2016

Restructuring the Eurozone

Anthony M. Juliano
Gettysburg College
Class of 2016

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Abstract

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ABSTRACT

This paper suggests that there should be a realignment of the current Eurozone. There has been research to argue that the Eurozone does not fit the Optimum Currency Area (OCA) criteria. This might be a contributing factor to the current economic crisis in Europe. I propose, based on results from k-means data clustering, that the Eurozone be divided into three separate regions under the European Central Bank (ECB). The division would allow for enhanced stabilization and efficiency due to better fitting of the OCA criteria and policy implications.

I.   INTRODUCTION

In 1992, the Treaty on the European Union (TEU) or Maastricht Treaty created the European Union. The treaty outlined five objectives for the Union in the ensuing years.   The objective relevant to this paper is the establishment of the economic and monetary union. This paper proposes a division of the current Eurozone into three regional currency areas based on k-means data clustering results for Gross Domestic Product (GDP) growth.

On a large scale, the Economics and Monetary Union (EMU) created interdependence within the member countries, in hopes to prevent conflicts like the first two World Wars in the future. Both Mundell (1961) and McKinnon (1963) indicate benefits to establishing monetary unions or

Optimum Currency Areas (OCA). Mundell (1961) argues that the adoption of a single currency eliminates the problem of domestic currency conversion, as the cost of valuation of foreign currencies, "tend to increase with the number of currencies" (Mundell, 662). In addition, money as a unit of account is less functional, "if the prices of foreign goods are expressed in terms of foreign currency and must then be translated into domestic currency prices" (Mundell, 662). Thus, the conversion of domestic currencies should make exchange between member countries less expensive and more efficient. Building on this idea, McKinnon (1963) discusses the benefits associated with an economy's openness as measured by the size of the tradable sector, the industry sectors whose output in terms of goods or services are

traded internationally, relative to that of the non-tradable sector. In a small and highly open economy, the general price level in domestic currency is sensitive to exchange rate movements. Therefore, monetary unification appears rational, as the economic benefit of a more stable price level would outweigh the economic cost of losing a monetary policy instrument (exchange rate manipulation). At the personal level, each European would also recognize a more efficient system for buying international goods, while the integration of markets, in theory, should create increase labor mobility.

There are also costs to single currency areas. The largest and most significant is the misalignment of member countries' business cycles. This makes the policymaking of the ECB more difficult because

one country may be experiencing a booming economy and another could be in recession. One can currently observe this in Europe today as many of the northern countries are suffering due to the recessions in southern European countries like Spain and Greece.

Several papers have proposed either the creation of a fiscal union or banking union in the Eurozone as a means of fixing the current financial crisis. A fiscal union would allow the Eurozone as a whole to introduce unified fiscal policies in order to stabilize economic issues specific to certain countries. In a different approach, this paper will address the current state of the EMU and propose a solution considering OCA theory. I propose that the current 19 EMU member nations should be rearranged into regional currency areas under one

central bank, the ECB. The first section will discuss

OCA theories and the second section will discuss

how well the Eurozone fits the OCA criteria. The

third section presents my argument for a

restructuring of the Eurozone with both my method

and results. Finally, in the last section, I will draw

conclusions.

II.   REVIEW OF OPTIMUM CURRENCY AREA THEORY

In order to evaluate the EMU as a currency

area, it is important to understand Mundell's

original theory. "An optimum currency area can be

defined as the optimal geographical area for a single

currency, or for several currencies, whose exchange

rates are irrevocably pegged. The single currency,

or the pegged currencies, fluctuate jointly vis-à-vis

other currencies" (Mongelli, 2). Mundell (1961)

initially suggested a world that was broken into regional currency areas. "If the world can be divided into regions within each of which there is factor mobility and between which there is factor immobility, then each of these regions should have separate currency which fluctuates relative to all other currencies" (Mundell, 663). He claimed that the presence of such a system would then "carry the argument" for the reasoning behind flexible exchange rates. The mobility of factors of production within regions would allow for stabilization process in the event of a demand shift. For example, when the demand shifts from good A to good B, there will be temporary unemployment surrounding the production of good A. Factor mobility would then allow for the unemployed workers to move to good B's industry, as the

increased demand would require increased supply. Thus, the first criterion for an optimum currency area is the mobility of factors of production, more specifically geographic labor mobility. The second criterion addresses the idea of the symmetry of shocks between countries. The currency area should include countries that tend to experience economic booms and recessions symmetrically, so that the appropriate monetary policies can be assigned for each occasion. The third criterion is the integration of product markets.

Mongelli (2008) provides an extensive analysis of OCA theory from its initial theories to the most current research at the time of the paper. He separates the criterion of the integration of product markets into the degree of economic openness and the diversification of production and

consumption. Economic openness incorporates the degree of trade integration, the share of tradable versus non-tradable goods and services, the marginal propensity to export, and international capital mobility. Production and consumption diversification is essential because it decreases the impact of sectoral shocks to the economy. "More diversified partner countries are more likely to endure small costs from forsaking nominal exchange rate changes amongst them, and to find a single currency more beneficial" (Mongelli, 3). He discusses the tradeoffs of a single currency area, as argued by Tower and Willett (1976). They claimed that the usefulness of money is increased for more open countries, but they compromise the liberty of discretionary macroeconomic policies. Therefore, countries would not have instruments to gain

internal balance during a shock. Mongelli (2008) compares the cost-benefit analysis of previous literature and concludes that price and wage inflation and similarity of shocks are the most important characteristics, with the similarity of shocks acting as a "catch all" property.

A unique aspect of Mongelli (2008) is the presentation of the "new" OCA theory. The first difference between the new and old theory is the cost of dependent macroeconomic policy. The monetarist movement argued that the cost was not as great as the pioneering economists had thought. However, more recent studies now claim that the costs are not as large as the pioneers thought nor as low as the monetarists suggested, but somewhere in between the extremes. Second, there is a creditability problem for countries that have

historically high inflation to claim low and stable future inflation. The solution is having an "anchor" country that has had a proven history of low inflation in the monetary union to legitimize the expectation. The third alteration falls in line with the theory of labor mobility, as it discusses the importance of wage bargaining. Nations that are contemplating a single currency should join with nations that have similarly organized labor markets. "Countries with either strong centralization or strong decentralization are more capable of facing supply shocks than countries with an intermediate degree of centralization" (Mongelli, 13). Finally, the "new" theory discusses the implications of losing nominal exchange rate as an instrument. The classical opinion identified a lag in the manipulation of the exchange rate, which rendered the effects of

the change less effective. However, the more recent

opinion, based upon various European devaluations

of the 1980s, is that there is a significant cost in

losing the ability to manipulate the nominal

exchange rate. Thus, it is imperative to partner with

nations that have similar symmetry of shocks so that

there is a harmonization of policy. The final

component involves empirical tests of the criteria,

which are similar to the tests run by Eichengreen

(1991) and O'Rourke and Taylor (2013) in the next

section.

Does Europe fit the criteria?

Eichengreen (1991) offers a critique of

whether Europe is an optimum currency area. To do

this, he used the variability in the real exchange

rates and regional stock price differentials of the

European countries to illustrate the symmetry of

shocks between the nations. The variation in real exchange rates represents the lack of symmetry between nations, as nations experiencing booms should have higher relative prices. Thus, if nations were experiencing a boom at the same time, the prices should both be high with little difference between them. Eichengreen tests this criterion by finding the standard deviations of the European real exchange rates for the 1970s and 1980s and compares them to that of the U.S. For the 1970s (see Figure 1), the European standard deviations ranged from 5.4 to 14.0 percent, averaging 8.9 percent, whereas the U.S.'s ranged from 2.0 to 2.7 percent. For the 1980s (see Figure 2), European standard deviations ranged from 1.0 to 9.6 percent, averaging 5.7 percent and the U.S.'s ranged from 1.3 to 1.5 percent. The regional stock price

differentials should also show the symmetry of shocks because, "the profits of equities should reflect the present value of current and expected future profits" (Eichengreen, 6). Therefore, the more closely related the real share prices are across the regions, the more asymmetric the shocks. He evaluates the differentials between the average prices of securities traded on the two regional Canadian stock exchanges (Toronto and Montreal) with differentials between Paris and Dusseldorf. The results show that the stock prices in Canada are historically more correlated than those in Paris and Dusseldorf, therefore region-specific shocks are stronger than in Canada.

Figure 1. 1970s Range of Real Exchange Rate
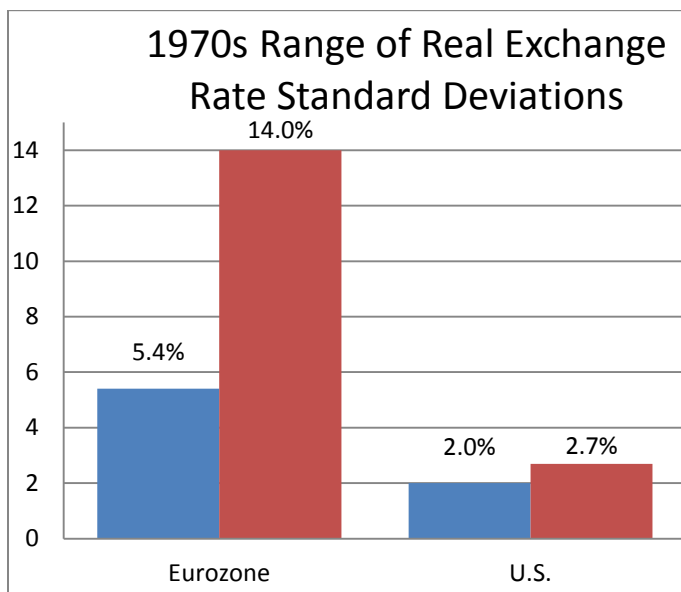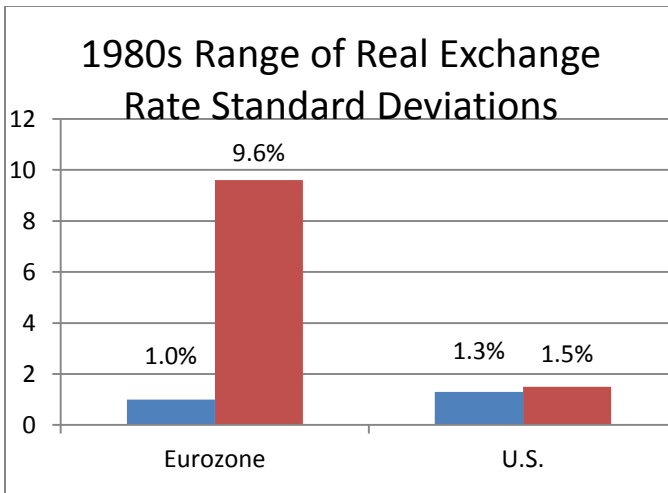Standard Deviations from Eichengreen (1991)

1970s Range of Real Exchange Rate Standard Deviations

- Eurozone: 5.4%, 14.0%
- U.S.: 2.0%, 2.7%

Figure 2. 1980s Range of Real Exchange Rate
Standard Deviations from Eichengreen (1991)

1980s Range of Real Exchange Rate Standard Deviations

Eurozone: 1.0%, 9.6%
U.S.: 1.3%, 1.5%

Next, Eichengreen (1991) investigates the labor mobility criterion. He bases this section on previous research that made a systematic comparison of the mobility within the U.S. and within the European nation. That study found that the mobility in the U.S. was two to three times as high as mobility within Europe. He also references his own past research in which he estimated regional unemployment differentials for both

Europe and the U.S. The study found that regional

unemployment rates in the U.S. adjust to one

another approximately 20 percent faster than

national unemployment rates of European countries

adjust. While the results clearly show that there is

not significant labor mobility between European

nations, Eichengreen (1991) does warn of bias due

to the presence of international barriers.

In addition to this analysis, O'Rourke and

Taylor (2013) also provides data to question the

suitability of an OCA for the 17 Eurozone countries

(note Latvia and Lithuania adopted the Euro after

this paper was published). For the market

integration criterion, they compare cross-border

interstate trade as a percent of GDP for the U.S. and

the Eurozone. They find that cross-border interstate

trade was 66 percent of GDP in the U.S. and only

17 percent in the Eurozone. For symmetry of shocks criterion, they considered the correlation between local growth and growth in the monetary union as a whole. The average correlation between real GDP growth in the eight U.S. Census regions and the national real GDP growth was .78 and the average correlation between real GDP growth in the Eurozone countries and real GDP growth across the entire Eurozone was 0.5. Finally, to measure labor mobility, they consider the average amount of people who were born outside of the current U.S. state that they live in compared to the amount of people born outside of the Eurozone country where they currently live. The results were that 42 percent of people in the U.S. were born outside of their current state and only 14 percent of people in the

Eurozone were born outside of their current

country.

Figure 3. Results for each criterion from Taylor and O'Rourke (2013)
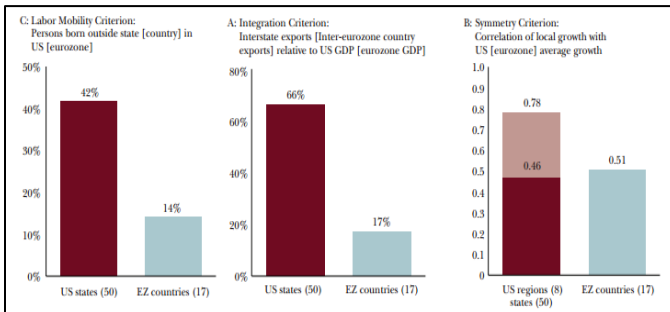
These results are only a small share of tests

that can be used to evaluate the EMU's ability to

meet the OCA criteria. Therefore, a more important

study would be to identify how the EMU should

move forward in correcting the problem of not

meeting the OCA, a problem that is somewhat

responsible for the current economic crisis. Mundell

(1961), Eichengreen (1991), and O'Rourke and

Taylor (2013), along with many more in recent

years, suggest that there should be a fiscal union,

banking union, or both to support the monetary

union that is in place. However, I would like to

propose an alternative method to deal with the

current economic situation and promote future

economic synchronization.

III.   RESTRUCTURING THE CURRENT EUROZONE

As I mentioned above, Mundell (1961)

initially saw the benefit in dividing the world into

optimum currency area regions. I would like to test

this theory in the current EMU today because of the

following reasons. First, it is apparent from the

existing literature that the current 19 independent

member nations do not appropriately fit the OCA

criteria. Second, a single currency in the Eurozone

has proven to be detrimental for both the countries

themselves and the value of the currency, as the

Eurodollar has depreciated by approximately 15.9

percent over the last year and drastically over the

past five years (see Graph 1). Though one may

argue that the depreciated currency has aided the

Eurozone economies from worse conditions, I see it

as a sign of a weaker economy than it traditionally

has been. Third, I believe that the continued

existence of a monetary union in Europe is

beneficial for maintaining stability on a continent

with an abundance of developed economies. In

consideration of all three reasons, I argue that there

should be a restructuring of the 19 Eurozone nations

into regional currency areas that would continue to

operate under one central bank, the ECB.

Graph 1. Historical Euro Dollar exchange rate from 2005-2015.
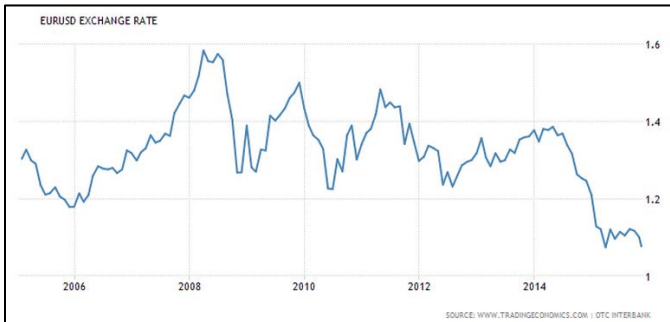
Source: www.tradingeconomics.com |OTC INTERBANK

Regional Currency Areas

Monegelli (2008) provides a blanket statement for the benefits of single currency areas. He argues, "The benefits from a single currency area result principally from the increased usefulness of money, the disappearance of intra-area nominal exchange rate uncertainty that would foster trade and promote cross-area foreign direct investments, and the access to broader and more transparent financial markets" (Mongelli, 5). With that, it may

seem unproductive to separate an already established single currency area. However, Mundell (1961) presents a section specifically pertaining to the theory of regional currencies. He argues an idea that excess demand in one region, experiencing inflationary pressure, could be transferred to the region lacking demand, experiencing unemployment, by allowing regional exchange rates to fluctuate. Therefore, if the EMU continued its policies to maintain price stability and full employment, there might be a stabilization mechanism in optimum currency regions with independent currencies. If one region was experiencing a boom and another a recession, the ECB would allow the booming currency to inflate, while the busting currency would depreciate. This manipulation would have an effect on exchange

rates, so that the demand for goods in the booming region would fall and the goods in the busting region would become more desirable. Therefore, one of the most significant costs of single currency areas, the narrowing of macroeconomic policy instruments, will become less significant with the establishment of three regional currencies. Under this system, the ECB would control the currency and monetary policy for each of the regions, as they will remain in the EMU.

There are some risks associated with this suggestion. Mundell (1961) claims that during, "the gold standard depression in one country would be transmitted, through the foreign-trade multiplier, to foreign countries. Similarly, under common currency, depression in one region would be transmitted to other regions for precisely the same

reasons" (Mundell, 660). This would suggest that the interdependence of the regions on each other could be detrimental if all of the regions fell into depression at the same time. There is also the risk that "fine-tuning" will prove to be ineffective in practice. There are many factors that contribute to the well being of an economy, so the theoretical belief that the regional currencies will promote stabilization mechanisms could fall apart. Overall, the division of the current Eurozone nations into sub-regions under the ECB presents benefits with more proper alignment and potential stabilization instruments, but has certain risk of only being functional in theory.

Method

To further this idea, I use both theoretical and statistical analysis. First, I have considered the

regional currency area theory in Mundell (1961)

and Mongelli (2008) by outlining their frameworks

in the last section to debate the cost and benefits of

having the currency areas, specifically how they

respond to shocks in demand. In order to determine

the number of regions and the placement of

countries for each region, I use the k-means data

clustering method. k-means is a widely accepted

form of data clustering that finds K clusters by

minimizing the distance between each data point

and its cluster's center (centroid) using an iterative

algorithm that adjusts each centroid's location. With

this method, the similar countries clustered around

the same centroid will be grouped in the same

currency region. My goal is to find three distinct

groupings of the Eurozone countries' based on GDP

growth rates to illustrate the symmetry of nations'

shocks. The GDP growth metric is used in agreement with Mongelli (2008). I will run the k-means in the MATLAB software over 1,000 times in order to find the clusters with the lowest mean distance from the counties to the respective centroids. My dataset includes pre-financial crisis annual GDP data from 2000-2007, extracted from *World Data Bank*. I would prefer to use quarterly GDP data to better observe how the business cycles fluctuated throughout the year for each nation, but am limited to annual data for this paper. In addition to the output from the k-means tests, I will also use geographic location as a determinant.

IV.   RESULTS

European Currency Regions

My statistical analysis provided me with
three regions for the current Eurozone. The k-means
test was run 1,200 times and the sum of the mean
distances from country to centroid for each cluster
was 243.25. The output provided numerous
combinations of mean distances for each cluster.
However, the sum of the three clusters was a

Figure 4. k-means cluster for the Baltic Region
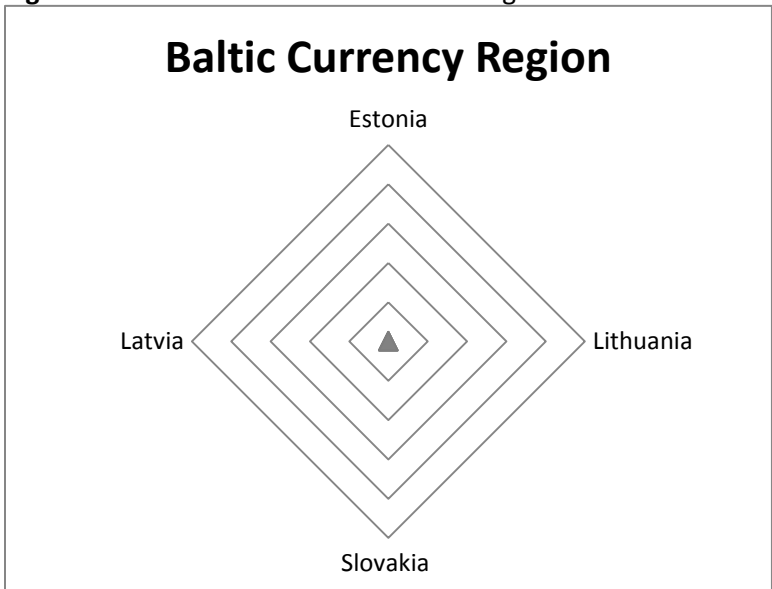
recurring number throughout the tests. Therefore, I used the lowest of the sums, which a combination of the three was 243.25 the majority of the time. The three regions that the k-means results determine are shown Figures 4-6 with the Baltic, Eastern, and Western Currency Regions. The only change that I have made based on location is the addition of Finland to the Baltic Currency Region. Therefore, the Baltic Region includes Estonia, Lithuania, Latvia, Slovakia, and Finland. The Eastern Region includes Spain, Greece, Slovenia, Luxembourg, Cyprus, and Ireland. The Western Region includes France, Portugal, Italy, Germany, Malta, Belgium, The Netherlands, and Austria. While the Baltic Region is logical based on location, the Eastern and Western Region results were more difficult to justify. The Western region consists mostly of the

larger and more disciplined economies, with
Germany at the forefront. However, the k-means
results further suggest that the economies that
continue to experience economic crises are
correlated. I believe it may be beneficial for policy
making purposes to have a stronger and more stable
region in the Western Region and a recovering
region in the Eastern region. I will further discuss
policy implications of the new currency regions in
the next section.

Figure 5. k-means cluster for the Eastern Region

Eastern Currency Region

Policy Implications

My recommendation for policy in such a
system would be to maintain similar, if not the same
targets the ECB has today. The new EMU as a
whole would target 2% inflation, but each region
could have fluctuating rates in order to enable the
stabilization mentioned above. The important
question is why I have decided to place one central

Figure 6. k-means clustering for the Western Region

Western Currency Region
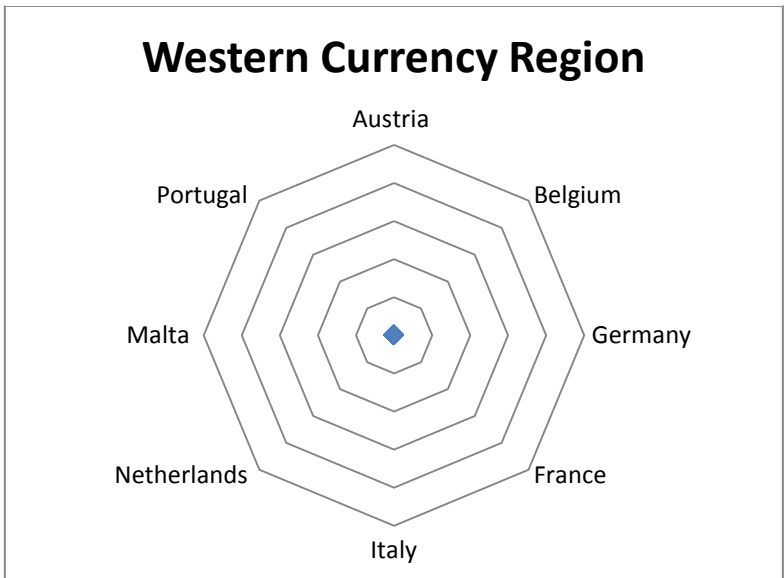
bank in charge of three different currencies. My reasoning is twofold. First, there are distinct reasons why the EMU unified monetary policy in the first place. Second, there is substantial literature that has established the benefits to integrating international policy. Tavlas (2004) addresses the significant creditability that countries that have had recent histories of relatively high inflation rates (Greece, Italy, Portugal, and Spain) gained from eliminating the "inflation-bias problem of discretionary monetary policy" (Tavlas, 94). Those countries were infamous for overstimulating the economies and financing debt and deficits through inflationary measures. Confining the erratic economies to the policies of prudent economies like Germany, with low and stable inflation and inflation expectations, makes each much more creditable and stable. In

consideration of this idea, it would seem foolish to remove policymaking from the one unified central bank due to the risk of potential erratic behavior of countries with previously flawed economic behavior.

In addition, Pikoulakis (1995) devotes a chapter to international monetary policy coordination. He claims that in a multiple country world with rigidities in wages and prices there are negative externalities associated with independent monetary policymaking. By using an example of monetary expansion, Pikoulakis presents how the depreciation of a home currency results in definite "beggar thy neighbor" effects. He concludes by saying the, "absence of international policy coordination leads to contradictory monetary

policies relative to the cooperative outcome"
(Pikoulakis, 185).

In consideration of both of these points, it is
logical to delegate the control of each currency to
one central bank to ensure appropriate and
consistent policymaking behavior along with proper
coordination of each regions respective policies.

V.   CONCLUSION

One of the main objectives of the Maastricht
Treaty in 1992 was to promote the interdependence
of European nations by forming a stable and
effective economic and monetary union. The
current economic situation in Europe is quite the
opposite as the troubles of Greece and other
southern European nations have caused a significant
crisis. The crisis calls for new improvements in
order to revive many strong, developed economies.

This paper reiterates the points of Eichengreen (1991) and O'Rourke and Taylor (2013) by agreeing that the current Eurozone is not an optimum currency area by theory. I suggest that the Eurozone could be more stable and efficient if it were divided into three sub-regions. The Baltic Region, the Eastern Region, and the Western Region, would have independent currencies controlled by one central bank in the ECB. The ECB would continue to target inflation as it does today union-wide, while using regional monetary policy as instruments. While this proposal is merely theoretical, further research could make the idea of European currency regions more practical.

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