

WHAT SEPARATES US? A STUDY OF SPATIAL ECONOMIC DISPARITY IN THE
UNITED STATES AND GERMANY

By

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To my grandfathers, Claudio De Jesus and Jose Rosa, it is because of you that I found my faith and know the value of life; Gracias por todo

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LIST OF ABBREVIATIONS

DE	Germany
EDA	Economic Development Administration (United States)
ESDP	European Spatial Development Perspective
GDP	Gross Domestic Product
GIS	Geographic Information Systems
US	United States

Abstract of Thesis Presented to the Graduate School
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Economic disparity is a growing problem in the United States. Understanding economic disparity in a spatial context can help researchers and leaders understand what sectors of the economy are failing and which are successful in their region. The characteristics of this region such as population and land use controls could be affecting economic productivity. For a community leader to write truly effective policy they must also understand the spatial aspects of their region this helps achieve social cohesion.

What is economy telling us about the United States aptitude to reduce spatial economic disparity? Germany has managed to reduce spatial income disparity throughout the period which is examined in this study. Examining the German economy, the researcher has been able to make recommendations the United States for future development.

Using Global Moran's I and Local Moran's I the researcher first examined both Germany and the United States for clustering or dispersion of income. After finding that the United States was leaning toward a clustered environment of unequal distribution and Germany was leaning toward a dispersed environment of more equal distribution,

the Global Moran's I scores were regressed with the past performance of the selected economic indicators. The regression results combined with economic theory were used to draw conclusions about the performance of each country.

The results of this study showed the growth of Global Moran's I scores in the United States from a random dispersion (0.033489) to a clustered dispersion (0.357683). In Germany the results of this study showed a decline in Global Moran's I scores from a clustered dispersion (0.605395) to a random dispersion (0.189717). The Global Moran's I scores were regressed with 13 variables. The most notable was a distinct decline in industry with an almost equivalent growth in services. Germany managed this transition quite well while the United States experienced adverse affects on spatial economic disparity.

Other conclusions of the study deal with population growth. Germany experienced manageable (0.5%) population growth during the period examined. Meanwhile the United States went through extreme growth in population (11%) without a commensurate growth in employment creating sectors which may have lead to the growth in spatial economic disparity. After examining the growth in population much of this growth can be attributed to immigration. Immigration laws in the United States are a constant battle but should continue to be examined in an economic context.

CHAPTER 1 INTRODUCTION

Economic disparity affects many parts of life for people on both ends of the economic spectrum. The discussion provided throughout this document addresses regional disparity along with local and individual. It should however be stated that the research conducted for this publication is intended to investigate the scope of regional economic disparities in Germany and the United States. The additional literature is for the readers' reference and to frame the problem at hand.

Background

The interference of government within private business to protect the rights of the people is often debated. Germany (DE) has taken it upon itself to write spatial economic policy to fight economic disparity, while the United States (US) has taken a more laid back free market approach. Both have seen successes and failures. The aim of this research will be to examine these countries economic performance in a spatial distribution context by examining income per capita. In the past, United States presidents have been very vocal in expressing the way they believe the economy should work.

We who live in free market societies believe that growth, prosperity and ultimately human fulfillment, are created from the bottom up, not the government down. Only when the human spirit is allowed to invent and create, only when individuals are given a personal stake in deciding economic policies and benefiting from their success -- only then can societies remain economically alive, dynamic, progressive, and free. Trust the people. This is the one irrefutable lesson of the entire postwar period contradicting the notion that rigid government controls are essential to economic development. (Reagan, 1981, para. 10)

Ronald Reagan made these remarks at the annual Board of Governors meeting of the World Bank and International Monetary Fund. Throughout his speech President Reagan

makes it very clear that it is his utmost belief that economic prosperity can only be achieved through a free market. To make his point he sites World War II times and post-war conditions in participating countries, claiming that these conditions are a reflection of the economic policies of these countries. Twenty years earlier another United States president made his argument on the economy.

...create a social framework within which all the people of a nation can share in the benefits of prosperity, and participate in the process of growth. Economic growth without social progress lets the great majority of the people remain in poverty, while a privileged few reap the benefits of rising abundance. In addition the process of growth largely depends on the existence of beneficial social conditions. (Kennedy, 1961, para. 16)

President Kennedy spoke these words to Congress in 1961 while he was requesting funds for the Inter-American Fund for Social Progress and reconstruction in Chile. His claims are interesting in that he says that without social progress, economic progress is quite meaningless. His argument stems from the belief that illiteracy, geography, and other barriers can, but should not, cause a lack in participation in economic growth. He believes that it is the government's place to intervene and close gaps so that all may benefit. He once also made the claim "economic policy can result from governmental inaction as well as governmental action" (Kennedy, 1960, para. 10). Hilary Clinton used the quote during her failed campaign for the US presidency in 2008 making the argument that this was the time for the government to act.

Both John F. Kennedy and Ronald Reagan spoke in Berlin during their presidencies. In 1963 President Kennedy gave his I am a Berliner Speech, in which he repeatedly uses the phrase "Let them come to Berlin." The point of his speech is to attack communism's suppression of the people and the economy. He makes the notion that economic progress and freedom cannot be attained in a communist nation. Coming

to Berlin would allow people of his time the opportunity to really see, with their own eyes, the difference between a communist state and a free democracy, although West Berlin was technically an occupied state at the time.

In 1987 Ronald Reagan came to the Berlin wall and spoke at the Brandenburg Gate. His famous speech, Tear Down this Wall, challenges Soviet Union, General Secretary Mikhail Gorbachev to destroy the Berlin Wall as proof that the Soviets were changing their ways. Reagan, in a very even tone, proclaimed, "...if you seek peace, if you seek prosperity for the Soviet Union and eastern Europe, if you seek liberalization, come here to this gate. Mr. Gorbachev, open this gate. Mr. Gorbachev, tear down this wall" (Longley, 2010, para. 6) The Berlin Wall served as possibly the best and clearest symbol of spatial economic disparity. In 1989 the wall was taken down and Germany became a unified country under one government. Recovery from economic disparity is a slow process.

The United States, in its relatively short existence has achieved the highest GDP, \$14.2 trillion, of any single country; the closest country being Japan with \$4.9 trillion (The World Bank, 2009). Germany comes in at fourth place with \$3.6 trillion. Both the US and DE rank above the world average of GDP per capita (CIA, 2009).

While the economic success of both regions is undeniable it is still important to address the quality of life people experience. For example, China ranks third in the world by GDP yet 89th in GDP per capita (The World Bank, 2009), showing that the quality of life does not fall in line with its ranking in GDP. Between 13% and 17% of the United States population lives in poverty at any given time (Zweig, 2004). In 2004 the German poverty rate was 16% (Eurostat New Chronos, 2004). These rates indicate that

economic disparity exists in both the US and DE. However, the US and DE show something completely opposite from china, their respective rankings in world GDP and world income per capita share a higher proximity. If one is able to scrutinize income per capita on a county level (or Landkriese in Germany) over time an analysis of spatial economic disparity is possible.

Relevance of the Topic

As the EU continues to grow it is inevitable that countries of lower economic status will seek ascension. In 2007 the EU granted ascension to Bulgaria. Bulgaria ranks 72nd in GDP (\$51.9 Million) and 67th in GDP per capita (\$11,760) according to the International Monetary Fund. This makes Bulgaria the poorest nation in the European Union. Economic disparity will occur in the EU simply because the economic centers of the poorer ascension countries are not yet as viable. A major factor affecting economic disparity in Europe is a city's location within Europe (McCarthy, 2000). As the EU grows it will have to attempt to reduce economic disparity to preserve the structural integrity of the EU.

...the poorest urban 'engines' are becoming weaker relative to the richest ones. If the assumption is correct that lowering disparities will promote growth, the lack of a reduction in urban inequalities has implication for the overall health of the EU. (McCarthy, 2000, pp 407)

The United States went through a rapid growth from 13 colonies to 50 states in 183 years. Through those years the U.S. went from a rebellious thought to an industrialized world superpower. That expansion had economic implications for the middle and mid-west portions of the country. It is very evident that the spatial distribution of wealth that occurred from 1776 to 1959 has translated well into the 21st century. Similar concern exists in the EU. Linda McCarthy claims "the likely scenario for the foreseeable future is

continued higher income disparities for the cities compared with the regions” (2000, pp 408). The past governments of the ascension countries may have much to do with existing disparity as some of these countries were former communist regimes, such as East Germany during much of the 1900s.

Freedoms from persecution and access to education are part of the basic human rights both Americans and Germans enjoy. Yet race, gender, and access to good education still act as barriers to economic progress for both countries today. The United States distribution of family income Gini index numbers have been on the rise since at least the 1970s. In 2000 the index read 40.8, seven years later in 2007 the number looked more like 45 (CIA, 2009). The Gini coefficient measures statistical dispersion, it has been adapted to many fields of study but its most common use is to measure the inequality in the distribution of family income in a given country. The US, having a coefficient of 45, is most similar to Costa Rica, Jamaica, the Philippines, Uganda, and Uruguay. In 2000, reports indicated Germany's Gini coefficient at 28.3, and six years later in 2006, at 27 (CIA, 2009; The World Bank, 2009). Germany's present Gini coefficient is most like Austria, Czech Republic, Hungary, and Albania.

Germany's Gini coefficient is showing signs of convergence while the United States' coefficient is clearly diverging from its preceding numbers. Politicians in the US have failed to address the diverging wage gap it in the past. In June of 2005, Alan Greenspan was quoted during a congressional hearing saying, "as I've often said, this (increasing inequality) is not the type of thing which a democratic society, a capitalist democratic society, can really accept without addressing" (Grier, 2005, para. 8). Since 1776 the US has been proclaiming freedom and equality.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are Life, Liberty and the pursuit of Happiness. — that to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed. (US Declaration Ind.)

Climbing wage gaps in the land where all men are created equal; a country with the highest GDP and 11th highest GDP per capita in the world begs the questions as to why and how disparity is growing and more importantly how do you slow it down or reverse it? In 1979, the top 1% of the United States' population earned 7.5% of the nation's income (Shapiro,2005). As of 2002, the top 1% of the US population earned 11.4% of the nation's income, further confirming the existence of divergence in income distribution (Shapiro,2005).

The causes for wage disparity are constantly debated. The most obvious is occupation. Lawyers and doctors make more than secretaries and postal workers. This fact falls in line with the most basic of economic principles, scarcity. The skills of a doctor or lawyer are simply scarcer than that of a secretary or postal work and therein lies the wage disparity. As a capitalist society, the US is not only aware of this fact but generally supports it. Two other causes for income disparity in the United States are the rise of the single parent household and the increase in immigration. Location has been attributed to disparity in the European Union but is often overlooked (or unaddressed even when observed) in the United States.

Income inequality has consequences ranging from public health to social cohesion. In April of 2005 the University of Wisconsin was responsible for putting together a report which analyzed the link between increased economic inequalities and the potential makeup of the future American work force. The issue of economic disparity is one that has been dealt with over a long period of time in a variety of ways. Using

available literature and applicable economic models this project will analyze the spatial component of wage disparity throughout time in both Germany and the United States in order to propose recommendations for the reduction of spatial economic disparity. The histories of these countries in economics and government are very different, yet they have been involved with each other deeply for almost a century; perhaps they have something to learn from one another when it comes to economic disparity.

Planning Implications

Spatially the majority of wealth in the US is located toward the coast lines, corresponding with the colonization (east coast) and the gold rush (west coast). Thirteen of the 25 richest cities in the world are located in the United States. Of those 13 cities, nine of them are located along the country's coastline. The U.S. has continued to grow and while cities like Dallas, Austin, and St. Louis have become economic centers the density of economic prosperity still remains in the coastal extremities of the U.S.

A geographically opposite affect has taken place in the EU where the concentration of world market economic activity has occurred in the center; inside the pentagon created by London, Paris, Milan, Munich, and Hamburg. West of the Munich-Hamburg line are 10 of Germany's 12 regional economic centers (Kratke, 2002). To the east of the Munich-Hamburg boundary lie only 2 regional economic centers as one reaches the Polish border. As Poland's economy grows, Polish businesses are not investing to their borders but the "regions' transnational economic interlinks reveals the predominance of a 'leapfrogging effect' in favour of the regional development and innovation centres in West Germany" (Kratke, 2002, pp 657). Much like the attraction to the west of U.S. settlers for Gold there is an attraction for foreign investments in areas that have already proved their economic vitality. The feeling is mutual as it seems that

the established economic powers in West Germany are the ones making foreign investments in Poland as well. Of the 833 surveyed German firms with Polish subsidiaries, 793 of them reside in West Germany (Kratke, 2002).

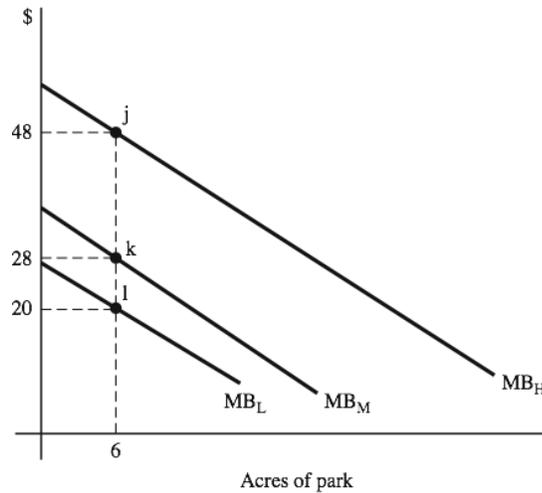
The “leapfrogging” effect may also be explained by the population residing on the borders of East Germany and Poland. Stefan Kratke makes a critical observation about these groups of people:

in the eastern border regions...the average stock of manufacturing employees amounted to only 58, which means that it was roughly half the size (52%) of the average value in West German regions . . . In the German-Polish border region's...the average stock of employees in the manufacturing sector comes to 36 in the border town of Frankfurt, 45 in the district Markisch-Orderland, and 70 in the district Oder-Spree. (2002, pp 659)

Equally important is the industry of technology or research and development, which is also reliant on people as capital. Population ranks third in the top four indicators of a competitive city in Europe (Lever, 1999). Studies have shown that competitive success is positively correlated with urban size and that economic potential favors the core of Europe with no regard for the periphery (Lever, 1999). The United States is very similar in that most of its foreign investors are locating in areas of high density and resources of people. While pockets of success occur throughout the Midwest, it is not the norm, as the population density is low there relative to the United States' coasts.

Urban Planners deal with different economic classes on a daily basis. Planners, by trade, are always supposed to have their clients' best interest in mind. Many Planners work for government meaning their client is the populace of the municipality in which they are employed. Dealing with many different groups of different economic backgrounds can be difficult.

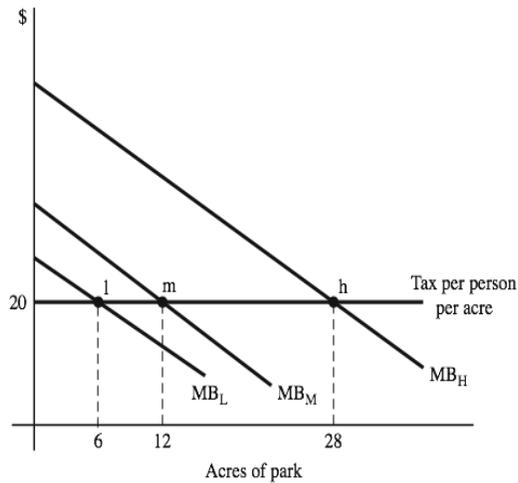
Take a simple park planning example. A city has three types of voters, low, middle, and high income. Each income group has different demands for park services. The park costs \$60 per acre, and the costs are shared equally by the citizens regardless of their economic class. Examine the figure below.



Source: Adapted from O'Sullivan, 2008

Figure 1-1. Diversity of Demand for Local Public Good

All other things being held equal, our group of low income voters is willing to pay a \$20 for a 6 acre park at point L. At six acres our group of high income voters is willing to pay \$48 per acre of the cost as a tax.



Source: Adapted from O'Sullivan, 2008

Figure 1-2. Twenty dollar tax imposed

When a tax of \$20 is imposed the demand of the higher income group is a bigger park to achieve the utility of the smaller park at the higher cost. Then comes the question of where to locate the park. Does one put the smaller park in the higher income neighborhood where it will be much cheaper for the city to build because the citizens are willing to pay a much higher tax? Does one aim to please the middle class? These are all questions a Planner must address.

This example may seem trivial but it serves to show just how invasive income disparity can become when it even begins to deal with the placement and design of a possibly meaningless small city park. Planners also deal with issues of economic development. They are attempting to raise the standard of living in their municipality by attracting economic investments. In Europe it is illegal for local governments to offer tax abatements to industries. In the United States, governments are constantly putting together tax breaks and incentive programs to make their area more attractive for investments.

Cities with lower populations or industries which pay less money than their neighboring cities have a smaller tax base and then are unable to put together the competitive incentive packages for industries looking to expand in their region; their only incentive may be cheap land or their proximity to a better city. Economic disparity can have serious implications on the development or lack of development in a region. The planner is an integral part of this process as he/she is repeatedly the representative of the city or negotiator of the arrangement and must still abide by private property rights set forth by the United States' government.

Discussion of Economic Policy

The United States economy, since its inception, has operated with the fiscal federalism school of thought; spreading fiscal responsibilities across different levels of government. Germany also operates with fiscal federalism as its economic backbone but also employs fiscal equivalence, starting with Germany's constitution. Article 72.2 of the German constitution states

The Federation shall have the right to legislate on these matters if and to the extent that the establishment of equal living conditions throughout the federal territory or the maintenance of legal or economic unity renders federal regulation necessary in the national interest. (Federal Law Gazette, 1949)

The provision of equal living conditions refers mostly to infrastructure and public services, such as police, fire, education, or recreation. These are services which in the US are controlled by the counties and states, with very little interference by the federal government.

The US Department of Education acts as a cabinet level department. Its main function is to create programs that raise funds for education and to help enforce privacy and civil rights laws in school. Some have attributed the department's limited power to the general opposition it has received in the past from the Republican Party. It was not until the President George H. Bush administration that a republican supported the Department of Education. His son, George W. Bush, shared a similar ideology, passing the "No Child Left Behind Law." Still, the provision and quality of education, along with the majority of public goods are left to the control of local governments.

The unification of Germany was a very delicate process. It was the joining of a communist nation and a democratic nation; which essentially created economic disparity. In West Germany, the notion of equal provisions already existed. The aim to reduce disparity throughout the region was built-in through a revenue sharing method. States with lower tax generating capabilities are aided by states with the better tax generating capabilities. This system is flawed in some of its design but has still seen success. In the United States, most counties receive the majority of their tax revenue through property taxes. An area with smaller homes, homes of lesser quality, or less inhabitants will have less tax revenue and vice versa. The typical situation is to work within ones means; meaning lower quality of public goods due to lower wages in that county with little to no chance of federal assistance. Some local (city and county) governments may receive assistance funds from their states budget; different states having different policies. In addition to its own fiscal policy, the European Union has added spatial policy of its own.

The goal of the EU regional policy is to create a union of interests among the member nations. The EU paints their regional policy aim as:

...the reduction of the gaps in development among the regions and disparities among the citizens in terms of well-being. The Union seeks to use the policy to help lagging regions to catch up, restructure declining industrial regions, diversify the economies of rural areas with declining agriculture and revitalize declining neighborhoods in the cities. It sets job creation as its primary concern. (Working for the, 2004, pp 3)

One of the ways the European Commission has chosen to create solidarity is through the European Spatial Development Perspective (ESDP).

The ESDP was approved by the Commission in 1999. The purpose of the ESDP to “work toward a balanced and sustainable development of the territory of the European Union.” (European spatial development, 1999, pp 3). EU member nations have individual control over their countries; that includes their land, and land use. In order to achieve national spatial planning, member states have been asked to cooperate voluntarily with the proposed planning perspective; the document is legally nonbinding. In this case the EU has gone to great lengths to provide options and guidance on how to achieve what they view as a successful spatial map in sectors such as land use, transportation, and economics. Germany has taken it own initiative to address spatial economic disparity as well. These will be discussed in the following chapter.

“The Commission is particular in making profuse use of principles that, by virtue of coming out of the ESDP, can be considered as representing the consensus amongst member states” (Faludi, 2002, pp 906).When assessing long-term development the document points to cooperation between member states, the importance of local and

regional communities, and the future enlargement of the EU, as the most important factors to address. The 1999 ESDP writing gives countries the flexibility to work within their means to contribute toward the initiative and its nonbinding design allows them to do it on their own schedule. This policy has proven itself to be strong and the United States has nothing equivalent.

As was pointed out in the earlier portions of this chapter, Germany has managed to decrease its Gini coefficient for income disparity all the while the United States' coefficient has continued to increase. The United States' competitive fiscal federalism has served it well in becoming a prosperous nation. Germany remains comparable but uses distributive federalism. The differing economic policies of these countries have much to say on how economic development has occurred.

The Following Writing

The writing to follow is organized into theoretical framework, methodology, hypothesis, results, and conclusions and recommendations sections. The section on theoretical framework is set to outline economic theories and real world examples along with commentary on existing literature on the matter at hand. Second, the methodology and hypothesis sections will serve to summarize the methods chosen by the researcher to examine the problem and give the expected outcomes of the research. The results section will provide the results of the study in an objective manner without additional comments. Lastly, the results and recommendations section will synthesize the results with the discussed economic theories and the current regional economic policies in their respective countries.

CHAPTER 2 THEORETICAL FRAMEWORK

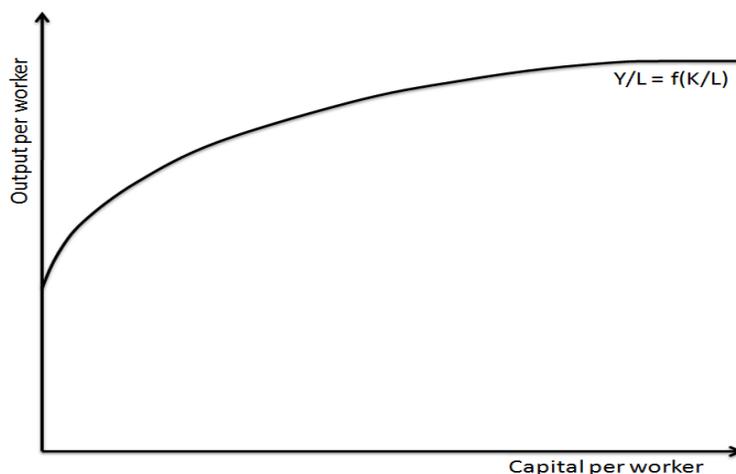
Neoclassical and Keynesian Growth Theory

The schools of neoclassical and Keynesian economists have worked tirelessly to evaluate theories and concepts that aim to explain economic development. Many take the general definition of development as general economic growth or an increase in the ability of a region to produce, while others claim the reduction of spatial disparity as the true definition of development. Neoclassical economics takes on a free market approach to dealing with disparities. When analyzing spatial disparity Keynesian theories assume that governing mechanisms are useful and necessary. Both theories serve their purposes in explaining the 21st century economic situation.

Neoclassical Growth Theory (Solow-Swan Model)

In 1890 Alfred Marshall, recognized by many as the father of neoclassical economics, published *Principles of Economics*. As part of his work Marshall sought an economic solution to improve the quality of life for the poor including the interference or participation of government in the economy. From the days of Marshall, economists have come to the three assumptions about neoclassical thought. First, that people are rational and have rational preferences associated with their values (Weintraub, 1993). Second, persons and firms seek to maximize their utilities (Weintraub, 1993). Lastly, that the same persons and firms act independently using complete information in order to reach that maxima (Weintraub, 1993). The assumption of utility maximization is a very interesting in that it implies the existence of a relative maximum, with that thought comes what economists refer to as diminishing returns. Diminishing returns implies that the return from one additional input will yield a higher numerically but disproportionately

smaller output than the addition which came prior. The firm will reach a point where adding a unit of input will yield zero additional output and may end up costing the firm money and resources.



Source: Adapted from Pike, Rodríguez-Pose, & Tomaney, 2006

Figure 2-1. Illustration of diminishing returns

Neoclassical theory explains that spatial disparity occurs as a result in the variations in the factors of production; essentially technology versus the labor/capital ratio. As economies grow technological advances are necessary along with an increased labor/capital ratio. Diminishing returns are a product of differing rates in growth of the inputs of production. Growth will halt at an equilibrium point when there is no incentive to increase the labor/capital ratio. That region now has no incentive to continue developing until the inputs of production produce a demand.

The neoclassical theory of convergence defines development as "...the long run reduction of geographical disparity in income per capita and output" (Pike, Rodríguez-Pose, & Tomaney, 2006, pp 62). According to this definition the United States has actually experienced negative development using Gini coefficient numbers. By the same

measure Germany has gone through positive growth. Encyclopedia Britannica defines Gross Domestic Product (GDP) as the “total market value of goods and services produced by a nation’s economy during a specific period of time” (“Gross Domestic Product,” 2010, para. 1). The idea of production or output is also one that bears great implications on regional growth. The neoclassical growth model addresses output growth and output growth per worker on a per region basis. These measurements allow a researcher to measure the level of economic competition between regions.

Cities compete for four different objectives; mobile investment in manufacturing or wealth/job providing industry, economic growth, population, and public funds from larger government agencies (Lever, 1999). The neoclassical model states that growth relies on three factors; capital, labor, and technology (Pike, Rodríguez-Pose, & Tomaney, 2006). These three factors of economic growth are covered by the four levels of competition outlined by Lever. If perfect competition was attainable and the market was to function without failures then it is said that the market is able reduce geographical disparities and the social situation will improve (Pike, Rodríguez-Pose, & Tomaney, 2006).

The occurrence of regional economic convergence is the result of a self-correcting mechanism that balances price, wages, capital, and labor (Pike, Rodríguez-Pose, & Tomaney, 2006). The mechanism is said to function because of two markets; one in which wages are high and one where wages are low. In a high-wage region the capital/labor ratio is high. These markets tend to lose capital and attract labor to the wages in that region. As labor increases relative to capital wages will drop. In a low wage market the capital/labor ratio is low. The low wages attract capital investment

while a loss of labor is forthcoming. As capital improvements and investments are made wages will increase due to an increase in efficiency of productivity. Regional convergence is stifled due to the inability of capital, labor, and technology to move freely between regions. The result is market failures such as the negative externality of unemployment in a high-wage region or inefficient production and higher costs in a low-wage region. When keeping these theories and theoretical results in mind it is no surprise research shows that convergence is slow and sporadic.

Monetarily capitalist economies outperform centrally planned economies (Murrell, 1991). Therefore, general thought is that too much government participation in the economy can lead to misallocation of resources. Neoclassical theory suggests that firms act with complete information and it can be argued that this information would be the same information used for government regulations (Murrell, 1991). Yet regional divergence is still a problem because complete information does not warrant an account for the public good. Failures like increased unemployment may constitute grounds for government intervention. While neoclassical thought forecasts markets working toward equilibrium and convergence; history shows that free market economies have the ability to create and reinforce geographical economic disparity.

Keynesian Growth Theory

In 1936, John Maynard Keynes published *The General Theory of Employment, Interest, and Money*, in which he gave birth to whole new school of economic thought. The role of government participation in the economy varies from country to country, often with what political party is in power and the nature of that party (capitalist, socialist, etc). Keynesian economic theory supports government participation while still sustaining the dominance of private firms in market (Keynes, 1936). The theory

assumes that due to the utility maximization nature of private firms they will contribute to macroeconomic inefficiencies in the market. Keynes argues that monetary and fiscal policy imposed from the government can help to regulate and stabilize the economy (Keynes, 1936).

In a Keynesian world an economic downturn could be reversed through government spending on infrastructure and a reduction in interest rates. This approach has been made famous in recent history by the President Barack Obama administration of the United States in their Economic Stimulus Act of 2008 and the American Recovery and Reinvestment Act of 2009. Keynes goal was to use policy to stimulate the economy back to a full employment level because he disagreed that markets drive themselves toward equilibrium (Keynes, 1936).

Keynesian theory agrees with neoclassical thought in that when attempting to create economic convergence, it aims to understand divergence. They also share an almost identical definition of development; “the reduction of geographical disparities” (Pike, Rodríguez-Pose, & Tomaney, 2006, pp 62). Two key variations exist between neoclassical and Keynesian thought. The first is very basic, neoclassical growth theory deals with supply and the factors of supply while Keynesian theory focuses on demand (Pike, Rodríguez-Pose, & Tomaney, 2006). Second, neoclassical growth theory (as was stated above) believes that markets have a self-correcting mechanism which leads to equilibrium and convergence and Keynesian theory believes that markets aggravate economic disparity and lead to divergence (Martin, & Sunley, 1998).

Economies of scale and agglomeration lead to the cumulative concentration of capital, labour, and output in certain regions at the expense of others: uneven regional development is self-reinforcing rather than self-correcting. (Martin, & Sunley, 1998, pp 201)

If markets do in fact aggravate economic disparity then the Keynesian thought of understanding disparity is the first step in policy making against disparity. Below is the discussion of three Keynesian theories of economic growth that claim the fortification of disparities.

Export Base Theory

One prominent Keynesian growth theory is Export Base Theory. Export based theory claims that the difference in a region's ability to experience growth directly correlates with the export demand of that region's products (Pike, Rodríguez-Pose, & Tomaney, 2006). Regions tend to specialize in specific industries such as technology or manufacturing. Based on export demand a region's firms must then make the individual decision of entering the export market or remaining a non-export firm whose products are for local consumption. Export demand for these local products can cause growth for a firm that is potentially exponentially larger than the demand that a local economy can provide.

Export Base theory teaches that specialization is a crucial part of establishing one's position in the market. Specialization creates value, regardless of it being perceived or actual, and hence a higher demand. A good example of export base growth and specialization is Vermont or Wisconsin cheese. The export demand for the cheese is now global. Due to regional specialization the demand for the cheese has remained high along with the price. It can be argued that the regions have experienced economic growth due to the fame and export potential of cheese and the benefits of agglomeration. Vermont cheese continues to grow; production grew by 10% from 2000 to 2006 (Voice of America, 2006).

As a result of growth, an industry's demand for inputs of production such as land, labor, and capital rise; a firm can now afford to pay higher wages and they begin to pull input factors from other regions. The occurrence of agglomeration can also contribute to economic growth as the interest in reducing costs or an available labor pool can bring complimentary or sometimes even competitive industries/firms into a region. Export based theory argues that the inevitable result is geographic economic disparity.

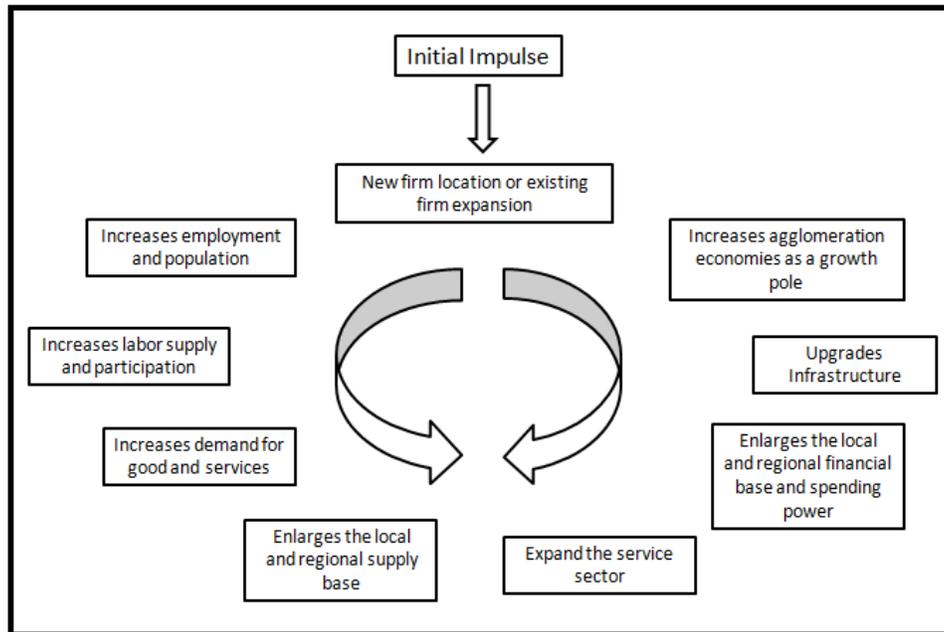
Theory of Cumulative Causation

During the 1970s and 80s Nicholas Kaldor released writings related to the work of Allyn Young, Gunnar Myrdal, and Thorstein Veblen. All of these men are in some way connected and credited with Theory of Cumulative Causation. Kaldor's work is extremely interesting because he completely disregards neoclassical diminishing returns and claims increasing returns of scale relative to factor inputs (Kaldor, 1970). In other words, he believed that one additional unit of input could add an inexplicably higher increase in output. The name of theory comes from the notion that "growth processes founded upon increasing returns are cumulative as fast growing regions steal a march on other regions and further reinforce their regional specialization" (Pike, Rodríguez-Pose, & Tomaney, 2006, pp 73).

Kaldor's theory relies on manufacturing as the central industry of a region (Pike, Rodríguez-Pose, & Tomaney, 1996). The reason for this is manufacturing's need to reach for efficiency. Higher efficiency leads to higher production and in the end higher profits. Manufacturing also lends itself to specialization and extensive division of labor. If one person is able to complete five steps in five seconds, could not five people essentially do one step each in one second, increasing production fivefold or even higher? Kaldor also argues for vertical integration, where firms which create consumer

goods also employ engineers to design and build machinery involved in the production phase. This in house engineering not only provides faster service and expertise to the on site process but creates an export market in and of itself, leading to more growth.

This circular growth can self-propagate leading to more and more growth in a region. The figure below outlines the cumulative causation growth cycle.



Source: Adapted from Pike, Rodríguez-Pose, & Tomaney, 2002

Figure 2-2. Cumulative Causation

Detroit, Michigan is a fine example of cumulative causation. This city is a symbol of agglomeration for the automotive industry. It has housed vertically integrated automotive firms, which have been highly specialized with a large opportunity for division of labor. The specialization of the automobile grew Detroit into a large economic center. The automobile had a high export demand to other regions of the US and the world. Unfortunately, Detroit also fell victim to the negative relationships that can result from cumulative causation, what Andy Pike refers to as “the vicious circles of decline”

(2006, pp 75). A decline in the competitiveness of the particular export due to prices rising in the inputs of production, the consistently lower price of a competing good, or a loss of quality can then lead to the collapse of an economic region which is too reliant on one industry. Cumulative causation can also cause demise of regions surrounding the growing region, as the growing region can often leach labor, capital, and other resources for its own benefit.

All of these qualities continue to point to higher spatial economic disparity. In the case of cumulative causation theory a region could potentially be, at some point in time, on both ends of the economic prosperity spectrum. Industries or firms can also grow to the point where they are unwieldy, or too big to manage efficiently. This phenomenon has shown to be present in the US recession of 2007-10. The word 'bailout' is extremely prominent during these times in that the US government has spent countless funds to save some of these giant corporations which may have grown to a point of no return. Some would argue that the 2007-10 US recession is enough to prove that while cumulative causation can create positive growth it can also create macroeconomic problems (in line with Keynesian theory) and government regulation, as minor as it may be, can be a fundamental necessity.

The Verdoorn Effect Growth Pole Theory

One final Keynesian growth theory is the Growth Pole theory. Verdoorn Effect Growth Pole theory is similar to Cumulative Causation in that it believes that positive outcomes become self-propelling. Summarized the Verdoorn Effect proposes that the growth of production by a firm's labor relies upon the growth of that firm's output (Dixon & Thirlwall, 1975). A Growth Pole is essentially an area of economic growth which has

fostered agglomeration. Growth in other regions is related to the depth of relation and proximity to the pole.

For example, many argue the economy of Osceola County, FL has benefited due its relationship with a larger growth pole, Orange County, FL. Osceola County has a smaller population and tax base than Orange County and although the dispute about the location of Disney will never end among locals, Orlando has become the name most closely tied with the popular tourist attraction. This year the Disney Beach Club Villas boasted the highest ranking among timeshare rental resorts ("Top 25 timeshare," 2010). It is however no surprise that among that top 25 list was Osceola County's Orange Lake Resort – East Village – Kissimmee. Although Disney is not all that helps support the Osceola County economy the Verdoom Effect was at work due to demand for vacation property surrounding it. High output in the timeshare market was met by a high demand, and so higher production was the answer both in and around the growth pole.

The Verdoom Effect Growth Pole Theory explains some very typical growth patterns observed around the United States. Many other municipalities have benefited from the growth of cities like Orlando, Miami, Los Angeles, Washington D.C., etc. While these growth patterns tend to lean toward the convergence of spatial economic disparity it is quite easy to see that the influence of a growth pole can only go so far before it is ineffective, hence weakening spatial disparity slightly but not eliminating it. One can also argue that industries in a growth pole become so large that the pole cycles into cumulative causation pulling resources from surrounding regions and in the long run reinforcing spatial disparities. Due to the unpredictable outcome of this situation

government intervention could help to maintain the positive aspects while controlling the negative externalities of too much growth.

Theoretical Justification

In this study several variables exist. The first is the differing economic systems; distributive federalism (Germany) and fiscal federalism (United States). The second variable to address is the dependent variable which is identified as the status of spatial economic disparity, whether increasing or decreasing. The last variable is the numerous economic indicators that explain the growth or decline of spatial economic disparity.

When measuring the effectiveness of an economy in handling spatial economic disparity it is necessary to construct units of measure which will help to indicate positive or negative growth. Decreasing spatial economic disparity is essentially the redistribution of wealth and should eventually lead to an increase in competition which will lead to higher specialization. As was discussed above, higher specialization should lead to a higher export demand; in the end creating strong economies in places where they might have not existed before.

The problems caused by spatial economic disparity are extensive. Barriers to education and lack of public services are just the beginning of a long list. Neoclassical theory argues that markets are self-correcting while Keynesian theory states that government policy is necessary in a country's economy in order to insure that private interests are not interfering with the rights of the people.

As was stated in the previous chapter the German the Gini coefficient numbers have decreased while the United States numbers are increasing. This indicates a growing middle class with income wage convergence in Germany and a disappearing middle class in the U.S. It was mentioned that in May of 1999 the European Union's

European Commission published the European Spatial Development Perspective document. Going beyond (and before) this Germany approved the Landerfinanzausgleich (program which balances state budgets) mechanism in 1950 and a few Gemeinschaftsaufgaben policies; one for improving economic structure and the other for improving agricultural and coastal regions.

The United States has tackled economic development in its own fashion. The Economic Development Administration's (EDA) mission statement reads as follows "To lead the federal economic development agenda by promoting innovation and competitiveness, preparing American regions for growth and success in the worldwide economy" (EDA, 2010, pp 1). The EDA is more or less a grant agency which invests in local economic growth all over the United States. Interestingly its highest priority on the investment priority list is to "support the development and growth of innovation clusters based on existing regional competitive strengths" (EDA, 2010, pp 1). This goal fundamentally takes strong competitive economic centers and makes the stronger, which is not a negative goal from the macro perspective federal agencies must often endorse.

If this holds true this goal is contributing to higher GDP and a stronger economy but according to Keynesian theory will only make spatial economic disparities higher. If the neoclassical approach were to hold water than these extremely strong economic centers should in fact be helping reduce disparity. Given the recent market failures where the phrase "too big to manage" was overwhelmingly popular the Keynesian scenario may be the more likely of the two. The priority list of EDA has six points; the last of which directly addresses economically distressed and undeserved communities.

This priority falls below the goal of Global Competitiveness and Environmentally Sustainable Development. This list is not a to-do list. United States policy when written in the form of a priority list is specifically a list of priorities; meaning that its last priority is to address economically distressed areas. Of the six priorities this is the only one that can directly address disparity and may even have quick short term effects with long run implications.

The U.S. may be exacerbating economic disparity by following this priority list. If the government were to invest in economically distressed areas first, the effects could include the reduction of spatial disparity and an increase in competition. As was stated before, an increase in competition can also result into further specialization and direct investment by firms looking for an adequate labor force. If so, cumulative causation can work in favor of these regions helping them grow as a result of the initial impulse that is illustrated in Figure #. If the neoclassical self-correcting mechanism works, than its effects may be too small, too theoretical due to the lack of a perfect market, or too long term where they will not be felt for generations.

The Solow-Swan (neoclassical) model may also be more applicable in a macroeconomic sense. A global economy may experience spatial convergence as countries are constantly feeding off of each other and exchanging goods. With a common goal of development, this long-run neoclassical effect may be inevitable. On the microeconomic scale; going from city to city and county to county, the long run effects of the Solow-Swan model are often absent; such as East and West Germany or the Coastlines of the United States in comparison with the interior.

Paul Krugman explained regional growth as a pattern. The pattern established by regional growth may be even or uneven in its distribution but then may continue and reinforce itself throughout time; meaning strong economic regions will continue to prosper while poorer regions may stand idle, suffer, or fade away (Pike, Rodríguez-Pose, & Tomaney, 2006). Krugman argues that the incentive to cluster often outweighs the incentive to converge (Krugman, 1991). Alfred Marshall's benefits of localization become an important part of investment. Marshall claimed that firms have three major reasons to pursue localization.

First, the concentration of several firms in a single location offers a pooled market for workers with industry-specific skills, ensuring both a lower probability of unemployment and a lower probability of labor shortage. Second, localized industries can support the production of nontradable specialized inputs. Third, informational spillovers can give clustered firms a better production function than isolated producers. (Krugman, 1991, pp 484)

These benefits while tangible and effective are exhaustible. The best example of this is the American automotive industry localizing in Detroit. With the economic collapse and the fall of General Motors came mass job loss and economic distress in Detroit. This incentive structure purely guards the private interest and from a Keynesian point of view it will add more spatial economic disparity. One could also argue that the collapse of the industry was the neoclassical self-correcting mechanism at work. Regardless of opinion the result was less than favorable, had the proper attention been given much of the United States economic crisis could have been avoided.

Neoclassical theory is the optimal situation theory. In a perfect world it would work. Pareto Efficiency, meaning no party can do better without hurting someone else, must be respected; perfect competition, with no externalities, and no demand for public

goods are also necessary (Stiglitz, 2009). Stiglitz claims that without perfect information in the market pareto efficiency is impossible to achieve (2009). Peter Murrell mentions that with informational problems the invisible hand effect of neoclassicalism is obsolete (1991). The common conclusion is that the neoclassical model, while useful in policy making (Murrell, 1991) does not hold theoretically true in explaining spatial convergence and divergence in the 21st century American economy (Stiglitz, 2009).

Throughout American history crisis has often come before government regulation (Stiglitz, 2009). In his article, Joseph Stiglitz gives the example of Upton Sinclair's release of *The Jungle* which led to the implementation of government food safety regulation (2009). Stiglitz also sites a more modern scandal in the Enron and WorldCom situation; this scandal required government response to restore consumer confidence (2009). Once again in the current economic crisis the only possible savior of the American economy is the American government, issuing bailouts to companies, regulating bank behavior, and issuing stimulus monies to its population in the tax return process.

If the current economy is not able to be explained or even plausible by neoclassical theory then one has no reason to assume that the current market is self-regulating. Yet much of American economic policy follows the notion of self-regulation.

Why Space Matters

“No, a very early lesson must be to know your audience and to write/talk accordingly – start from where your audience is now” (Massey, 2002, pp 1). When writing policy it is important to not only understand the problem but understand where the problem is occurring and who the people are that it is occurring to. The interaction of a demographic with their surroundings can often help explain why a condition exists.

This problem was witnessed in African and Asia in the declining elephant population. A basic example can be found in the demand for ivory leading to an increase in elephant poaching which caused the Convention on the International Trade in Endangered Species of Wild Fauna and Flora to ban the trade of this particular ivory (Stiles, 2004). A more relevant example can be seen in zoning practices. One of the reasons zoning exists is to reduce nuisances among property owners. When land uses conflict they often lead to inefficient results for both parties. When traveling to new places a windshield survey of the most blighted and degraded areas often points to conflicting land uses and a lack of efficient planning. Even though zoning is often in the best interest of the population people continue to oppose zoning plans nationwide. Protecting private property rights while attempting to preserve the future character of a local economy can be a tasking balancing act.

The case of Carpenter against The Double R Cattle Company made it to the supreme court of Idaho. This case revolved around the Double R Cattle Company expanding its property in order to handle up to 9,000 cattle at a time. The particular side effect of this feed lot was the scent which was being carried into a community; leading to a decrease in home sales and an unpleasant environment (Supreme Court of Idaho, 1985). Regardless of the outcome one can see why this lead to problems for the homeowners and contractors who had hoped to build a profitable neighborhood.

When Germany wrote its *Gemeinschaftsaufgaben* (common goal) policies it took location into mind. One of these policies deals strictly with agricultural and coastal areas. While some of these policies result in farm subsidies similar to the United States others involve capital improvements projects such as coastal protection to reduce

barriers to agriculture, something that private business owners may not be able to afford. Other parts of this policy aim to aid export policy to keep German farmers competitive in the European market in order to ensure future needs will be met. Specificity is part of strengthening or growing new economic centers. Writing policy with location in mind allows the policy maker to specifically address the needs of that community. Macroeconomic policy must be very broad and aim to help the entire country; while it is not the entire country that is struggling to keep up, only certain parts, with very specific characteristics and needs.

Understanding space when it comes to economic disparity is also important to companies that are looking to make investments in other regions. Smart investing tactics, especially for companies in manufacturing, may include rural localization. Companies that do not have extensive reliance on agglomeration may find that investing in undeserved regions may save them a lot of money in property acquisition and labor costs while assisting the economic situation of that municipality. In 2006 Contender Boats expanded its manufacturing by renovating a former mobile home manufacturing facility in Baxley, Georgia (Kalis, 2006). This plant was estimated to add 100 jobs in its first year and 500 jobs by its fifth year; a great addition to this small Georgia town of slightly over 4,000 people (Kalis, 2006). However, this situation was the brain child of a smart business man and is not always the accepted practice in business.

In addition, staying competitive involves innovation and growth in technology. Providing access to funds and education in undeserved areas can possibly increase the labor capital participating in innovative fields. By not providing a more equal opportunity

for individuals to enter the market a country may be short changing itself as innovation is often a collaborative effort.

Writing effective economic policy to reduce economic disparity can thus be done in a variety of ways. Assuming that present economic growth is best explained by Keynesian thought, the stimulation of export markets, regulation of growth poles, and the stimulation of cumulative causation while controlling these markets from spinning out of control can help achieve uniform growth patterns. A planner's role in this process is crucial to see the process out in the long run. Keeping location in mind can contribute to the effectiveness of the policy. This translates into a higher quality of life and a stronger national economy in the long run.

Previous Cases

Techniques in analyzing spatial economic disparity are still evolving. In May of 2003 the United Nations University: World Institute for Development Economics Research released a report on measuring spatial effects in parametric and nonparametric modeling of regional growth and convergence. The study was an attempt at measuring per capita income convergence in Italy.

The study sites the recent interest in regional convergence studies because of the ascension process of the European Union. In order to have a successful monetary and economic union the reduction of spatial economic disparity is fundamental. Throughout the report the authors discuss several methods for analysis of spatial economic disparity; one of which being Moran's I statistics. This method is most intriguing given the developments in GIS technology; computing Moran's I is a relatively fast operation with good data, the results of which paint a very interesting picture. The

researchers in this case found that there was a very strong spatial dependence on income in Italy (Arbia, Basile, & Salvatore, 2003).

The study also took the time to measure variance in income during the same time that was being put through Moran's I testing. The UN team of researchers also concluded that economic convergence (non-spatial) and spatial dependencies have a direct relationship with one another (Arbia, Basile, & Salvatore, 2003). A group of researchers in 1997 from San Diego State University also took interest in spatial econometrics.

During their study Rey and Montouri found that the United States displayed patterns of income clustering through both global and local econometric analysis. Their study begins in 1929 and ends in 1994. Their findings up until that point agreed with other studies which indicated the United States had been achieving low income disparity. This team also employed Moran's I testing on a graph against the coefficient of variance and found a steep decline in spatial convergence and variance through the 1994 period (Rey, & Montouri, 1999). Their study also shows a high degree of spatial dependency on the distribution of income (Rey, & Montouri, 1999). As has been discussed numbers in the time following 1994 into the year 2000 show an increasing Gini coefficient for the United States indicating that income dispersion reached a relative minimum and has now begun to rise.

Perhaps one of the most interesting portions of their study involves the way they perceive economic analysis. As regions begin to become spatially clustered by income they help researchers understand a bigger picture. Three counties next to one another which all have very low income per capita may share characteristics that can help slow,

end, and reverse the heightened disparity. Understanding spatial characteristics allows a researcher the opportunity to bring geography into an economically explanatory capacity.

CHAPTER 3 METHODOLOGY

Research Question(s)

Primary question: A. Is Germany's economy converging spatially? B. Is the United States economy converging spatially?

Secondary question: What do the selected economic indicators tell us about spatial economic convergence in each of the examined countries?

Location of The Study

This study was conducted in the United States and Germany for the time period 1996-2007. The sites were chosen in accordance with several criteria in mind. First, both countries are performing at a high global level in Gross Domestic Product (both in the top 5 in the world). Second, these countries operate on different fiscal policies; the United States is a system of fiscal federalism while Germany is a system of distributive federalism. Third, both countries are seeing opposite results in Gini Coefficient performance. Lastly, Germany entered the period that is being studied as a newly unified country with strong policy against economic disparity which helps to exaggerate differences in spatial economic disparity while the United States is acting almost as a control group with weak policy on disparity and a 234 year old unified democracy.

Research Design

The research design consists of two factors. The first part of the research is a comparative quantitative study using convergence analysis methods to analyze spatial economic disparity in both the United States and Germany. This will help to illustrate patterns of spatial economic divergence and convergence in both regions. Second is a mixed quantitative and descriptive portion which will aim to explain the results of the

quantitative study using the known economic characteristics of the regions which were examined.

Sampling Procedure

No sampling methods were required for this study. In Germany the entire data set was acquired. The German data set consists of Income per capita on the Landkreis/Kreisfrei-Stadte (county/district) level from 1996-2008. In this case district or Kreisfrei-Stadte refers to areas like Berlin which act as their own state and are not divided into counties due to their size. The American data set, of income per capita, is shown at the county level as well.

The data on economic indicators is also available in its entirety for the time period which is being studied. The data used is on the national level for both Germany and the United States.

Data Collection

This income per capita data has been made available in the United States by the United States Census Bureau. The German data has been provided by the Statistische Ämter des Bundes und der Länder (Statistical Offices of the Federal and State Governments). In addition Geographic Information Systems (GIS) shapefiles of the German states, counties, and districts were acquired from Humboldt Universität zu Berlin. The American GIS shapefiles were acquired from the United States Census Bureau's TIGER/Line database. Finally, the data collected on the chosen economic indicators was provided by the World Bank Group's World Data Bank list of World Development Indicators & Global Development Finance.

Data Analysis

ArcGis has been used to create two sets of maps, one of the United States and the other of Germany, broken down to the county/landkreis level. Per capita income was mapped at the county level on a per year basis from 1996 through 2007 for the United States and Germany. The map was then analyzed using the spatial statistic analysis capabilities of ArcGis.

Using the spatial autocorrelation (Moran's I) function gives the researcher a "measure of spatial autocorrelation based on feature locations and attribute values" (ESRI, 2010). The Moran's I coefficients range from -1.0 (dispersed) to 1.0 (clustered). A result of zero indicates no pattern or a random result. These resulting coefficients have been plotted in a Moran's I score vs coefficient of variance chart through the corresponding period of time. This chart allows the reader to observe Moran's I behavior at a given time against the overall national income per capita variance.

The resulting Moran's I scores were then put through linear regression analysis against the various economic indicators listed in the table below.

Table 3-1. Selected Economic Indicators

#	Title of indicator	#	Title of indicator
1	Trade (% of GDP)	9	Services, etc., value added (current US\$)
2	% of population Economically active in Agriculture	10	Agriculture, value added (% of GDP)
3	Net Exports of Agriculture	11	Population Growth
4	Employment in services (% of total employment)	12	Gross Domestic Product (current US\$)
5	Government Spending (% of GDP)	13	Industry, value added (% of GDP)
6	Employment in industry (% of total employment)		
7	Manufacturing, value added (% of GDP)		
8	Net Exports of Goods and Services		

Synthesis

The Moran's I scores, coefficients of variance, and Local Moran's I maps were examined. The researcher used this quantitative analysis to observe spatial economic convergence or divergence in the given countries. This information was then used for linear regressions against explanatory variables.

Linear regression allows researchers to model relationships between variables. By running regression models between the countries' Moran's I scores and chosen economic indicators the researcher was able to examine which variables exhibit the strongest explanatory ties to the Moran's I results. The 13 variables were chosen using the following economic justifications.

General economic thought and knowledge of business cycles shows that when countries are closed off to international players in a particular field there are more domestic players. When a country opens its borders to international trade in that field, import/export potential goes up. Trade (% of GDP), Net exports of Agriculture, and Net Exports of Goods and Services were chosen based on their ability to display a measure of openness. With more players in the market there is a rightward shift in the supply curve. Higher supply normally results in a lower price. Lower prices often drive small players out of the market because they cannot afford to operate at lower margins. The anticipated results of higher openness was higher spatial economic disparity (clustering) and lower spatial economic disparity (dispersion) for lower openness.

William Lever argues that cities compete mainly in four categories; those categories are economic growth, employment creating sectors (mainly manufacturing), population, and government funding. To address economic growth, Gross Domestic Product (current US\$) was used. To address competition for employment creating

sectors, Industry, value added (% of GDP), Services, etc., value added (current US\$), Manufacturing, value added (% of GDP), Agriculture, value added (% of GDP), Employment in Agriculture (% of total population), Employment in services (% of total employment), and Employment in industry (% of total employment) were used. Population Growth and Government Spending (% of GDP) were used to address population and government funding respectively. Other than population growth, a decrease in the values of any of these variables can be linked to higher spatial economic disparity. The reasoning is very simple, there is less of that said variable and the same amount of space. Without commensurate growth in employment population growth simply adds to disparity.

The remaining variable is Employment to population ratio, 15+, female (%). This variable was chosen on the notion that the more women entering the workforce the lower the spatial disparity would be. Other indicators such as poverty level have been shown to vary directly with the percentage of women working.

Short Comings

The short comings of this study lie in the shortage of data and the size of the area being examined. Income per capita data was found on the county level for Germany only back to 1996 which limits the duration of the study. Had data been available from the 1970s and 80s the researcher would have been able to paint a better picture of the spatial metamorphosis of the German economy. The size of the United States may have also inhibited the Moran's I feature of GIS from accurately accessing clustering.

CHAPTER 4 HYPOTHESIS

Primary Question

Is Germany's Economy Converging Spatially?

Hypothesis A: This study intends to prove that Germany's economy is converging spatially in income per capita

Is the United States Economy Converging Spatially?

Hypothesis B: This study intends to prove that the United States economy is diverging spatially in income per capita.

Discussion

These hypotheses are supported the theories discussed in the theoretical framework portion of this composition along with policy. First to be discussed is neoclassical growth theory, then the three Keynesian theories; export-based theory, the theory of cumulative causation, and growth pole theory.

Germany

In the case of the Germany neoclassical growth theory appears to be possible. Germany by area is slightly larger than New Mexico. Despite its superior transit connectivity, size alone shows us that movement of goods and people within the country is much more possible than in the United States. With this freedom to move about the about the country comes the self correcting mechanism of neoclassical growth theory. The aptitude of the invisible hand to function is much larger in a smaller space.

Germany is also a major global manufacturer and exporter. World Bank data serves to show that Germany's ratio of exports is rising and they continue to export

more than they import every year. Export-based theory tells us then that Germany should be seeing higher spatial disparity. A unique characteristic in Germany is that almost every region specializes in something, and even then the industry is not only located in that site. Stuttgart is the major center for automotive business and production, yet seven other cities also claim the title of automotive industry driven economies. The distribution of economic sectors throughout Germany is very uniform and highly specialized. It is inferred that Germany is benefiting from the growth provided by export demand without seeing the adverse effects of higher spatial disparity. This effect is perpetuated through cumulative causation which has yet to see a major Germany failure.

In Germany the power of growth poles to cause spatial disparity is diminished again by size and connectivity. A 40 minute commute allows persons from Potsdam, Strausberg, Falkensee, Eberswalde, and many other towns to work in Berlin. Their income allows them to support the local economy in their small towns of residence.

Lastly, policy has been implemented in Germany to reduce spatial disparity. These policies support foreign direct investment, agriculture, the growth coastal economies, and economic development. After unification the German government called on the major economic contributors to expand and locate in the east as well as the west. Companies like Porsche and Bayer Pharmaceuticals took the lead and have provided jobs and the reduction spatial disparity between the east and west.

Small size, successful exports, spatial distribution of export producing industries, great connectivity, and well written policy help the researcher to conclude that Germany's economy is converging spatially.

United States

In the case of the United States neoclassical growth theory would appear to be almost inapplicable. Neoclassical growth theory assumes that a perfect exchange of inputs of production is capable between locations. If this were the case a person who loses a job in one location would simply move to the other location and find a job. This growth model does not take into account the cost of moving. In 2007 a CNN report indicated that the cost of relocating can reach up to \$17,000 before one is actually settled into a new location (Rosato, 2007). Taking cost into account, relocating may not be an option for many Americans. However, the free movement of goods within the United States, especially capital, is possible but it may take time given the size of the United States. These speed bumps in United States indicate that if neoclassical growth theory is at work, it will be slow moving and often inhibited.

As was discussed in the previous section Keynesian economics suggests that a market without governance perpetuates spatial disparity. Export based theory tells us that regions grow based on the export potential of their goods; export potential grows with specialization. Higher specialization means higher demand for that region's products. The United States went through the industrial revolution at a relatively young age. Economic centers were quickly established based on location many of them around natural resources such as water or coal. World Bank figures indicate that exports have been slowly diminishing in the United States and we are becoming a major importing nation, more so than before. Export-based theory tells us that spatial convergence would be taking place as the major exporting centers shifting away from exporting. The only issue here is that a decrease in exports has caused a decrease in jobs in the same sector; many of which have not been replaced. The economy can only

spatially converge so much before it begins to diverge once again, in an opposite direction. A perfect example is the population of Detroit, Michigan which has been declining since the 1970's.

Detroit also serves as a fine example cumulative causation and growth pole theory. With manufacturing at its core combined with the export demand of the Automobile, Detroit grew into a large economic center for the United States. A second example is New Orleans, with its port at the headwaters of the Mississippi river it became a major center for United States agricultural exports. Cumulative causation tells us several things. First, when growth is spurred by a central industry it has the potential to continue in a cyclical manner. Should a part of that cycle be stifled, an example being a decline in the demand of the central product, that region can be put into a circle of rapid decline. The United States exhibits both of these behaviors throughout its many large cities. As cumulative causation takes place it creates agglomeration. Agglomeration helps to create jobs. With more economic participants these regions, acting as growth poles begin to take capital and population from others creating spatial disparity. Should these regions begin to fail they will cause temporary spatial convergence until they begin to diverge once again.

The spatial distribution of growth poles in the United States is very sparse and therefore creates an even large potential for spatial disparity. Given the above discussion it is the belief of the researcher that United States economy is diverging spatially.

Secondary Question

What Do the Selected Economic Indicators Tell Us About Spatial Economic Convergence in Germany?

Hypothesis: The table below indicates the expected behavior of the chosen explanatory economic variables in Germany.

Table 4-1. Expected Indicator performance: Germany

Group	Indicator	Expected Effect of categorical growth on Spatial Disparity
Measure of Openness	Trade (% of GDP)	Inverse
	Net Exports of Agriculture	Inverse
	Net Exports of Goods and Services	Inverse
Economic Growth	Gross Domestic Product	Inverse
Employment Creating Sectors	Industry, value added (% of GDP)	Inverse
	Services, etc., value added (current US\$)	Inverse
	Manufacturing, value added (% of GDP)	Inverse
	Agriculture, value added (% of GDP)	Inverse
	Employment in Agriculture (% of total population)	Inverse
	Employment in services (% of total employment)	Inverse
	Employment in industry (% of total employment)	Inverse
Population Growth	Population Growth	Direct
Government Spending	Government Spending (% of GDP)	Inverse

In this case the German economy indicates that we are not able to exclude neoclassical growth theory. It is the belief of the researcher that due to its small size and great connectivity, neoclassical theory has the ability to work very in Germany; as was discussed in the above section. Neoclassical theory tells us that a successful market will correct itself. Germany has the benefits of great economic performance and well written economic policy. It is therefore hypothesized that any positive activity of the selected economic variables other than population growth in the German market will work to

reduce spatial economic disparity. Population growth must be met by growth in employment. A growth in working aged population that is unmet by job growth only leads to higher unemployment rates and in turn higher spatial economic disparity.

Hypothesis: The table below indicates the expected behavior of the chosen explanatory economic variables in the United States

What Do the Selected Economic Indicators Tell Us About Spatial Economic Convergence In the United States?

Hypothesis: The table below indicates the expected behavior of the chosen explanatory economic variables in the United States.

Table 4-2. Expected Indicator performance: United States

Group	Indicator	Expected Effect of categorical growth on Spatial Disparity
Measure of Openness	Trade (% of GDP)	Direct
	Net Exports of Agriculture	Direct
	Net Exports of Goods and Services	Direct
Economic Growth	Gross Domestic Product	Inverse
Employment Creating Sectors	Industry, value added (% of GDP)	Inverse
	Services, etc., value added (current US\$)	Inverse
	Manufacturing, value added (% of GDP)	Inverse
	Agriculture, value added (% of GDP)	Inverse
	Employment in Agriculture (% of total population)	Inverse
	Employment in services (% of total employment)	Inverse
	Employment in industry (% of total employment)	Inverse
Population Growth	Population Growth	Direct
Government Spending	Government Spending (% of GDP)	Inverse

In this case the researcher has seen evidence of Keynesian growth theories working on a regular basis in the United States, more so than neoclassical. It is then hypothesized by the researcher that higher trade and exports will lead to higher spatial

economic disparity which agrees with Keynesian export based theory. Since higher domestic production on the whole does indicate higher productivity within the United States, growth in GDP is hypothesized to reduce spatial economic disparity. The growth of employment creating sectors and growth in employment levels shows potential and actual employment on the rise. A decrease in unemployment would then help to decrease spatial economic disparity.

Population growth must be met by growth in employment. A growth in working aged population that is unmet by job growth only leads to higher unemployment rates and in turn higher spatial economic disparity. Lastly, government spending is hypothesized to reduce spatial disparity. While the character of government spending is always in question, government projects often involve infrastructure and critical facilities investment among other domestic spending which helps to employ its citizens.

CHAPTER 5
RESULTS AND DISCUSSION

Moran's I Testing

Moran's I is a measure of spatial autocorrelation. It was used in this study to measure the amount of clustering or dispersion of income per capita in the United States and Germany. The Moran's I coefficients range from -1.0 (dispersed) to 1.0 (clustered). A result of zero indicates no pattern or a random result. The results below are from 1996-2007 for both countries; which is the chosen time period of the study.

Table 5-1. Moran's I Results: Germany

Year	Moran's I Score	Description
1996	0.605395	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
1997	0.272877	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
1998	0.266361	There is less than 5% likelihood that this clustered pattern is the result of random chance.
1999	0.288191	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
2000	0.233137	There is less than 5% likelihood that this clustered pattern is the result of random chance.
2001	0.219721	There is less than 5% likelihood that this clustered pattern is the result of random chance.
2002	0.235849	There is less than 5% likelihood that this clustered pattern is the result of random chance.
2003	0.22468	There is less than 5% likelihood that this clustered pattern is the result of random chance.
2004	0.225539	There is less than 5% likelihood that this clustered pattern is the result of random chance.
2005	0.233921	There is less than 1% likelihood that this clustered pattern could be the result of random chance.
2006	0.19016	There is less than 5% likelihood that this clustered pattern is the result of random chance.
2007	0.189717	There is less than 5% likelihood that this clustered pattern is the result of random chance.

The effect of clustering in Germany is interesting to observe. As will be shown later in this section clustering occurs with values which are like each other. The

observed trend is a lowering in Moran's I scores for Germany of 0.416 over the given period. Should the trend continue in the same direction Germany is reaching the center point of random. With low variation and small space it is possible to achieve a clustered score with a uniform economic map.

Table 5-2. Moran's I Results: United States

Year	Moran's I Score	Description
1996	0.033489	The pattern is neither clustered nor dispersed.
1997	0.020865	The pattern is neither clustered nor dispersed.
1998	0.00024	The pattern is neither clustered nor dispersed.
1999	0.000518	The pattern is neither clustered nor dispersed.
2000	0.015736	The pattern is neither clustered nor dispersed.
2001	0.034682	The pattern is neither clustered nor dispersed.
2002	0.153659	The pattern is neither clustered nor dispersed.
2003	0.301492	The pattern is neither clustered nor dispersed.
2004	0.273978	The pattern is neither clustered nor dispersed.
2005	0.260324	The pattern is neither clustered nor dispersed.
2006	0.268577	The pattern is neither clustered nor dispersed.
2007	0.357683	The pattern is neither clustered nor dispersed.

The size of the United States may have helped to skew the computer results from detecting clustering or dispersion. The observed trend is a rise in Moran's I scores for the United States of 0.324 over the given period. While the score indicates neither clustering nor dispersion, the trend is that the United States is getting closer toward clustering and away from dispersion. GIS does not conclusively say that clustering is occurring however it is commonly excepted for analysis purposes that the scores above 0.1 may be considered as clustered. Local Moran's I testing helps to further explore that notion.

The Moran's I scores were then plotted on line graphs against their respective coefficient of variation for income per capita. The thought here is that high variation would yield a high Moran's I score showing a clustered map while low variation would

correspond with a low Moran's I score showing a dispersed map. The discussion of these results is provided in section entitled "Discussion of Moran's I" if this chapter.

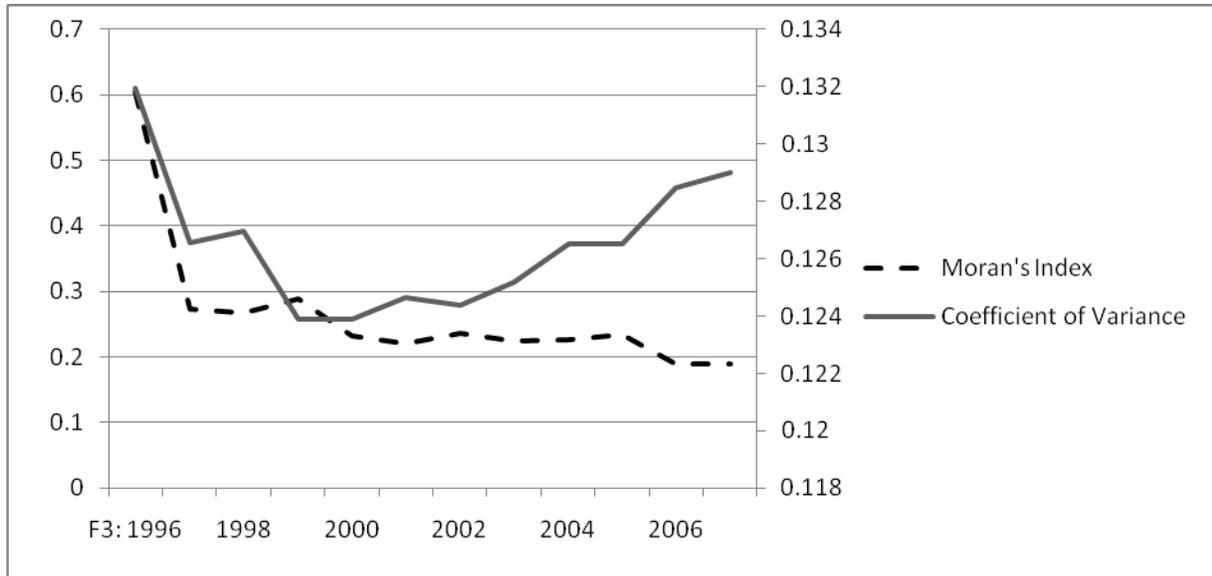


Figure 5-1. Germany 1996-2007

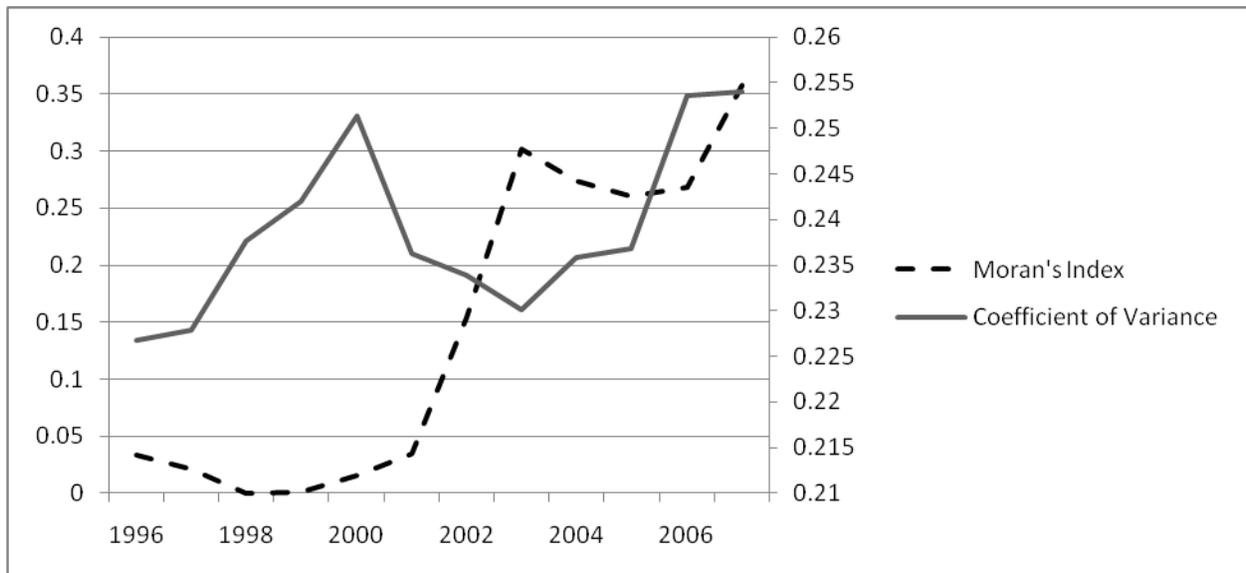


Figure 5-2. United States 1996-2007

Local Moran's I testing

Local Moran's I testing was conducted on the countries during the examined period. The reason for the additional layer of testing was to observe clustering or dispersion in a more graphic way. Local Moran's I simply searches for and maps

clustering of similar values without taking the entire area into account therefore one can observe the patterns of clustering. Global Moran's I may sometimes cancel out similar values which are geographically separated skewing the results. Therefore, coupling the two methods was the best way to observe clustering or dispersion in this case. The maps are displayed in order by year first the Local Moran's I map and then the map of income per capita distribution. The income per capita distribution maps are provided to illustrate the magnitude of the income which is clustering.

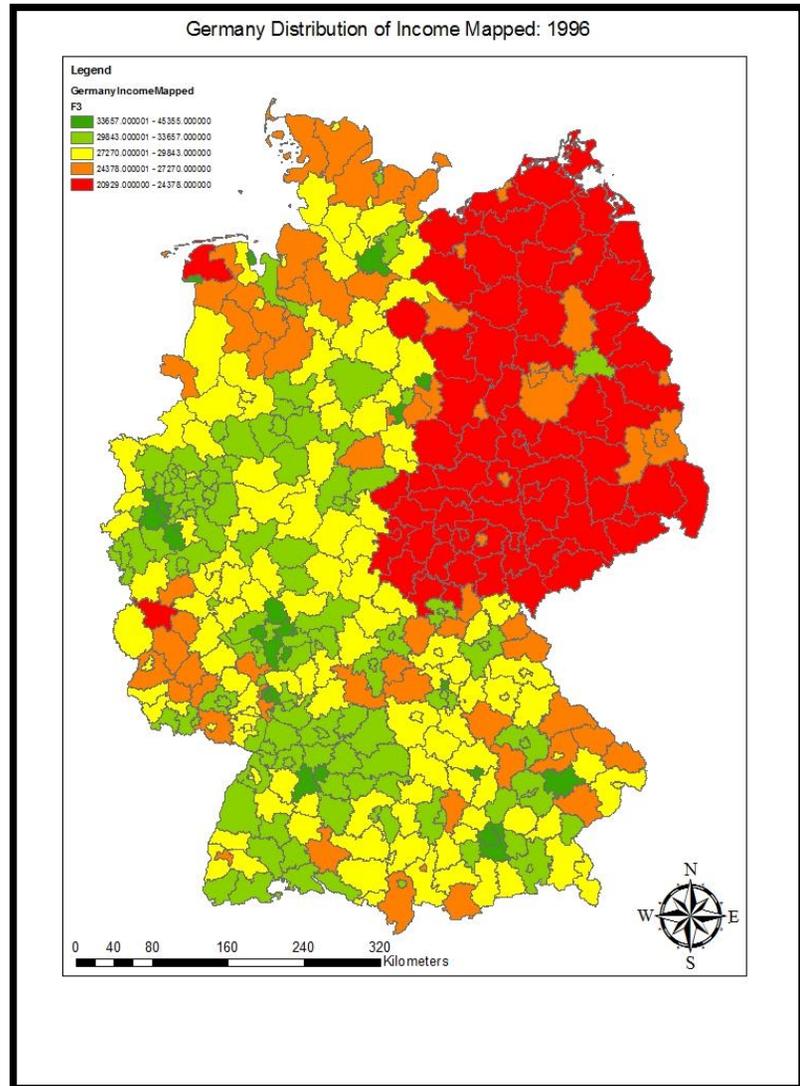
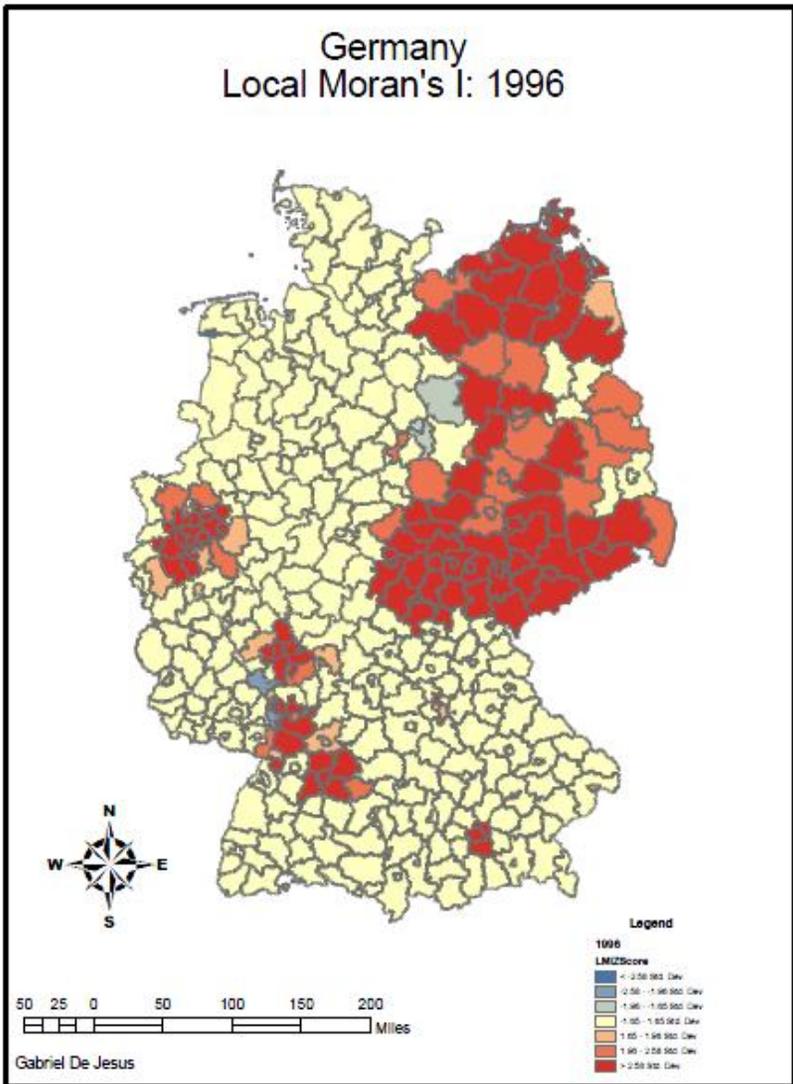


Figure 5-3. Germany Local Moran's I and Distribution of Income 1996

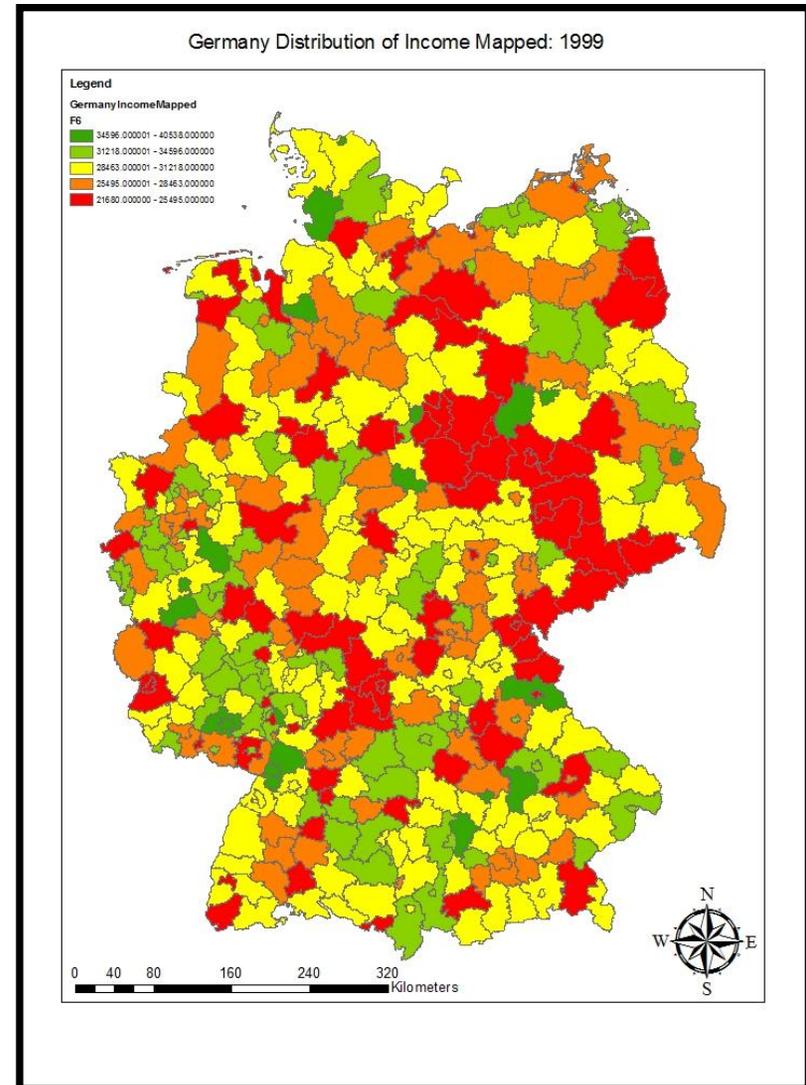
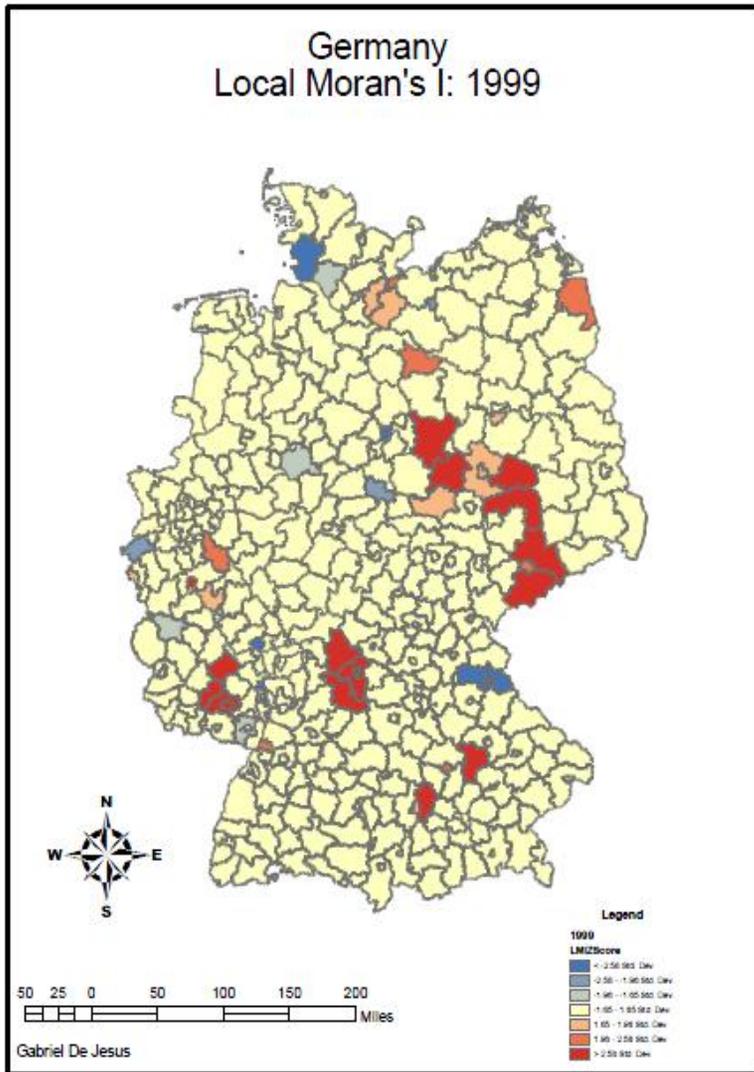


Figure 5-4. Germany Local Moran's I and Distribution of Income 1999

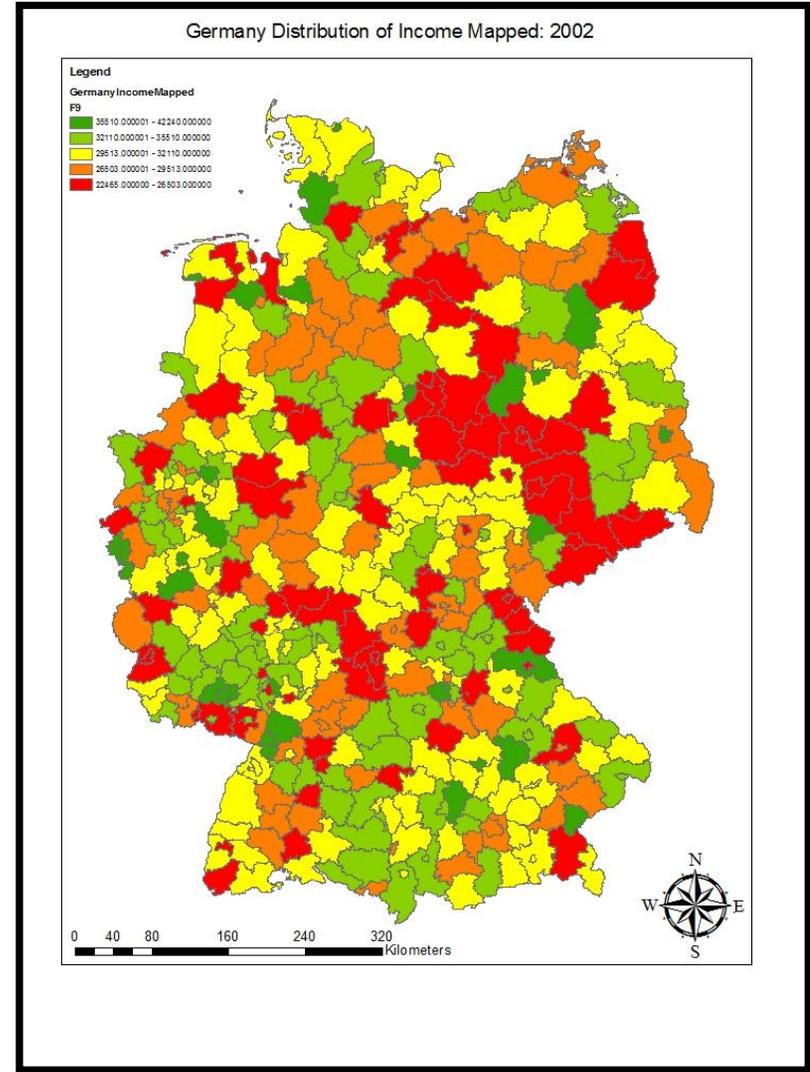
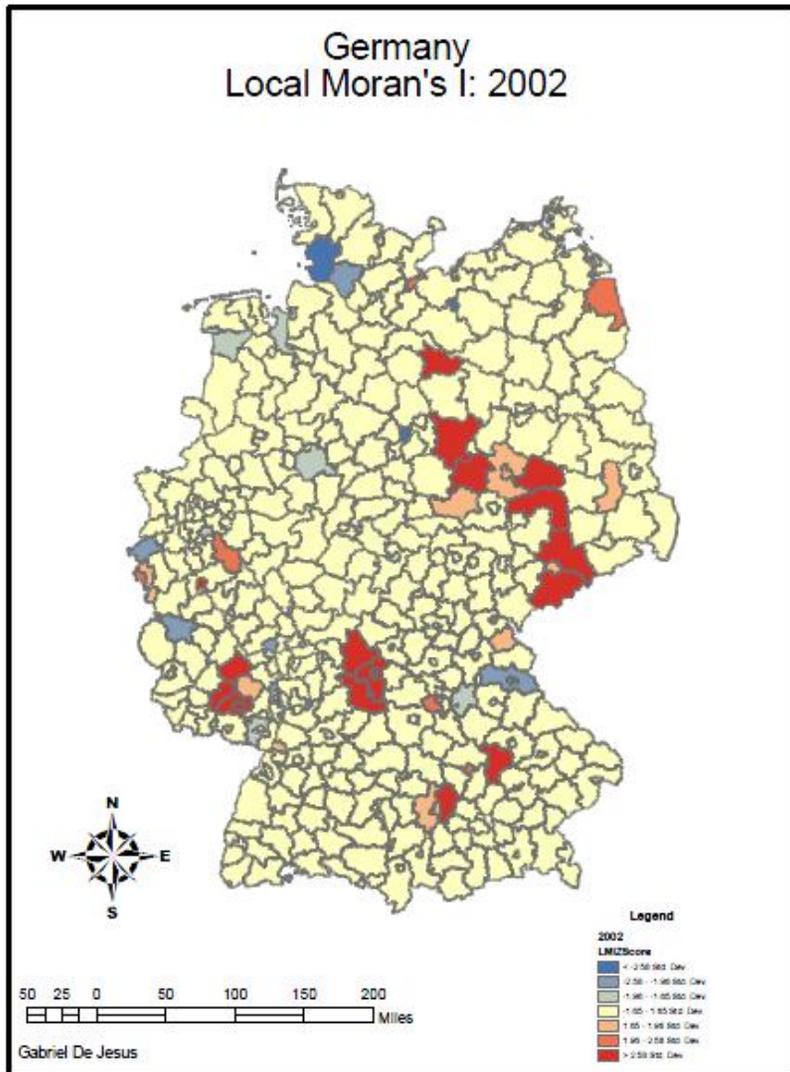


Figure 5-5. Germany Local Moran's I and Distribution of Income 2002

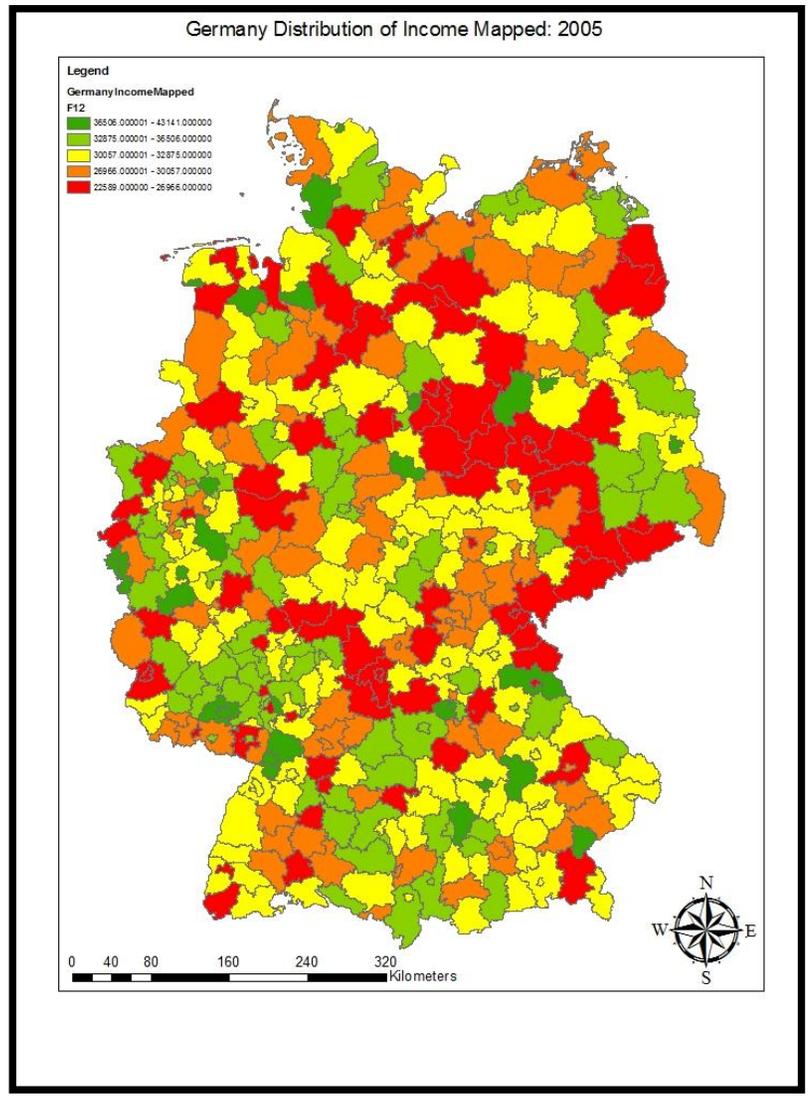
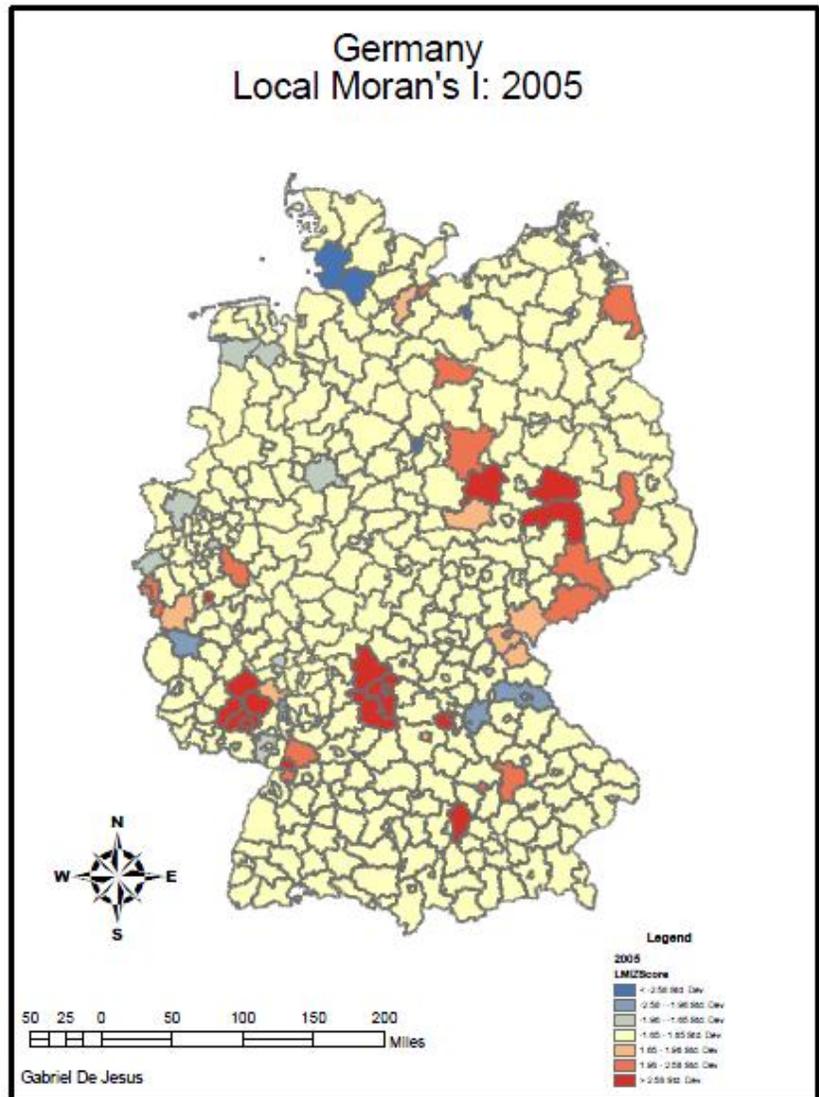


Figure 5-6. Germany Local Moran's I and Distribution of Income 2005

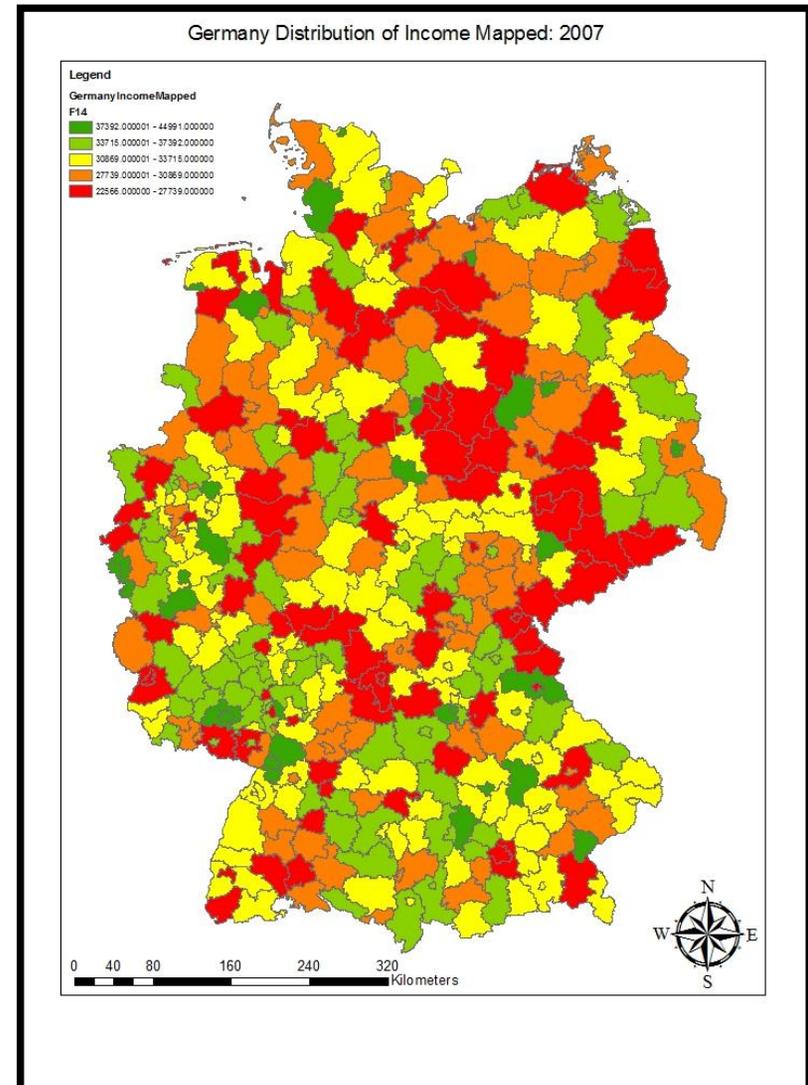
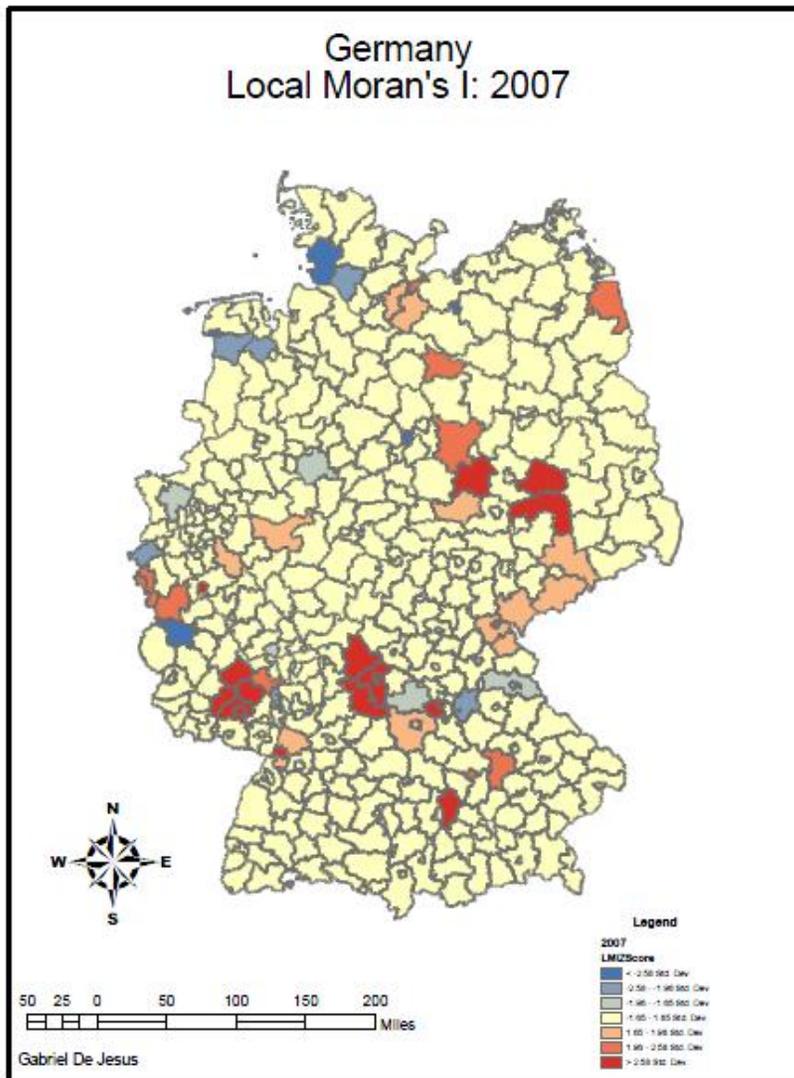


Figure 5-7. Germany Local Moran's I and Distribution of Income 2007

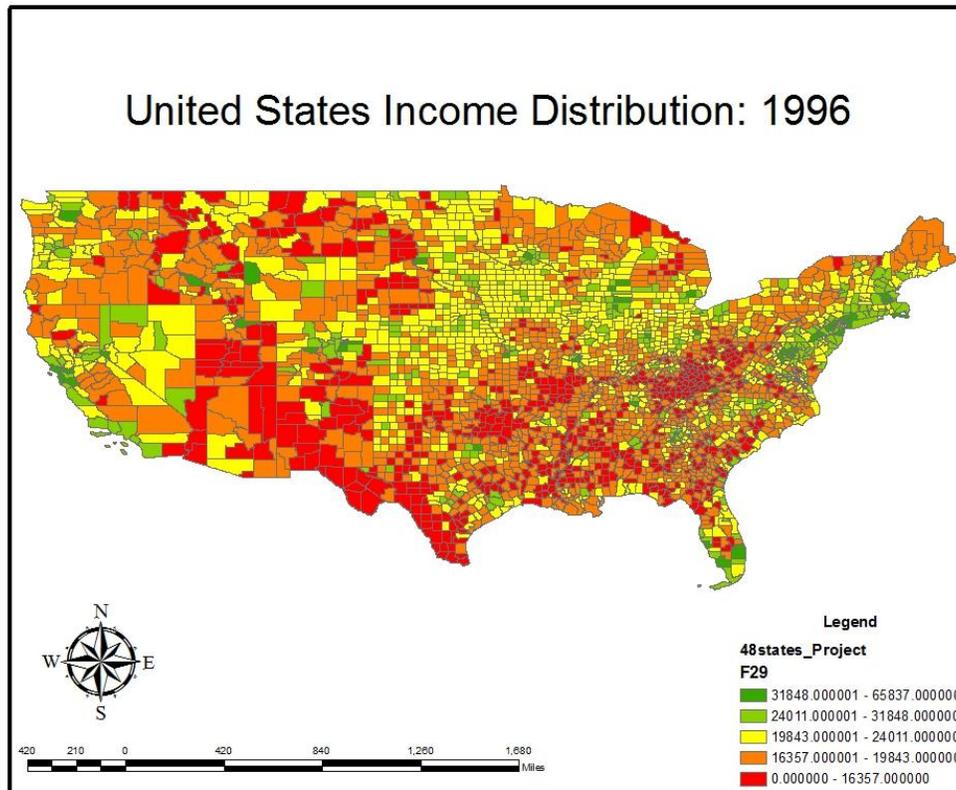
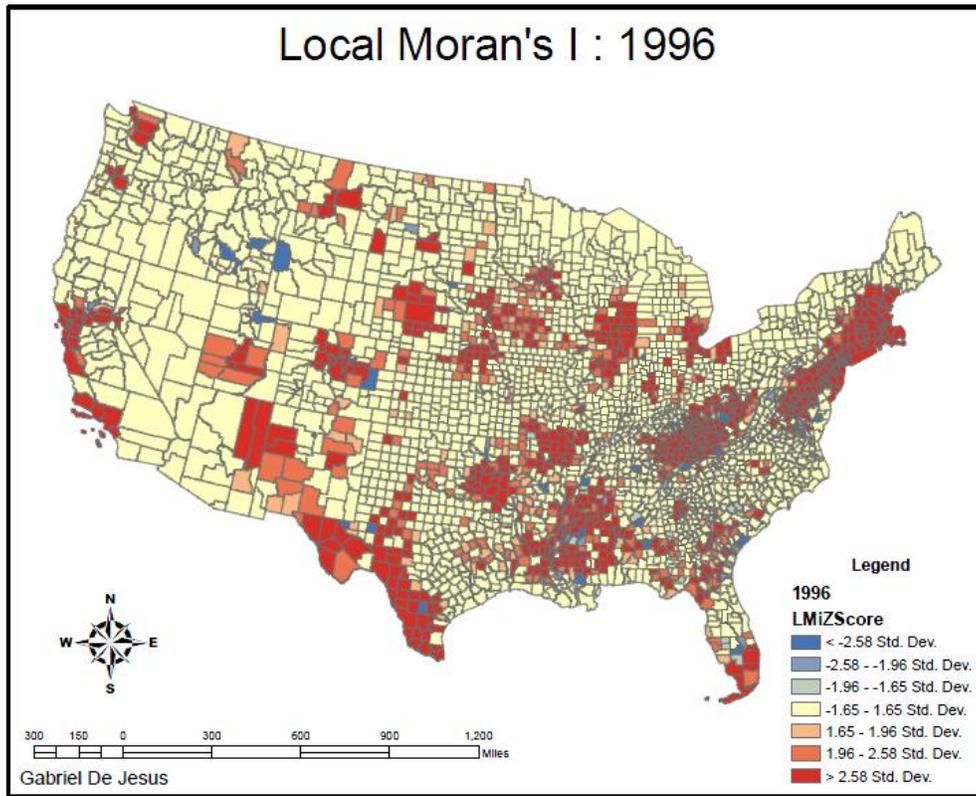


Figure 5-8. United States Local Moran's I and Distribution of Income 1996

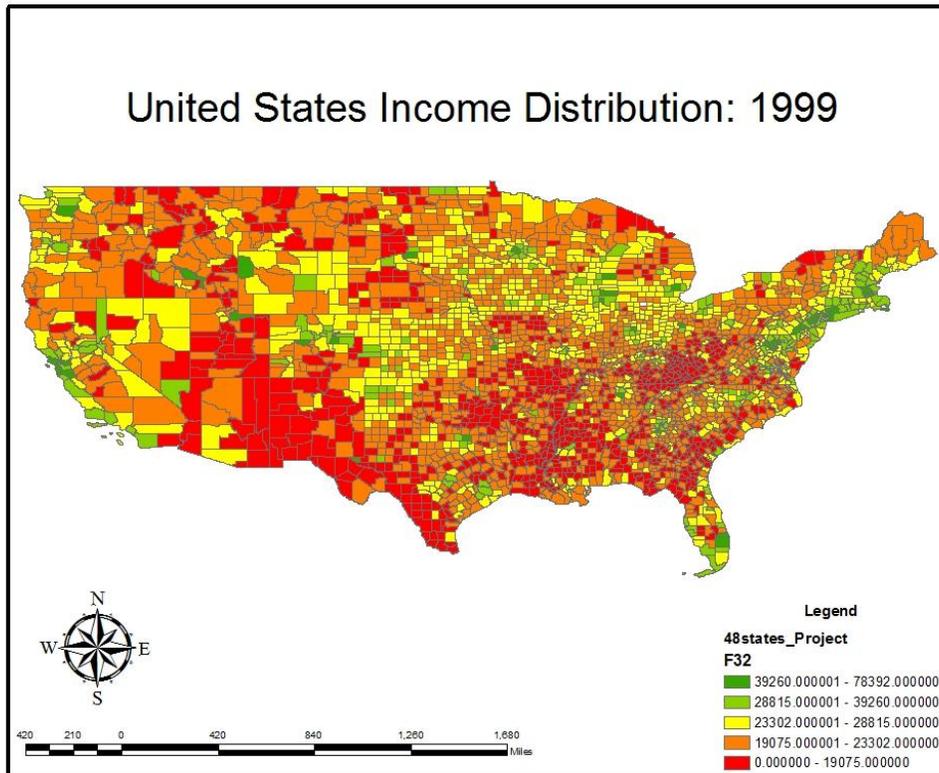
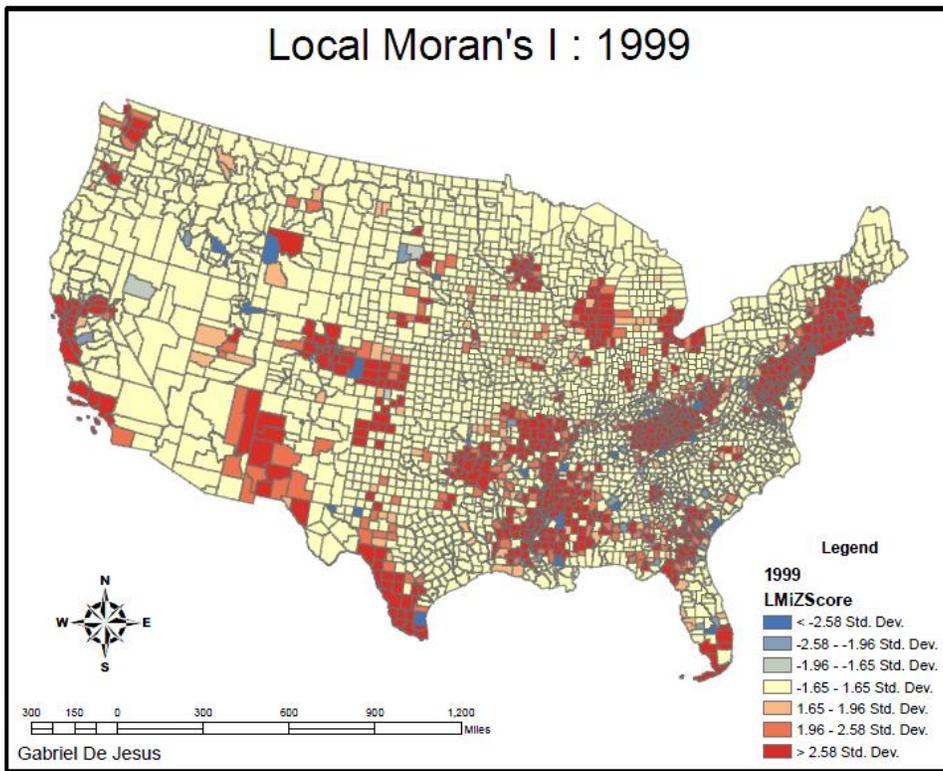


Figure 5-9. United States Local Moran's I and Distribution of Income 1999

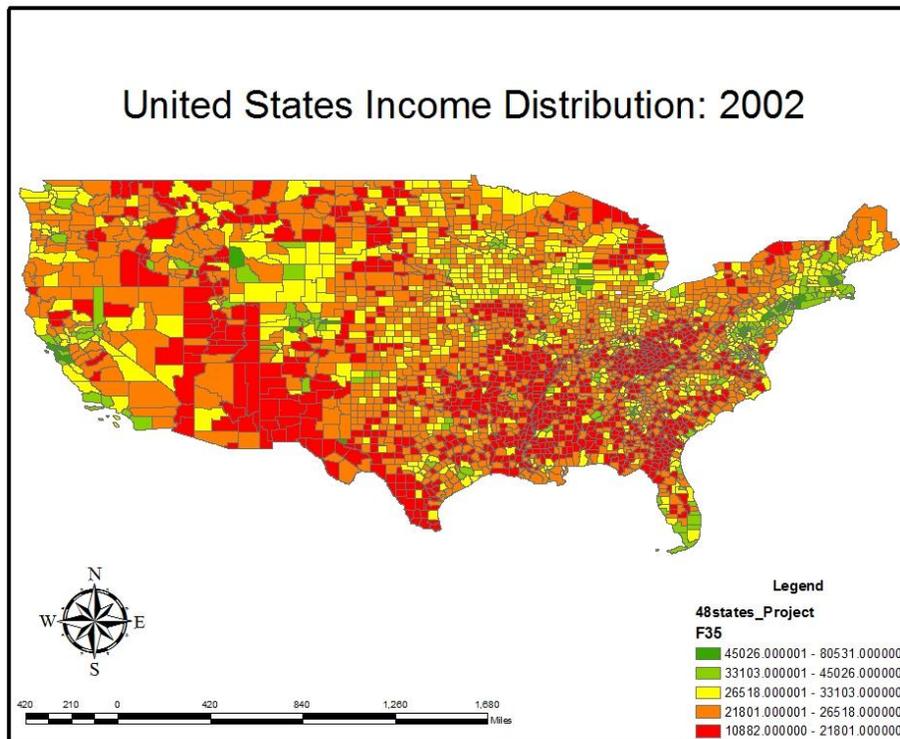
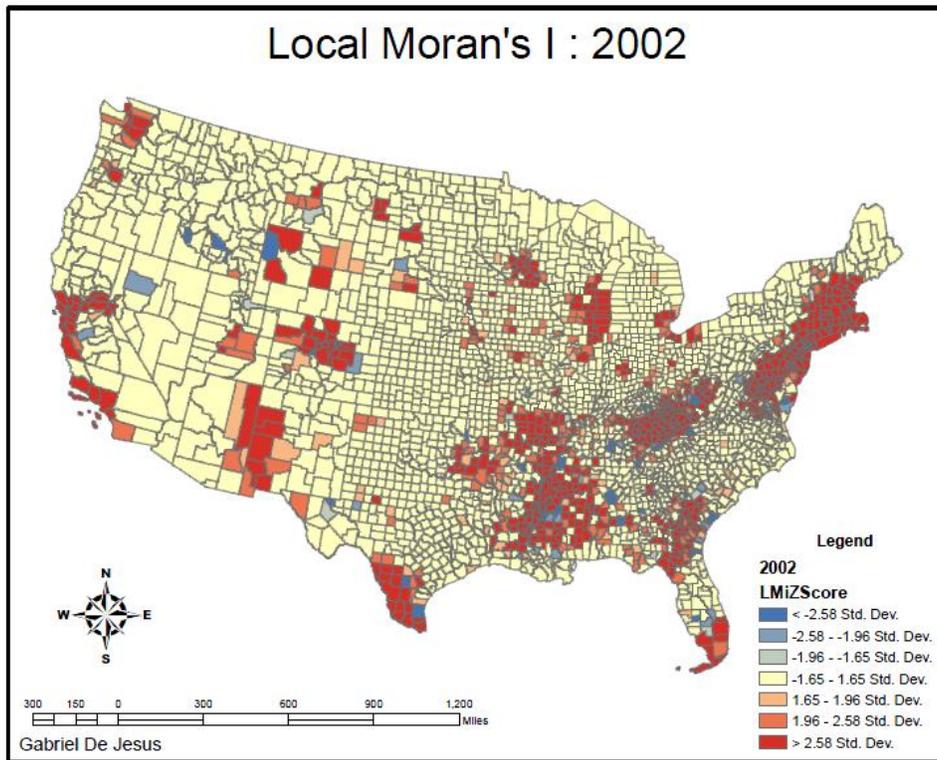


Figure 5-9. United States Local Moran's I and Distribution of Income 2002

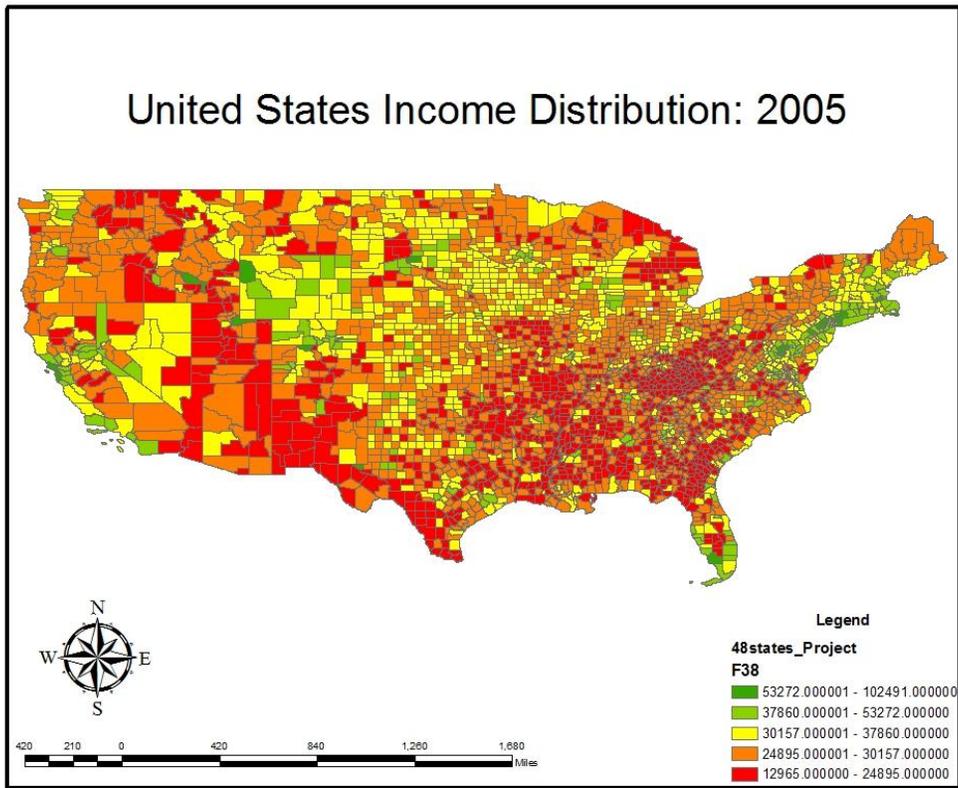
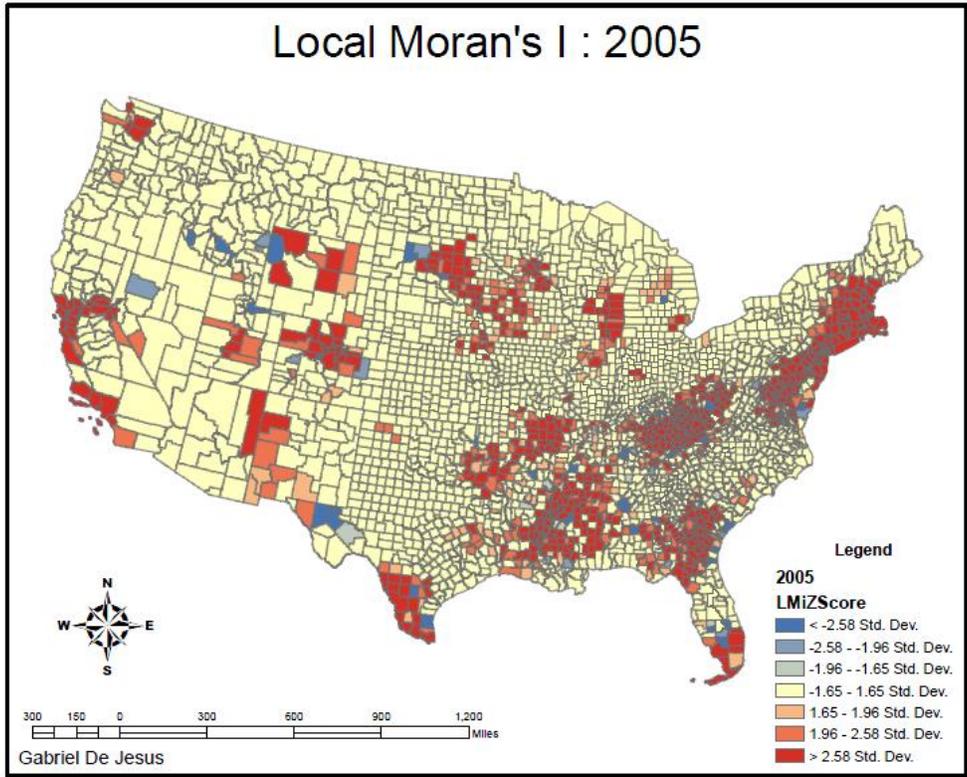


Figure 5-10. United States Local Moran's I and Distribution of Income 2005

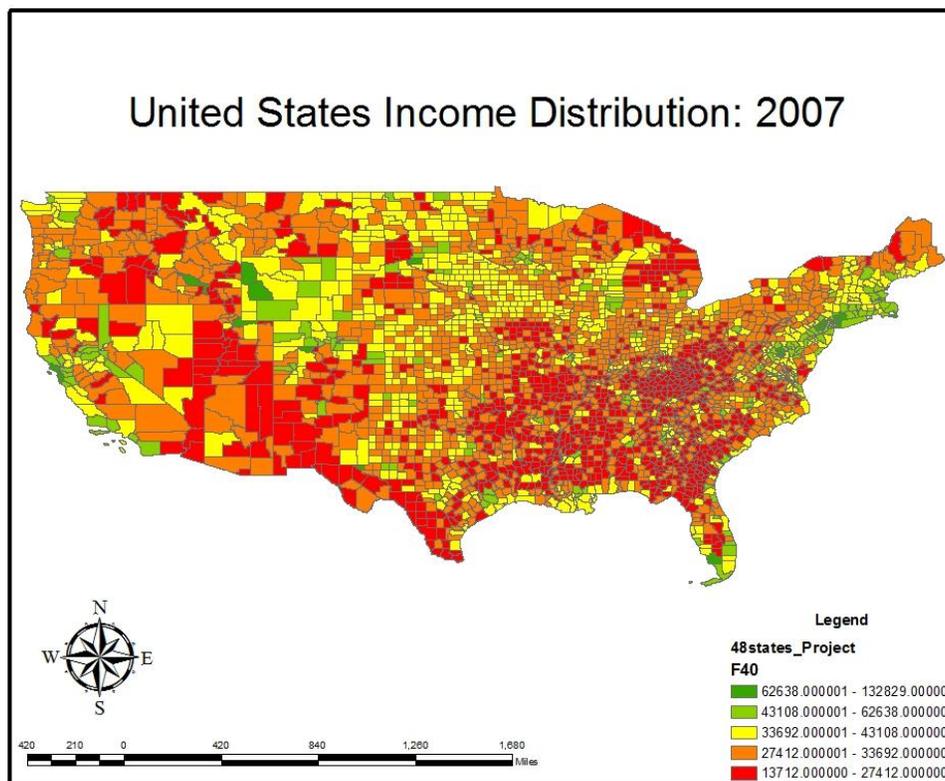
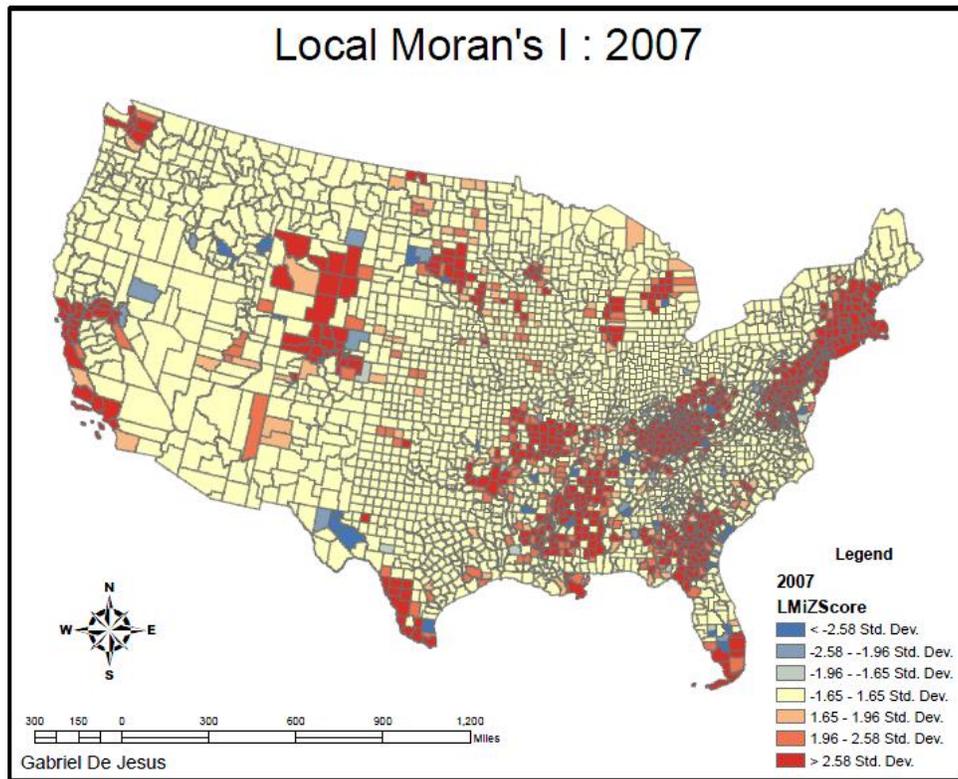


Figure 5-11. United States Local Moran's I and Distribution of Income 2007

Regression Analysis of Economic Indicators versus Global Moran's I Scores

For the examined time period a number of economic indicators were identified. The reason for selecting these variables is discussed in the methodology chapter of this document. Linear regression allows a researcher to model the relationship between two variables. The regression can be used to predict future outcomes if conditions were to remain similar. Each economic indicator was regressed individually with the Global Moran's I scores previously calculated. Results of the regression analysis are shown below per country and discussed in the section entitled "Discussion of Regression Analysis of Economic Indicators," in this chapter.

Table 5-3. Regression Results: Germany

Rank	Indicator	Multiple R	R-squared	Significance
1	Trade (% of GDP)	0.9115009	0.8308339	9.3903E-05
2	% of population Economically active in Agriculture	0.8617772	0.7426599	0.000648308
3	Net Exports of Agriculture	0.8572865	0.7349401	0.000743565
4	Employment in services (% of total employment)	0.8314969	0.691387	0.001509879
5	Employment in industry (% of total employment)	0.8146224	0.6636097	0.002260654
6	Government Spending (% of GDP)	0.8058024	0.6493175	0.002749
7	Net Exports of Goods and Services	0.7547343	0.5696238	0.007259023
8	Manufacturing, value added (% of GDP)	0.7065779	0.4992523	0.015065489
9	Services, etc., value added (current US\$)	0.625498	0.3912478	0.039567878
10	Agriculture, value added (% of GDP)	0.6148237	0.3780082	0.044112156
11	Gross Domestic Product	0.61235	0.3749726	0.04521451
12	Population Growth	0.4674298	0.2184906	0.147145201
13	Industry, value added (% of GDP)	0.4609358	0.2124618	0.153611833

Table 5-4. Regression Results: United States

Rank	Indicator	Multiple R	R-squared	Significance
1	Government Spending (% of GDP)	0.9738212	0.9483278	9.267E-08
2	Employment in services (% of total employment)	0.9540478	0.9102072	1.494E-06
3	Employment in industry (% of total employment)	0.9451308	0.8932723	3.571E-06
4	Manufacturing, value added (% of GDP)	0.9109909	0.8299044	3.783E-05
5	% of population Economically active in Agriculture	0.906312	0.8214014	4.849E-05
6	Services, etc., value added (current US\$)	0.8916023	0.7949547	9.8E-05
7	Net Exports of Agriculture	0.8901195	0.7923128	0.0001046
8	Gross Domestic Product	0.8878733	0.788319	0.0001153
9	Population Growth	0.8718703	0.7601578	0.0002185
10	Industry, value added (% of GDP)	0.8449986	0.7140227	0.0005399
11	Net Exports of Goods and Services	0.8269072	0.6837756	0.000908
12	Trade (% of GDP)	0.6017753	0.3621335	0.0384348
13	Agriculture, value added (% of GDP)	0.3109119	0.0966662	0.32529

Discussion of Moran's I results

Moran's I testing shows a trend toward random distribution in Germany. This being said, by 2007 the Local Moran's I maps show that the majority, roughly 85%, of the country is within the -1.65 – 1.65 standard deviations range (uniform). During the period of 1996-2007 income variation in Germany fell from 0.13193 to 0.128991. However, it should be noted that from 1997-2007 income variation was rising but had not yet risen back to 1996 levels. Moran's I testing shows a trend toward clustering in the United States. Moran's I was then plotted against variation. The expectation is a direct relationship between variance and Moran's I.

In Germany the chart indicates that the expected phenomena is present but ends around 1999. From 1999 until 2007 there is a rise in variance as Moran's I decreases.

This can be explained by the fact that Germany was very economically segregated in 1996. The difference between the east and the west was great but the difference within the east and the west was not as high. As unification began to grow roots money began to move more freely and opportunities for foreign investment were made available cause variation with in the east and some variation in the west. The resulting factor here is higher variation with a relatively healthy spreading of wealth throughout the country.

The Local Moran's I maps indicate a drastic change from the 1996 to the 1999. Although the shifts in the years following 1996 are not quite as drastic it is evident that change continues to occur. The results indicate that the counties which were far behind, mostly in the east due to the former government, have begun to perform at a comparable level to those which were better off to begin with.

Not only does there appear to be some overall economic convergence there are also signs of spatial uniformity. Clusters of rich and poor which existed in 1996 have disappeared or reduced greatly in size by 2007. The percentage of groups that are 2.5 standard deviations above or below the mean has begun to dissipate. Using the numbers derived from Moran's I testing and evidence from Local Moran's I mapping it is possible to confirm the hypothesis of spatial economic convergence for the German economy.

In the United States the chart indicates that the expected phenomena is present. Moran's Index varies directly with variance until 2000. In 2000 variance begins to decrease while Moran's I grows. They share that inverse relationship until 2005 when both inputs experience positive direct correlation. The overall trend during the 1996-2007 period is growth in variance and Moran's I scoring.

Due to the United States being a unified country for 200 years leading up to this point in time it is quite easy to assume that changes would not be as drastic as the German example. The Local Moran's I maps indicate that the areas in the 1.96 standard deviation category and higher experience growth in the majority of the zones through the time examined. Some of the smaller clusters begin to dissipate after 1999 but areas in the eastern portion of the country seem to reinforce their disparities. The largest clusters of income are those in the bottom quintile of their time period. This not only indicates higher overall economic disparity, as can also be seen by the United States GINI coefficients, it also demonstrates higher spatial economic disparity.

Using the numbers derived from Moran's I testing and evidence from Local Moran's I mapping it is possible to confirm the hypothesis of spatial economic divergence for the United States economy.

Discussion of Regression Analysis of Economic Indicators

Once it is understood how the economic map is behaving it is then important to explore into possible reasons why this is happening. Thirteen variables were chosen as explanatory variables. After regression analysis was complete the ANOVA results showed that 11 of 13 explanatory variables were statistically significant at the 95% confidence level for Germany and 12 of 13 explanatory variables were statistically significant at the 95% confidence level for the United States. In addition, 8 of the 14 explanatory variables were significant at the 99% confidence level for Germany while 12 of the 14 explanatory variables were significant at the 99% confidence level for the United States.

Table 5-5. Performance of Economic Indicators 1996-2007

Rank*	Germany	Indicator	United States	Rank*
	-	Moran's I Scores	+	
1	+37.92%	Trade (% of GDP)	+5.73%	13
2	-0.56%	% of population Economically active in Agriculture	-0.34%	5
3	+0.72	Net Exports of Agriculture	+0.30	7
4	+6.20%	Employment in services (% of total employment)	+4.90%	2
5	-5.5	Employment in industry (% of total employment)	-3.5%	3
6	-1.83%	Government Spending (% of GDP)	+1.19	1
7	+2.90%	Employment to population ratio, 15+, female (%)	+0.20%	12
8	+6.16%	Net Exports of Goods and Services	-3.91%	11
9	+1.75%	Manufacturing, value added (% of GDP)	-4.5%	4
10	+37.2%	Services, etc., value added (current US\$)	+87.97	6
11	-0.39%	Agriculture, value added (% of GDP)	-0.47	N/S
12	+35.99%	Gross Domestic Product	+77.03%	8
N/S	+0.43	Population Growth	+11.83	9
N/S	-0.88%	Industry, value added (% of GDP)	-3.98	10

*Ranks are noted in order of significance; a rank of N/S indicates that the variable was not significant for the noted country. A sign of + indicates growth in that category and a sign of – indicates contraction in that category.

The variables are broken into 6 categories for examination, as is illustrated in the table below and listed with hypothesized effect spatial economic disparity.

Table 5-6. Economic Indicator Groupings

Group	Indicator	Expected Effect Germany	Expected Effect United States
Measure of Openness	Trade (% of GDP)	Inverse	Direct
	Net Exports of Agriculture	Inverse	Direct
	Net Exports of Goods and Services	Inverse	Direct
Economic Growth	Gross Domestic Product	Inverse	Inverse
Employment Creating Sectors	Industry, value added (% of GDP)	Inverse	Inverse
	Services, etc., value added (current US\$)	Inverse	Inverse
	Manufacturing, value added (% of GDP)	Inverse	Inverse
	Agriculture, value added (% of GDP)	Inverse	Inverse
	Employment in Agriculture (% of total population)	Inverse	Inverse
	Employment in services (% of total employment)	Inverse	Inverse
	Employment in industry (% of total employment)	Inverse	Inverse
Population Growth	Population Growth	Direct	Direct
Government Spending	Government Spending (% of GDP)	Inverse	Inverse

Measures of Openness

Through observation and quantitative analysis it has been shown that Germany has begun the steps toward a uniform economic map. When dealing with measures of openness it was hypothesized in achieving lower spatial disparity an inverse relationship would be found with the selected variables. For example, higher net exports, yields more exports than imports; this fact indicates higher domestic productivity (a more closed economy) and less spatial economic disparity. This also

agrees with productivity in neoclassical theory. Germany is working with the invisible hand and leaning toward economic convergence.

In Germany all three measures of openness yielded a positive growth. All three economic indicators in the measures of openness category were statistically significant to the 99% level. This is an indicator that Germany is a large exporter, and as its exporting capabilities grow economic opportunities within its borders grow. This agrees with the hypothesis that an inverse relationship exists between measures of openness and the decreasing of spatial disparity.

In the United States two of the three indicators of openness showed a positive trend. Net exports of goods and services indicated an inverse variation with spatial disparity growth which disagrees with the hypothesis. All three of the economic indicators were statistically significant to the 95% level. It should be noted that the goodness of fit coefficient (R-squared) in this case was 0.36 for Trade (% of GDP), which indicates a weaker relationship as an explanatory variable. It is also useful to note that Trade (% of GDP) growth was roughly 6 times larger in Germany than it was in the United States and Net Exports of Agriculture growth was roughly 2.5 times larger in Germany than in the United States. In Germany as Trade and Net Exports of Agriculture became larger, spatial disparity decreased while in the United States it increased.

These results while opposite agree with the researchers hypothesized effects of growth. In the United States it was hypothesized that Keynesian growth theory would have a stronger magnitude than neoclassical. Export based theory explains the relationship of growth in Trade and Net Exports of Agriculture and higher spatial economic disparity.

Economic Growth

The chosen variable for economic growth was GDP. An increase in GDP indicates higher production within the bounds of country. Growth in this variable was hypothesized to cause an inverse effect on spatial disparity. In the case of GDP both countries saw an increase from 1996-2007. In both cases the regressions were statistically significant; in Germany at 95% level and in the United States at the 99% level. Germany experienced the hypothesized effect where a rise in GDP corresponded with lower spatial economic disparity; the United States did not. The regression line in the United States indicated a strong relationship between growth of GDP and higher spatial disparity. The direct relationship in the United States points to the fact that higher GDP was achieved by the export of higher priced goods, expensive services, more efficient production, any other economic activity which produced high yields with less inputs of production; specifically labor, etc.

Employment Creating Sectors

To address employment creating sectors of the economy, seven variables were selected. Three of the seven variables relate to agriculture, industry, and services, and their respective levels of employment. All three of the regression operations for the variables were statistically significant to 99% level; ranking these three in the top five for both countries by significance. Both countries experienced growth in Employment in services (% of total of total of employment) which in Germany agrees with the hypothesis of inverse effects of spatial disparity while in the United States it is the opposite. There was a simultaneous and nearly equal shift in the increase of employment in services and the decrease in employment in industry. A reduction in any of these variables was hypothesized to create higher spatial economic disparity which

agrees with the outcome in the United States but disagrees with the German result. In Germany as in the United States the growth in employment level for the service industry outweighs decrease in employment levels for agriculture and industry combined. Taking that fact into consideration, population growth in Germany rose by less than half a percent from 1996-2007 while in the United States it grew just over 11% (population was hypothesized to cause higher spatial disparity). This helps explain why although having the same directional performance and almost equal displacement between sectors Germany has been able to manage their problem while the United States has seen continued growth in spatial disparities.

When addressing growth in economic sectors (employment levels aside) the four explanatory variables of Industry, Agriculture, Manufacturing, and Service, were selected. Over the 1996-2007 period Germany grew its manufacturing value while the United States experienced a decrease in value as a percentage of GDP; confirming the hypothesized inverse effects.

Both countries saw a very noticeable rise in Services, value added (current US\$); 37.2% in Germany and 87.97% in the United States. As an economics term, service means any good with an essentially intangible product. Service can range from consulting to valet parking and bar tending. Using that spectrum it is easy to see that there are more than likely more low paying jobs than middle and high paying jobs in this category. Growth in services was statistically significant to the 95% level in Germany although the goodness of fit for the regression was weak 0.39 (R-squared).

A logical assumption would be that growth in services in Germany equates with jobs in the middle to high paying range, whatever that may be. Meanwhile, in the United

States, higher spatial disparity could correlate with the fact that such high growth in services may have been attributed to low paying occupations. Services in the travel and tourism industry are often victims of agglomeration and carry low-wage averages. Due to its high potential to attract agglomeration drastic growth in services can help to create growth poles. According to Keynesian growth pole theory growth poles perpetuate spatial disparity. By examining the Local Moran's I maps of the United States it can be observed that clustering of low income per capita is taking place in regions with large cities at their core. In the southeast this can be seen in northern Georgia, Atlanta being the core.

Industry carried a negative growth result in both countries. In Germany the negative growth was so small that the results yielded an insignificant regression result, so the variable was removed for analysis purposes in Germany. In the United States the regression on industry was statistically significant to the 99% level and carried an R-squared value of 0.71. Industry not only causes agglomeration but it can also sustain an entire city or town. Small towns like Centralia, Pennsylvania have lived and died by industry. In the case of Centralia, coal mining was the major economic activity. During its peak Centralia housed over 2500 residents in its incorporated and unincorporated areas, in 2009 it was home to 9 recorded residents. With the death of Centralia coal mining came the death of the town itself, a perfect example of spatial economic disparity growing in the United States. The decrease in the industry sector agrees with the hypothesis of higher spatial economic disparity.

Lastly in the category of employment creating sectors was agriculture. The decrease in agricultural production was statistically insignificant in the United States.

Germany also experienced a decrease in agriculture, value added (% of GDP) but it was commensurate with the decrease in agricultural employment levels. Taking the small German population growth and considerable growth in other economic sectors it is quite reasonable to assume that employment has been displaced between sectors of the economy with little to no effect on spatial disparity.

Another fact to consider is the previously mentioned growth in German net exports of agricultural. Agricultural in Germany is becoming more efficient and a less than 1% decreases in employment levels and total agricultural value could be temporary or negligible. Yet another thought is that although some towns are heavily reliant on agriculture, agriculture does not cause agglomeration as much as other economic sectors. Therefore agriculture does not create growth poles nor does it cause cities to fall victim of cumulative causation because it is not often vertically integrated. As a player in neoclassical thought the current upswing may very well be part of the cycle Germany is currently going through. Although it does not interact very well with Keynesian thought agriculture's export potential (and growth in the United States) may be contributing to the growth of spatial economic disparity.

Population Growth

In order to address William Lever's notion of completion for population, population growth data was used as an explanatory variable. In the case of Germany, population growth was a mere 0.43% throughout the 1996-2007 period and yielded an insignificant result. In the United States population growth was 11.83% and the regression was significant at the 99% level and achieved a strong goodness of fit. This variable is the only variable tested which was hypothesized to vary directly with spatial economic disparity. A rise in population without an equivalent rise in income generating

opportunities creates spatial economic disparity. The United States has seen an rise of over 31,000,000 people some newborn Americans and some immigrants. Population growth in the United States agrees with the hypothesized direct relationship on spatial economic disparity.

Government Spending

Government Spending was the most statistically significant explanatory variable in the United States. In Germany it was sixth. In both cases it carried a significance at the 99% level. Government spending was hypothesized to vary inversely with spatial economic disparity on the grounds of higher spending in communities having the ability of creating jobs and supporting needy individuals and families. In the case of government spending the hypothesized effect was incorrect in both cases. In Germany a decrease in government spending saw a decrease in spatial disparity while in the United States the opposite happened. Using this dataset it is impossible to ascertain the nature of the spending which took place but the strong regression correlation points to an incorrect hypothesis by the researcher. It is impossible to assume that the observed affect is in fact the correct or global affect.

Summary of Test Hypotheses

Primary Research Question

Table 5-7. Test of Spatial Economic Convergence

Country	Hypothesis	Correct (Y/N)
Germany	Spatial Economic Convergence	Y
United States	Spatial Economic Divergence	Y

Secondary Research Question

Table 5-8. Economic Indicator Hypothesis Results

Group	Indicator	Expected: Germany	Germany: Correct?	Expected: United States	United States: Correct?
Measure of Openness	Trade (% of GDP)	Inverse	Y	Direct	Y
	Net Exports of Agriculture	Inverse	Y	Direct	Y
	Net Exports of Goods and Services	Inverse	Y	Direct	N
Economic Growth	Gross Domestic Product	Inverse	Y	Inverse	N
Employment Creating Sectors	Industry, value added (% of GDP)	Inverse	N/S	Inverse	Y
	Services, etc., value added (current US\$)	Inverse	Y	Inverse	N
	Manufacturing, value added (% of GDP)	Inverse	Y	Inverse	Y
	Agriculture, value added (% of GDP)	Inverse	N	Inverse	N/S
	Employment in Agriculture (% of total population)	Inverse	N	Inverse	Y
	Employment in services (% of total employment)	Inverse	Y	Inverse	N
	Employment in industry (% of total employment)	Inverse	N	Inverse	Y
Population Growth	Population Growth	Direct	N/S	Direct	Y
Government Spending	Government Spending (% of GDP)	Inverse	N	Inverse	N
Total Counts			7 Correct 4 Incorrect 2 Insignificant	7 Correct 5 Incorrect 1 Insignificant	

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Research in the field of reducing spatial economic disparity is difficult.

Techniques are still being perfected in examining the subject. Using the combination of techniques presented the researcher has concluded that the United States economy is diverging spatially (disparity is growing) while in Germany the economy is converging spatially (disparity is declining).

United States

Moran's I testing clearly indicates an upward trend away from random distribution and slowly entering the realm of clustered. Local Moran's I mapping helps to illustrate the clusters and demonstrates the high clustering of groups over two standard deviations away from the mean. These clusters have slowly changed, some have grown in their reach and some have simply become stronger and more pronounced. The time period examined ends in 2007; this is before the time of major economic stimulus to the American economy. It would be interesting to continue this study and see how and which parts of the United States stimulus package have been effective in producing economic growth in places where it had halted, was absent altogether, or had begun to decline. The time following 2007 was not omitted, the data was simply unavailable.

Testing throughout the time period indicated that population growth in the United States has played a strong role in effecting the economy. While examining the explanatory variables the most noticeable in the United States analysis are the population growth of over 11% and the 87% growth in the services sector. It seems as though the only sector of the economy which was able to assist in employing the excess

of 31 million people added between 1996 and 2007 was services; granted not all 31 million were entering the workforce. As an economic sector services already displays characteristics of disparity given that medical services and custodial services are put into one category. Given the rise in spatial economic disparity, high population growth, and immense growth in the service sector value, shrinking in other employment levels, and only 4.9% growth in employment of service, a fair assumption is that the growth in the service industry was in the category of few high paying jobs versus many low to middle range paying jobs. The remaining 3 sectors of the economy examined performed negatively through the 1996-2007 period in the United States.

A rise in government spending during a time of increased spatial economic disparity indicates that government spending was not on public programs or spending on infrastructure. Government spending during much of this time period was dedicated to military related engagements. In 2007, the United States, was importing over 5% more than it exports. This correlates with the drop in value of the manufacturing, agricultural, and industrial sectors. A drop in employment levels for industry and agriculture also agrees with higher disparity given that these are often sectors of agglomeration with supply chain interaction. Should a major sector of the chain fail the entire operation may fail.

Germany

Moran's I testing indicates a downward trend toward a more random or uniformly distributed economic map. Local Moran's I mapping makes the reduction of income disparity painfully obvious. Clusters of income in the bottom quintile heavily clustered in the east began to dissipate and have nearly disappeared by 2007. The time period examined comes five years after the unification of Germany. The drastic change in

economic mapping toward a more uniform Germany makes a case for economic policy. During the time period examined Germany experienced a decrease in the value of agriculture, the percentage of people employed in agriculture, the percentage of people employed in industry, and a decrease in government spending. The expected effect of these variables declining was an increase in spatial disparity and yet that trend was not observed.

An argument for this is the presence of German and European Union spatial economic policy. These are policies written to specifically address economic disparity in a spatial context. Germany's Gemeinschaftsaufgaben policy was written to address infrastructure investment, preserving industries that rely on coastal property, and boosting agriculture. The decline in agricultural employment level as a percent of the population does not indicate an exit from the market of the population participating in 1996 and may very well be result of population growth; the decline in agriculture value added indicates that an exit of workers from agriculture may have taken place. Regardless, the declines are both less than 0.60% and matched with a 0.72% increase in net agricultural exports throughout the time period it seems as though Germany's policy is working.

The second leg of the Gemeinschaftsaufgaben addresses economic development and infrastructure investment. Trade as a percent of GDP in Germany experienced nearly seven times the growth the United States experienced. The value of German manufacturing also rose during the period while the United States experienced a sharp decline. Infrastructure development such as public transportation, which is excellent in Germany, involves manufacturing on many fronts, many of which takes

place within the bounds of the country. Germany also experienced a rise in women working, the growth in that category was 14.5 times greater than the United States. Women participating in the formal workforce often indicate strong growth in the economy. Germany is known for its capabilities in engineering. Innovation allows for specialization and specialization leads to high demand for those goods. This is reflected in the growth of net exports for Germany.

Recommendations

Using the German example several things are clear. Population growth in the United States was 27.5 times higher than in Germany. Present day estimates indicate that 12.5% of the American population is foreign born, up from 6.2% in 1980. The drastic rise in population in the recent years combined with lower native birthrates indicates that immigration is on the rise. Stronger immigration controls and work visa protocols may be necessary in the future to secure the United States' economic stability.

A second point of recovery for the United States is growth in manufacturing. Many products designed or researched in the United States are produced in other countries, this keeps overhead low for companies. This also enables the American companies to resale at an often times low price. Germany has seen positive results by keeping production inside of its own country, the overhead might be higher, but the price level is even higher and demand for German goods is still high. The United States can benefit from domestic manufacturing. This effect agrees with export based growth theory.

If the United States were to enter a time of producing more quality domestic goods and aggressively marketing those goods along with our current products for

export not only would our GDP continue to rise it would provide more jobs. A rise in jobs decreases economic disparity. To address disparity in a spatial context further studies would need to address the economically stressed areas of the country and identify the struggling economic centers. Conclusions from this study indicate that the U.S. needs to focus on growing its agricultural, industrial, and manufacturing sectors; which all have high export and employment potential. The service sector of the economy has shown that it may not be the best way to perpetuate growth poles and does not provide the export capability of tangible goods. Germany has shown that policy addressing these economic sectors can be successful. A slight shift of focus in American economic development toward concrete tangible goods can go a long way in reducing spatial economic disparity.

For urban planners this study brings important conclusions. Plainly stated, Industry, Agriculture, and Manufacturing provide jobs for people. Growth in the service sector is an externality of population growth. Therefore, planners in the future may want to focus on incentivizing the aforementioned three categories rather than attempting to grow the local service industry. Future land use coordination should allow room for these large economic sectors to locate within all municipalities lacking in these fields. These sectors provide stability that service markets cannot always provide.

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BIOGRAPHICAL SKETCH

Gabriel De Jesus was born October 16, 1985, at Ashford Medical Center, in San Juan, Puerto Rico. He is the first son to Axel and Jossie De Jesus. He has one brother, Sebastian. Gabriel began his education at First United Methodist elementary school. He also attended Neptune Middle School and Osceola High School. While attending Osceola High School he began his university studies and upon graduation continued course work at the University of Florida. In 2008, Gabriel earned his bachelor's degree in economics. He also heavily pursued electives in the fields of chemistry, biology, and religion during that time.

In 2008 he was admitted to the college of Urban and Regional Planning at the University of Florida Graduate School and graduated in August of 2010 with his Master of Arts in Urban and Regional Planning. During that time he specialized in economic development, Geographic Information Systems, and hazard mitigation. His interests in international economic development lead him to Germany in January 2010 where he conducted graduate research with Humboldt University of Berlin. Apart from school Gabriel enjoys fishing, golf, and is an avid basketball and football fan. He is also a member of his local church and enjoys being an active member of his community.