410 |
| Malta | 0.647 | 0.727 | 0.887 | 1.033 | 1.413 | 1.387 | 1.233 | 1.243 |
| Slovakia | 0.467 | 0.387 | 0.733 | 1.367 | 1.647 | 1.690 | 0.923 | 1.673 |
| Slovenia | 0.420 | 0.423 | 0.530 | 1.113 | 1.687 | 1.417 | 0.817 | 0.690 |
| Average Spread | 0.467 | 0.387 | 0.733 | 1.367 | 0.000 | 0.000 | 0.000 | 0.000 |
| Bulgaria | 1.127 | 0.720 | 0.907 | 2.813 | 4.247 | 3.883 | 4.290 | 3.550 |
| Estonia | 3.630 | 4.153 | 3.877 | 5.057 | 5.087 | 5.113 | 4.377 | 3.647 |
| Latvia | 1.430 | 1.783 | 2.327 | 4.247 | 8.080 | 8.340 | 9.640 | 10.480 |
| Lithuania | 0.607 | 0.653 | 1.207 | 4.023 | 11.243 | 11.177 | 11.197 | 9.510 |
| Average Spread | 1.698 | 1.828 | 2.079 | 4.035 | 7.164 | 7.128 | 7.376 | 6.797 |
| Czech Republic | 0.757 | 0.874 | 0.161 | 0.803 | 2.090 | 2.127 | 1.707 | 0.790 |
| Denmark | 0.163 | 0.253 | 0.283 | 0.487 | 0.403 | 0.303 | 0.360 | 0.393 |
| Hungary | 3.773 | 3.947 | 3.693 | 5.600 | 7.280 | 6.940 | 5.070 | 4.313 |
| Poland | 1.947 | 1.917 | 1.887 | 2.597 | 2.810 | 2.957 | 2.843 | 2.980 |
| Sweden | 0.083 | -0.030 | -0.137 | -0.303 | -0.183 | 0.133 | 0.097 | 0.063 |
| United Kingdom | 0.450 | 0.620 | 0.820 | 0.507 | 0.463 | 0.260 | 0.427 | 0.550 |
| Average Spread | 1.196 | 1.263 | 1.118 | 1.615 | 2.144 | 2.120 | 1.751 | 1.515 |
| Total Average | **0.774** | **0.823** | **0.874** | **1.569** | **2.482** | **2.336** | **2.098** | **1.963** |

**Table 5: Summary Statistics for Average subsamples Spreads Compared Across Subsamples from 2002 to 2006**

|  | t-stat | p-value | Direction |
|---|---|---|---|
| Euro Area vs. Late Euro Area | -6.987 | 0.000 | + |
| Euro Area vs. Peg | -6.833 | 0.000 | + |
| Euro Area vs. Free Float | -13.289 | 0.000 | + |
| Late Euro Area vs. Peg | 3.281 | 0.007 | - |
| Late Euro Area vs. Free Float | -1.390 | 0.192 | + |
| Peg vs. Free Float | -5.419 | 0.000 | + |

**Table 6: Summary Statistics for Average subsamples Spreads Compared Across Subsamples from 2007 to 2009**

|  | t-stat | p-value | Direction |
|---|---|---|---|
| Euro Area vs. Late Euro Area | n/a | n/a | n/a |
| Euro Area vs. Peg | -3.998 | 0.002 | + |
| Euro Area vs. Free Float | -20.267 | 0.000 | + |
| Late Euro Area vs. Peg | n/a | n/a | n/a |
| Late Euro Area vs. Free Float | n/a | n/a | n/a |
| Peg vs. Free Float | 3.034 | 0.011 | - |

## C.2    YIELD SPREAD VARINANCE

**Table 7: Average Spread Variance per Subsample from 2002 to 2009**

**Key**

| | | | | | |
|---|---|---|---|---|---|
| Subsample A | | Subsample C | | Not an EU member | |
| Subsample B | | Subsample D | | EU Total | |

| | Q1 2002 | Q2 2002 | Q3 2002 | Q4 2002 | Q1 2003 | Q2 2003 | Q3 2003 | Q4 2003 |
|---|---|---|---|---|---|---|---|---|
| Number of Countries | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| Variance | 0.209 | 0.212 | 0.214 | 0.203 | 0.188 | 0.127 | 0.121 | 0.120 |
| Number of Countries | | | | | | | | |
| Variance | | | | | | | | |
| Number of Countries | | | | | | | | |
| Variance | | | | | | | | |
| Number of Countries | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Variance | 0.299 | 0.348 | 0.364 | 0.385 | 0.383 | 0.457 | 0.462 | 0.557 |
| Number of Countries | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Variance | **0.327** | **0.350** | **0.359** | **0.358** | **0.344** | **0.339** | **0.339** | **0.395** |

| | Q1 2004 | Q2 2004 | Q3 2004 | Q4 2004 | Q1 2005 | Q2 2005 | Q3 2005 | Q4 2005 |
|---|---|---|---|---|---|---|---|---|
| Number of Countries | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| Variance | 0.133 | 0.148 | 0.120 | 0.114 | 0.071 | 0.126 | 0.118 | 0.104 |
| Number of Countries | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Variance | 0.894 | 0.768 | 1.372 | 1.550 | 1.348 | 1.376 | 1.097 | 0.694 |
| Number of Countries | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variance | 0.771 | 0.466 | 0.516 | 0.610 | 0.426 | 0.635 | 0.654 | 0.346 |
| Number of Countries | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Variance | 2.098 | 2.108 | 2.273 | 1.991 | 1.694 | 1.714 | 1.357 | 1.623 |
| Number of Countries | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| **Variance** | **1.622** | **1.579** | **1.814** | **1.699** | **1.446** | **1.489** | **1.201** | **1.232** |

| | Q1 2006 | Q2 2006 | Q3 2006 | Q4 2006 | Q1 2007 | Q2 2007 | Q3 2007 | Q4 2007 |
|---|---|---|---|---|---|---|---|---|
| Number of Countries | 11 | 11 | 11 | 11 | 12 | 12 | 12 | 12 |
| Variance | 0.127 | 0.157 | 0.146 | 0.160 | 0.164 | 0.156 | 0.231 | 0.243 |
| Number of Countries | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 |
| Variance | 0.550 | 0.324 | 0.683 | 0.475 | 0.350 | 0.244 | 0.421 | 0.493 |
| Number of Countries | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |
| Variance | 0.281 | 0.230 | 0.484 | 0.833 | 0.728 | 0.844 | 0.922 | 1.291 |
| Number of Countries | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Variance | 1.484 | 1.397 | 1.661 | 1.525 | 1.330 | 1.099 | 1.160 | 1.263 |
| Number of Countries | 24 | 24 | 24 | 24 | 25 | 25 | 25 | 25 |
| **Variance** | **1.112** | **1.023** | **1.270** | **1.197** | **0.733** | **0.650** | **0.711** | **0.841** |

| | Q1 2008 | Q2 2008 | Q3 2008 | Q4 2008 | Q1 2009 | Q2 2009 | Q3 2009 | Q4 2009 |
|---|---|---|---|---|---|---|---|---|
| Number of Countries | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 15 |
| Variance | 0.394 | 0.409 | 0.475 | 0.916 | 1.485 | 1.254 | 0.933 | 1.005 |
| Number of Countries | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| Variance | 0.467 | 0.387 | 0.733 | 1.367 | 0.000 | 0.000 | 0.000 | 0.000 |
| Number of Countries | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Variance | 2.053 | 2.312 | 2.383 | 4.114 | 7.675 | 7.676 | 7.998 | 7.519 |
| Number of Countries | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Variance | 1.772 | 1.847 | 1.732 | 2.560 | 3.308 | 3.204 | 2.484 | 2.182 |
| Number of Countries | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| **Variance** | **1.234** | **1.332** | **1.333** | **2.197** | **3.657** | **3.583** | **3.498** | **3.286** |

**Table 8: Summary Statistics for Average subsamples Variances Compared Across Subsamples from 2002 to 2009**
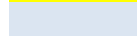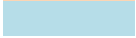
|  | t-stat | p-value | Direction |
|---|---|---|---|
| Euro Area vs. Late Euro Area | 3.123 | 0.005 | - |
| Euro Area vs. Peg | -3.751 | 0.001 | + |
| Euro Area vs. Free Float | -20.984 | 0.000 | + |
| Late Euro Area vs. Peg | -2.494 | 0.021 | + |
| Late Euro Area vs. Free Float | -6.742 | 0.000 | + |
| Peg vs. Free Float | 0.912 | 0.372 | - |

## C.3 CORRELATION MATRIX OF YIELDS

**Table 9: Summary of Results from Correlations between Subsamples**

| | | Beginning (B) 2002-2004 | Middle (M) 2005-2006 | Crisis (C) 2007-2009 | B-M | M-C | B-C | |
|---|---|---|---|---|---|---|---|---|
| **EU** | Correlations Sum | 220.644 | 201.519 | 68.716 | 19.125 | 132.803 | 151.928 | Difference |
| | n | 26 | 26 | 26 | 0.081 | 6.164 | 7.330 | t-test |
| | % Significant | 70% | 64% | 48% | | | | |
| **EU-(CY,MT,SI,SK)** | Correlations Sum | 165.438 | 184.302 | 42.596 | -18.864 | 141.707 | 122.842 | Difference |
| | n | 22 | 22 | 22 | -2.075 | 9.375 | 7.290 | t-test |
| | Percent Significant | 79% | 76% | 55% | | | | |
| **Euro Area** | Correlations Sum | 64.279 | 65.263 | 34.964 | -0.985 | 30.299 | 29.314 | Difference |
| | n | 12 | 12 | 12 | -1.588 | 3.867 | 3.686 | t-test |
| | Percent Significant | 100% | 100% | 71% | | | | |
| **Pegged** | Correlations Sum | 2.121 | 2.557 | 3.369 | -0.435 | -0.812 | -1.248 | Difference |
| | n | 3 | 3 | 4 | -0.403 | -2.047 | 1.046 | t-test |
| | Percent Significant | 33% | 67% | 100% | | | | |
| **Free Float** | Correlations Sum | 2.015 | 8.664 | 0.440 | -6.649 | 8.225 | 1.575 | Difference |
| | n | 3 | 6 | 6 | 0.807 | 2.556 | 13.051 | t-test |
| | Percent Significant | 33% | 60% | 40% | | | | |
| **EU-EU-(CY.MT,SK,SI)** | Difference | 55.206 | 17.217 | 26.120 | | | | |
| | t-test | 2.848 | -2.791 | 5.783 | | | | |
| **Euro Area-Peg** | Difference | 62.157 | 62.707 | 31.595 | | | | |
| | t-test | 2.721 | -3.013 | 6.594 | | | | |
| **Peg-Free Float** | Difference | 0.106 | -6.108 | 2.930 | | | | |
| | t-test | 7.778 | 12.660 | 14.827 | | | | |
| **Euro Area-Free Float** | Difference | 62.264 | 56.599 | 34.525 | | | | |
| | t-test | 2.808 | 6.486 | 8.664 | | | | |

**Key**

| | | | |
|---|---|---|---|
| ▮ (yellow) | t test was significant | ▮ (light blue) | Subsample A |
| ▮ (light blue) | EU | ▮ (orange) | Subsample C |
| ▮ (light pink) | EU-(CY,MT,SI,SK) | ▮ (blue) | Subsample D |

Correlations sum is the sum of all correlations between the countries in the subsample, n is the number of countries in the subsample, and percent significant is the percent of correlations in the matrix that are significant (as tested by the Spearman test). Difference is the difference of the sum of correlations of two subsamples.

# BIBLIOGRAPHY

Baele, L., Ferrando, A., Hordhal, P., Monnet, C., Monnet, K. "Measuring Financial Integration in the Euro Area." Occasional Paper No. 14, European Central Bank. 2004.

Baltzer, M., Cappiello, L., De Santis, R.A., Manganelli, S. "Measuring Financial Integration in the New EU Member States." Occasional Paper No. 81, European Central Bank. 2008.

Bekaert, G., Harvey, C., Lundblad, C. "Does Financial Liberalization Spur Growth?" Mimeo, Columbia University. 2005.

British Broadcasting Corporation. "EU Summit Scrapped After Obama "Snub"." BBC News Europe. 3 Feb. 2010. www.bbc.co.uk 10 Feb 2010.

British Broadcasting Corporation. "Q&A: The Lisbon Treaty." BBC News Europe. 5 Feb. 2010. www.bbc.co.uk 10 Feb. 2010.

Caribbean Community Secretariat. "The Caribbean Community History.". Caribbean Community. 1 Jan. 2010. www.caricom.org 14 Nov. 2009.

Churchill, Winston. "Speech to the Academic Youth." Zurich, Switzerland. September 19th, 1946. www.churchill-society-london.org 7 May 2009.

Communidad Andia Secretariat General. "Andean Community History." Comunidad Andina, 1 Jan, 2010. www.comunidadandina.org 14 Nov. 2009.

European Free Trade Association. "Fifty Years of EFTA." EFTA. 2009. www.efta.int 15 Nov 2009.

European Union. "Treaty of Lisbon amending the Treaty on European Union and the Treat establishing the European Community." Official Journal of the European Union. 13 Dec. 2007. www.eur-lex.europa.com 15 Jan 2010.

European Union European Commission. "Development and Relations with African, Caribbean and Pacific States." European Union Europa. 1 Jan 2010. www.ec.europa.eu 24 Nov. 2009.

European Union Europa. "Gateway to the European Union." Europa. 1 Jan 2010. www.europa.eu 3 Mar. 2010.

Fonteyne, Wim. "EU: From Monetary to Financial Union." Finance & Development Vol 43. International Monetary Fund 2006.

Fromkin, David. "The Suez Canal Crisis: Stuck in the Canal." New York Times. 28 Oct 2006. www.nytimes.com 30 Nov 2009.

Groupo Santander. "Milestones in Santander's History." Santander. 1 Jan 2010. www.santander.com 24 Feb. 2010

McCormick, John. "Understanding the European Union: A Concise Introduction." Palgrave Macmillian, 2008. Fourth Edition.

Mollenkamp, C., Paris, C., Walker, M. "Athens, Berlin Spar as Bailout Takes Shape." Wall Street Journal. 27 Feb 2010. www.online.wsj.com 9 March 2010.

Penn, William. "An Essay Towards the Present and Future Peace of Europe." London: Peace Committee of the Society of Friends, 1936.

Rising, David. "German Reluctance Grows Over Greek Bailout." Bloomberg BusinessWeek. 27 April 2010. www.businessweek.com 27 April 2010.

Rousseau, Peter L. and Richard Sylla. "Financial Revolutions And Economic Growth: Introducing This EEH Symposium," Explorations in Economic History, 2006, v43(1,Jan), 1-12.

Standard and Poors. "Sovereigns Rating List 2009." Standard & Poors. 1 Jan 2010. www.standardandpoors.com. 3 Mar. 2010.

Suder, Gabriele. "Doing Business in Europe." London: Sage, 2008.

United States. Central Intelligence Agency. "European Union Economy Statistics." CIA World Fact Book. 1 Jan. 2010. www.cia.gov 12 Feb. 2010.