



LUND UNIVERSITY

School of Economics and Management

**Master programme in Economic Growth,  
Innovation and Spatial Dynamics**

# **Economic Growth in Selected Economies and Automotive Industries through the Prism of Schumpeterian Business Cycle Theory**

**Daniel Chapala**

[daniel.chapala.860@student.lu.se](mailto:daniel.chapala.860@student.lu.se)

*Abstract:* Under the current economic situation, the major economies of the world are experiencing a significant downturn. Simultaneously, the automotive industries of certain prominent economies are experiencing comparable downturns. This study seeks to examine the commonalities between these downturns through the prism of Schumpeterian Business Cycle theory. The study looks to macroeconomic indicators from the US, Japan, Germany and the EU15, and compares these figures to data for the respective automotive industries of each economy over the last three to five decades. The findings show some potential commonalities in growth cycles, productivity increases, and simultaneous downturns which have the possibility to substantiate Schumpeterian Business Cycle analysis in this context.

*Key words:* Business Cycles, Automotive Industry, Schumpeter

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Supervisor: Lennart Schön

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## 1. Introduction

Joseph Schumpeter is one of the great economists of the twentieth century. In his monumental work of 1939 entitled *Business Cycles*, he laid out a theory on cyclical changes in patterns of growth and recession in economic performance. Rarely has the question of understanding fluctuations in the economy been more relevant, than in today's economic environment. It is in this context that this study has been designed, to gain a better understanding of the nature of fluctuations in economic performance over the long term through the prism of Schumpeterian business cycle theory. In particular, the study will address the question of whether long term growth patterns exist in the leading economies of the world today, and if these growth patterns are reflected in the growth patterns of the automotive industries of these leading economies.

There are a number of steps to take in attempting to gain a better understanding of this phenomenon in this specific context. First, it will be necessary to provide an extensive background to the argument which provides the framework for this analysis. This will be done by laying out a synopsis of the original work by Joseph Schumpeter, as well as some contextual analysis from some of his contemporaries. This will be an important first step to provide the reader with a better fundamental understand of the inspiration and context of the study.

The next step will be to provide an analysis of economic growth trends in what can be labelled the current "long wave" phase of economic growth in the world economy. This section will take-on a more quantitative approach, as figures of economic growth across a variety of vital economies will be tabulated, and measured against figures of efficiency and total factor productivity. This will allow for an accurate depiction of true economic growth performance, while also providing an overall picture of economic performance on a global scale.

The third method of analysis will involve a case study of auto sector performance in a number of key production locales. The auto sector is a key industry in relation to production and consumption in a capitalist economy. By correlating the waxing and waning of the auto industry to the oscillations in global economic growth in a business cycle framework, the intent will be to provide an industry specific contextual case study to qualify the global and domestic fluctuations in economic growth performance of the specified economies. This focus will provide a picture

of either convergence or divergence in the auto sector as it relates to long term business cycle oriented economic growth.

Through these steps, it will then be possible to gain a better understanding of the current economic crisis in terms of long-term Schumpeterian business cycles. Through a theoretical discussion of the concepts laid out by Schumpeter and others, through the analysis of macro-economic growth profiles, both domestic and international, as well as through the portrait of industry specific data over the time period, it will be possible to gain a well rounded idea of the phenomenon as it is suggested to be depicted. Through this process, it is the hope that a more accurate picture of our current economic climate can be portrayed, so that that we may gain a better understanding of the economic world which is unfolding around us today.

## **2. Theoretical Framework**

In introducing the ideas presented in Schumpeter's Business Cycles, it will be important to go step by step through his analysis. The first step in his analysis is to pinpoint the nature of the economic fluctuations that make up a business cycle.

### **2.1 The General Business Situation and the Business Man's Normal**

In attempting to assess the ebbs and flows of a business' success and failure, Schumpeter identifies a number of phenomena which play an important role. The first of these phenomenon he coins the general business situation. When a business owner is evaluating or projecting success or failure in the economic performance of their business, it is a commonly held notion that this performance is not determined solely by the actions of the business alone. There is also a question of the context in which this business is operating. As Schumpeter puts it, "every business man knows that success or failure depends not only on the internal functioning of his business, but also on the 'General business situation'" (Schumpeter 1939, 3). This is to say that

all the practices of business are dependent on this general situation which affects the flows of all business in a particular economy. He goes on further to describe that this general business situation “affects the fortunes of all business, general background for endeavours in a nation, or the whole industrial world” (Schumpeter 1939, 3). This is the first element to be conscious of when looking at ebbs and flows in business performance.

The next element which Schumpeter introduces is the “business man’s normal.” In looking at macro level business trends, there are two main focuses of analysis for Schumpeter: statistical normal, and equilibrium (Schumpeter 1939, 4). When speaking of statistical normal, this is the concept that when looking at a series of data, that there is a general norm which can be divined over the larger trend in a sequence. This could be coined as equilibrium, or as the central point around which fluctuations vary. In this context, Schumpeter introduces the business man’s normal. He feels that every business man has a conception of where this equilibrium, or statistical norm, should materialize in the functioning of his own business or sector. He outlines that “business people often speak of prosperities or boom, and depressions or slumps” with “the most serious situations” bringing “talk of crisis” (Schumpeter 1939, 5). Schumpeter argues that “an astute business mind can diagnose these trends” and therefore deduce where the actual point of equilibrium exists (Schumpeter 1939, 5). He goes on further to describe that “a doctor at a bedside can often diagnose a problem better than when in depth tests are done” (Schumpeter 1939, ). This outlines what he describes as a “metaphor for business cycles” as the demand for “econometric proof...limits the boundaries of cognition” (Schumpeter 1939, 6).

## **2.2 Econometric Method?**

As has been stated, there are dangers in relying too heavily on econometric calculations as a sole provider of economic truths. This is a belief which is firmly held by Schumpeter. He warns of such phenomena as “spurious verification” and “non-sense induction” which he gives of a variable interest rate. He mentions the observations that, in strong economic times, interest rates are low, whereas in weak economic times, interest rates are high. The nonsensical result would

be that the interest rate causes the boom or bust which, as we know, would be quite false (Schumpeter 1939, 32).

Schumpeter also addresses his disdain in relying purely on econometrics with specific reference to his business cycle methodology. He argues that the phenomenon that he is attempting to extrapolate does not manifest itself in purely mathematical economic variables that are so commonly employed in econometric calculations. He states that “no statistical finding can either prove or disprove a proposition which we have reason to believe by virtue of simpler and more fundamental facts” (Schumpeter 1939, 32). By this, he implies that the narrow focus of an econometric method would limit the observer from being able to calculate the phenomenon which he wishes to explain.

### **2.3 The Fundamental Question:**

Now that some of the preamble has been outlined, it is important to get into the fundamental question which Schumpeter is seeking to address with his business cycle thesis. He feels that, to understand any economic crisis, there must be an in-depth examination of the “minutia of context” which surrounds the events that lead an economy on a downward spiral (Schumpeter 1939, 34). That being said, the possibility exists that there may be some overarching tendencies in a capitalist system that lead to a rhythmic flow of success and failure which supersede the individual circumstances which a snapshot of an economic process may provide. The question is asked whether it is possible to look not to individual context, but to the functioning of the entire economic system to explain the booms and busts of capitalism. This is the fundamental question which Schumpeter is attempting to answer with his monumental undertaking, whether there are not just circumstantial periods of crisis and renewal, but a business cycle, which dictates macro movements in economic growth and recession (Schumpeter 1939, 34).



## 2.4 Equilibrium

As has been introduced earlier, the concept of equilibrium is a central tenant to the ideas of Schumpeter. The concept that there is a mean average of economic fluctuations, or a central locus around which the various fluctuations of boom and bust revolve around, is at the heart of Schumpeter's concept of equilibrium. He states that "the economic system must strive to re-establish equilibrium whenever it has been disturbed" and to, in effect "absorb the change" (Schumpeter 1939, 47). To understand the nature of these fluctuations and the concept of equilibrium, it will be necessary to enter into a more in-depth discussion of these concepts.

The economic system is a disharmonious one, for Schumpeter, as a result of a variety of lags in production and consumption, as actors in the economic sphere navigate the waters of expectation versus reality in the supply and demand structure as it changes. There are producer lags, and technological lags, which outline shifts in modes of production, or quantities of production, as price structures and production adjust to varying levels of output (Schumpeter 1939, 48). We can look, for example as Schumpeter does, to a firm in a competitive industry. When deciding quantities of production, this firm takes into account elements of the previous, current and future variables of economic performance which are deemed relevant to the decision at hand. When these decisions are taken, which can be called arbitrary at times, the selected industry will be affected not by its current state of production and consumption, but on future expectations deduced by producers. This denotes that it is not pure equilibrium which dictates the flow of an industry, but the interpretation of the state by those at the controls (Schumpeter 1939, 55). This is a firm based explanation of the process of variation which plagues the economic system, and the role of producers and expectations in this process. It is now vital to look deeper into this phenomenon.

Schumpeter's study of equilibrium economics is a study of business fluctuations. The fluctuations manifest themselves in the "phenomena of overproduction, excess capacity, unemployment, maladjustment" and all the processes that throw our economic system from harmony to disharmony (Schumpeter 1939, 68). The attempt to explain these phenomena

necessitates a discussion of equilibrium, for “economic fluctuations must be a movement around something” (Schumpeter 1939, 69). The fact that these movements rotate “above and below a statistical normal,” for Schumpeter, denotes “a central point, which represents equilibrium” (Schumpeter 1939, 69). But as Schumpeter notes, the nature of the economic system is fluctuation, since perfect equilibrium is never established. Therefore, it is more helpful for him to use the concept of “neighbourhoods of equilibrium” where, as the term suggests, there is not one firm point of equilibrium, but rather a range of inputs that could be characterized as the nearest possible point to an exact state of equilibrium (Schumpeter 1939, 71).

## 2.5 How the Economic System Generates Evolution

In the previous discussion, we have presented a theoretical model of how an economic system reproduces itself at a constant rate of growth, and in a constant state of equilibrium. It is now important to look to how this process has played out in real economies in historical time.

## 2.6 Innovation

Innovation is a central component of the business cycle theory for Schumpeter. It is an engine of growth, and the force that allows the cycle to reproduce new levels of growth. Schumpeter characterizes innovation in a number of ways. First of all, he mentions “technological change in the production of commodities already in use.” Secondly, he refers to “the opening of new markets or of new sources of supply.” Thirdly, he includes the “taylorization of work” and the “improved handling of material.” He fourthly mentions “the setting up of new business organizations.” Basically, he is referring to “doing things differently in the realm of economic life” (Schumpeter 1939, 84).

In terms of his business cycle model, innovation is characterized as an internal factor of change. He believes that divining new productions functions is a natural element of a capitalist economy and of business actors in this system. This process of innovation is a vital part of the capitalist

economy, as it generates the new processes that lead to further economic growth. These changes in processes, along with all of their consequential effects, and the response of the economic system, are the definition of economic evolution for Schumpeter (Schumpeter 1939, 86).

Schumpeter feels that innovation is central to virtually all phenomena in the capitalist system. Furthermore, he feels that all problems or difficulties of the capitalist system would be negated if innovation flowed at a constant rate, or at a steadily increasing rate through the same avenues, or for the same goals throughout economic life (Schumpeter 1939, 87). As we know, this is not the case in the reality of capitalist economy. We know that truly groundbreaking innovations do not flow in this continuous method. Schumpeter references the law of diminishing returns to underline the influence which innovation has on growth cycles. He outlines the law of diminishing return to state “that any production function or product will undoubtedly decrease profit margins as time goes by” (Schumpeter 1939, 88). This implies that any product or production function, no matter how revolutionary, has a shelf-life where it will be at a peak of economic growth production and that invariably, the profit produced declines over time. This is where he feels innovation plays a key role, as he states that “innovation is the key for interrupting this cycle, as it produces a new wave of profit” that offsets the diminishing returns (Schumpeter 1939, 88). He outlines further that as production increases, there must be an increase in the cost of production monotonically. He argues that wherever there has been an increase in production without an increase in cost, that innovation has occurred (Schumpeter 1939, 88). This factor of innovation, he argues, upsets the law of cost curves, which normally decrease monotonically. He argues that innovation makes this law invalid (Schumpeter 1939, 91).

The final area of innovation which Schumpeter chooses to give great focus is the market conditions which promote or inhibit the incorporation of innovation into production functions. He argues that new innovations are often led by new men, and that this lead to the production of new firms (Schumpeter 1939, 96). Furthermore, he goes into a systematic description of the traditional reactions of the economic environment to change. Firstly, he argues, is that traditional actors resist change, and observes new actions with neutrality, or even disapproval, as there is a reluctance to change. Market actors may even sabotage the innovation, as they are comfortable with the current modes of production. He also argues that the environment actively

promotes existing practices, providing a barrier for innovative activities. This includes the organization of labour and lending around routine products and processes, and even implicates the consumer as there is a tendency to buy what is familiar. This, he summarizes as a general “inhibition in most to treading a new path” (Schumpeter 1939, 100).

## **2.7 The Role of Entrepreneurship in Innovation**

Now that the role of innovation has been firmly established in Schumpeter’s theory, it is important to enter into a discussion of the economic actors that produce these vital innovations. There is an overriding theory that capitalism, in its fundamental nature, produces increases in knowledge and innovation as a matter of course. For Schumpeter, this is not the case. He argues that the ability to produce fundamentally innovative and revolutionary products and processes “is distributed as unequally as others are” (Schumpeter 1939, 130). By this he means that, there is an uneven flow of revolutionary innovation, because the skill to create that innovation is as rare as the product may be. It is now important to get into the mechanics of the process of entrepreneurial innovation.

The entrepreneur is motivated, for Schumpeter, by the prospect for profit. This individual introduces a new product, creates an innovative firm to distribute the product, and in-turn, changes the market orientation. Following the introduction of the product and the firm, other actors in the market follow and copy the innovation (Schumpeter 1939, 131). The effect of this is a total disruption of the market, including a disruption of the incumbent firms, who have had their existing processes jolted by the introduction of a new firm that challenges the status quo that has fuelled their success in the market. This, for Schumpeter, is the essence of disequilibrium, as the existing methods have been totally upset. These incumbent firms are at the heart of the disequilibrium, as they are forced to either adapt or face contraction, irrelevance, or even economic termination. This is termed by Schumpeter to be a process of “modernization, rationalization, and reconstruction,” where these firms are forced to either sink or swim in a highly competitive environment (Schumpeter 1939, 134).

This process creates a cyclical movement in production and profit in the market. As the new product or process is introduced, there is an upset in equilibrium. This is characterized by an increase in costs, interest rates, wages and receipts (Schumpeter 1939, 131). But, at the same time, there is little increase in net output. As the factors of production adapt to the new reality, there is a process of establishing a new equilibrium, through a decrease in profit per unit results from an exhaustion of the potential value of the new innovation (Schumpeter 1939, 135). This new equilibrium is finally a reality when the market has finally fully adapted to the new product or process. This new equilibrium is generally characterized by new production functions, minimum profits and lending activity, greater social production and lower prices (Schumpeter 1939, 137).

## 2.8 Business Cycles

Each of these actions of economic change rotates in cycles for Schumpeter, rotating in a two phase cycle. This cycle is fuelled by entrepreneurial activity, and represents a movement away from, and a movement towards equilibrium (Schumpeter 1939, 138). Prosperity and recession are the two dominant traits of these first two stages of the business cycle. These movements represent, for Schumpeter, “fluctuations in economic life” which, when “translated into...diagrams, present the picture of an undulating or wavelike movement in absolute figures and rates of change” (Schumpeter 1939, 138). As Schumpeter describes, this “sequence of events” described, has “come to be called business cycles” (Schumpeter 1939, 138).

This process does not stand alone in the continuum of economic evolution. In fact, it's quite to the contrary. As Schumpeter outlines, “one cyclical situation produces the next” in what he describes as “perpetuum mobile” (Schumpeter 1939, 139). This implies that each phase of prosperity and recession has been spurred on by the last cycle, and introduces the possibility of the next phase of growth and contraction. Schumpeter describes recession to be “the reaction to prosperity,” just as prosperity can be a reaction “leading from recession” (Schumpeter 1939, 139). Schumpeter references Juglar as a pioneer in this brand of analysis, as he was an innovator in the analysis of cyclical change in capitalist economies.

As has been stated, this first wave of economic prosperity and recession do not stand alone in the business cycle. What follows, can be termed as a secondary wave which has been spurred on from the initial disturbances to the economic equilibrium. This process is characterized by a reactive transformation in the economy brought on by the shocks of the initial shift from this transcendent technology. An example is given by Schumpeter to portray this secondary wave. If, for example, a new factory opens in an area to accommodate the new product or production function, there is an influx of individuals into this area to staff the new factory. As these workers move into the area, they demand and provide a need for infrastructure to support their new locale of living. This necessitates all the supportive industries such as grocery stores and consumer enterprises. This provides a secondary wave of prosperity, stimulating the economy to a new height via the consumer capital that has been injected via the profits from the initial prosperity. This can be described as a secondary wave, which although not created directly from the innovative activity, has been spurred as a direct result of the disturbance to equilibrium provided by that initial wave (Schumpeter 1939, 145).

This wave, which has grown indirectly from innovation, and more so from the secondary effects of the shift in the economy, it has also played a central role in growth measurement and theory in the past. Schumpeter notes this, as he describes the process with which this secondary wave has gained prominence. He states that the “secondary wave’s effects can be quantitatively more important than the first wave” as the new capital has circulated throughout the economy (Schumpeter 1939, 146). Schumpeter describes how this secondary wave is “easier to observe” and has, as a result can explain for him “why innovation has been absent from economic cycle theories” in the past (Schumpeter 1939, 146). As this secondary wave has had a more wide reaching effect on the entire economy, there are some wide reaching consequences to this shift which must be discussed.

The secondary wave produces a widely disruptive effect on the economy for Schumpeter, and this has positive effects, which have been summarized, but also can have some more dire effects on the economy as a whole. The effect of this secondary wave can be a false sense of security for economic actors as a whole, as there can be a tendency to misconstrue growth led by consumer spending to actually be growth led by fundamental advances in economic processes. As Schumpeter describes, the “secondary wave can give way to over indebtedness, as loans are

given on the bases of false assumptions about growth in the economy” (Schumpeter 1939, 147). This, in particular, can be the inability to diagnose that the growth is “not innovation lead growth, but second wave consumption growth” (Schumpeter 1939, 147). This misinterpretation can have wide reaching effects on the entire economic system, which can extend to loaning practices. There can be a tendency by loaning agencies to lend “purely for consumptive purposes on false expectations of salaries” while “businesses will borrow to expand old lines of production” and even “land prices will be inflated” (Schumpeter 1939, 147). As can be inferred from these destructive effects on the economy, this distortion of economic activities has the potential to lead to more dire economic consequences, which must be discussed further.

It is evident that this process of market distortion cannot continue unabated, and has the potential to lead into a dire situation for the economy. This leads to the next stage of this business cycle progression for Schumpeter, recession. Schumpeter describes how, “any prosperity...induces a period of liquidation” which is characterized by the elimination of “firms that have become obsolete” (Schumpeter 1939, 148). This is described as a “painful process of readjustment of prices, quantities and values” as a new equilibrium stage is being produced in the economy (Schumpeter 1939, 148). This is a crisis point for an economy, which often has a self-reproducing element to it. Schumpeter describes this as a “vicious cycle” where confidence is lost in the economy and many of the bad practices of the secondary wave begin to wreak their havoc on the economic system. Prices begin to fall, which can inspire panic in the market, as Schumpeter describes in the statement that “prices fall because they have fallen” (Schumpeter 1939, 148). At this point, lenders who have misconstrued the state of the market, begin to recall the consumptive loans which they mistakenly thought were justified, in order to improve their own liquidity. But the debtors are suffering from the same fall in the market, which leads to defaults on loans, and a downward spiral as value and capital are eroded in the market. Schumpeter describes how “pessimistic expectation may...acquire a causal role” as panic pushes market actors to reinforce the negative tendencies in the market (Schumpeter 1939, 148).

This downward spiral in the economy produces the third stage of Schumpeter’s business cycle, depression. As the second wave has run its course, the downward effects of the wave produce a situation of problematic indices in the economy. As Schumpeter describes, “the pressure of the breakdown of the secondary wave...will outrun the neighbourhood of equilibrium,” resulting in a

state of depression in the market (Schumpeter 1939, 149). It is important to note, however, that this stage of depression is not inevitable, and does not always sink to the same depths of despair. Schumpeter notes that the “vicious spiral effect of panic and hysteria” is “not always necessary” (Schumpeter 1939, 150). Nevertheless, it may take several years for an economy to rebound from this type of structural crisis.

This leads us to the final stage of Schumpeter’s business cycle theory. This phase can be labelled recovery. At this point, as Schumpeter outlines, “the economic system returns to the equilibrium level” (Schumpeter 1939, 149). This can only take place when the final throws of the distortion of the market reaction to the secondary wave have been played out. It must be noted that experienced actors in the economy play a vital role in recovery, and the limitation of the effects of crisis during a down period. Schumpeter notes that “insiders will often quietly buy during down periods” of economic turmoil (Schumpeter 1939, 152). These insiders are those who are familiar with the cyclical movements of the economy, and the concept that from crisis follows recovery, as Schumpeter explains. This is the end of the business cycle for Schumpeter. A new business cycle will take its place once innovation allows for a new transformation of the economy.

## **2.9 Time Frame – Long Wave Theory**

In attempting to define the time period which will comprise my analysis, the long wave theory will define the parameters of the study. Nikolai Kondratiev was a pioneer in economic analysis. He identified forty to fifty year cycles of renewal in capitalist economies. This theory will underlie the time period which will be the focus of the study, as I will focus on the latest long wave which has affected the major economies of the world. In order to understand the nature of this idea, it will be vital to give a very brief description of the dynamics of long wave theory.



## 2.10 General Purpose Technologies

The long wave theory rests on the principle that revolutionary technologies, which are introduced at scarce intervals in the economy, provide long cycles of growth as they disperse their beneficial effects. The concept of General Purpose Technologies (GPT's) was brought to notoriety by Carlota Perez, as she outlined the necessary elements which allow innovations to qualify for this auspicious title (Perez, cited in Freeman et al, 147). First of all, key factors of production have to become available and inexpensive, in order to facilitate a shift into new forms of production. Examples of these in the past include coal, oil, iron, steel or even electronic chips. Secondly, these innovations have to give rise to complementary products and industries that may allow for the technology to spread beyond its initial stages of dispersion. These have been termed as "carrier branches" as they allow for the innovation to spread. Such branches include steam engines giving rise to railways, or the micro chip being implicated in the computer. A third property of these GPT's is that they must spur organizational innovations involved in the production and distribution of the product or process. As we saw with railway construction and conglomeration which rose from the steam engine, which in turn affected the way companies organized themselves, new rules of interaction must branch out to disparate industries. A fourth and final element which is essential to the GPT's is that they will not be embraced by status-quo actors in the more arcane sectors of economic production. The inevitable consequence of a revolutionary technology is, that it will make obsolete, a previous form of economic interaction that may have once looked impermeable. This will be a process that favours new firms, which dynamic processes, and will inevitably lead to stagnation in other sectors, and a changing of the guard in who holds the reigns of economic power (Perez cited in Freeman and Louca, 2001. 147). Now that the definition of a GPT has been introduced, it will be vital to look to a brief description of these technologies in use in recent economic history.

There are a number of examples of GPT's in the last two hundred years of economic history. If we wish to look to the early nineteenth century, we can look to the steam-powered mechanization of industry and transport (Freeman and Louca, 2001. 141). This technology was fuelled by available coal and iron, was disturbed by railways, steam engines and machine tools, and led to such organizational innovations as joint stock companies, and subcontracting

(Freeman and Louca, 2001. 141). If we wish to follow the historical sequence of long wave cycles, we can see the next major GPT, electrification. This was a technology that was fuelled by the availability of copper, steel and metal alloys, was distributed by electrical equipment, heavy engineering and heavy chemicals, and helped in the establishment of specialized professionals, management systems and giant firms. The next major GPT surrounded the motorization of the early twentieth century. This was a phenomenon distributed by the automobile, trucks, aircrafts and refineries, was made possible by the availability of oil, gas and synthetic materials, and led to the organizational phenomena of mass production and consumption made famous through fordism. This brings us to the most recent and relevant GPT to this study, the microprocessor. Introduced in the early 1970's, this phenomenon led to the computerization of the entire economy, through the computers, software, telecommunications equipment and biotechnology. It was fuelled by the availability of integrated circuit chips, allowed for the availability of the internet, and created the organizational innovations of global networking, among other things (Freeman and Louca, 2001. 141).

It is in this framework that the historical confines of this study have been determined. According to the long wave theory, we are approaching the end of a long wave. The general trend of Kondratiev waves has been a 40 to 50 year trend from crisis to crisis (Freeman and Louca, 2001. 141). As it stands at the moment, our economy is hovering around the 40 year mark, with some substantial economic difficulties unfolding around us (Altman 2009, 2). It is for this reason, as well as many others that this study has materialized.

### **3. Approach**

#### **3.1 Macroeconomic Indicators and the Business Cycle**

It is important to introduce the means by which the analysis of the business cycle phenomenon will be introduced and examined in the study. There are a number of reasons to have this analysis as a focus. First of all, economic growth theories are prevalent in analyzing long term

economic data. It has been a long standing goal in economics, to attempt to define a pattern by which trends develop in economic growth performance. The unlocking of the partial mystery of these trends will help to solidify the process of economic forecasting and give economists a vital tool in examining potential growth trends. Secondly, growth theories are gaining weight in the current economic climate. As the world economy plunges into crisis, economists the world over attempt to gain a better understanding of the phenomena which bring the economic system from a period of improving potentials, to a period of panic and economic despair. Outlining some macro-trends serves everyone in this context, as we can bring some methodology to an otherwise chaotic process. Finally, it is vital to bring the prominent theories of yesteryear into today. Joseph Schumpeter wrote his seminal work on Business Cycles so many decades ago, and a re-evaluation of this theory in a more contemporary setting will provide an important second look at the theories presented by one of the twentieth century's greatest economists. It must be noted, at this point, about there is a vociferous debate which surrounds the validity of business cycle theory. This does not detract from the importance of examining the theory further, but it is important to understand the approach in its appropriate context. Now that some of the merits of the study have been presented, it will be useful to take a look at the approach and methodology that will be employed.

### **3.2 Economies in Focus**

In attempting to assess macro trends in an international context, the choice of which economies upon which to focus is of central importance. In making these selections, the element of presenting economies from a variety of the world's key economic zones has been a priority. In this respect, the study will focus on a number of the world's most prominent economies in some of its most important regions. The first economy which will be examined, is that of the United States. Little explanation is required in describing why the American economy would be part of a study of this nature. It is the world's largest economy, with production and consumption activities which affect the entire global economy. Macro trends in growth, production and

innovations in this domestic economy continue to have wide reaching effects on the disparate areas of the economic landscape. It is for this reason that it will make-up the first region under the focus of this study.

The next economy which will be an integral part of this study is that of Japan. There are a number of reasons for including the Japanese economy in this study. First of all, it is one of the world's largest economies. In formulating a group of the world's most influential economies, Japan ranks among the most important in a global setting. This makes it a vital element of the study. Next, the Japanese economy provides a look at a second major region of the global economy. The importance of Asia has increased over the latter part of the twentieth century in an economic context. As Asia's largest economy, a focus on Japan will provide an in-depth look at one of the most prominent economies in this important region, and will give further context to the study.

The third major economy which will be under focus in this study, is that of Germany. There is a comparable array of reasons for including the German economy in a global study of economic trends. First of all, the German economy is the largest economy in Europe. In its position as such a prominent economy in Europe, the German economy will give a country specific example of economic performance in one of the most prominent economies in the region. A second rationale for including this economy in the study, lies in its important role in the global economic system. As in the case of the other two national economies selected so far, the German case presents yet another giant in the global economic sphere. This will allow for further context in painting a picture of global economic trends.

The final economy in focus, is actually an amalgam of regional actors known as the EU15. This block of fifteen countries in the European Union, which is made up of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the UK, plays an important role in this study for a number of reasons. First of all, in an economic system such as the European Union, it is important to look at producers in an economic block. Although the look at Germany will be a useful one in gaining context of an individual economic actor in the European system, there are many economies in the European Union which combine to rival the global economic actors of the world. Economies such as those in Japan and the United States, have had few rivals in terms of size and economic performance

over the balance of the last long wave cycle. In the Asian case, recent events have seen China rise in prominence, but nevertheless there isn't the type of parody between large economic actors which combine to form a whole as has been the case in Western Europe. A second rationale for including this economic block, lies in the traditional role countries within it play in the global economic system. Over the recent history of economic activities, trends in the major Western European economies have played an important role, along with the US, in shaping economic trends in innovation, production and consumption. It is for this reason, as well as many others, that this economic block has formed an integral part of this study.

### **3.3 Economic Indicators**

Now that the economies under focus have been presented, it is important to look to the methodology with which this analysis will be undertaken. There are a number of key economic indicators for the economies in question which will provide data to illustrate macro growth trends over the last long wave growth cycle. The first of these indicators is total gross domestic product (GDP). This will detail the macro level economic growth experienced by the economy in question to show its evolution over the time period in question. The next indicator is that of annual hours worked. This will provide a picture of the evolution of worker activities on an annual basis over the time period in question. The next indicator will be total hours worked. In addition to the annual figures, the total figures will provide further context to the picture of raw labour output over the period.

After providing the raw data on GDP and hours worked, it will be useful to present next concepts of GDP in relation to the individual working statistics. These indicators will be provided in a number of forms. First of all, it will be useful to discuss GDP on a per capita basis. This will individualize the GDP figures on a per person basis, taking them away from their usual position as a purely summary indicator. The next data section will provide GDP per person employed. This will provide further context to the macro GDP figures. Finally, GDP per hour worked will be examined. In individualizing the GDP figures in this number of ways, it will be possible to calculate a measure of the role of productivity shifts during the period of economic growth. This

process will present the possibility to calculate economic activities over this time in a more accurate context.

### **3.4 Auto Industry and the Business Cycle**

Now that the economic growth picture has been laid out with reference to the business cycle theory, it is important to look into how the auto industry corresponds within this framework. There are a number of reasons to focus on the auto industry as a key industrial sector in this context. First of all, it makes up a large percentage of manufacturing production for a number of prominent economies of the world. If we look to some of the leading industrial producers in the world, the US, Japan, Germany and the EU15 all have the auto industry as a key employer and producer of value added goods. A next reason for this focus lies in the close relationship between auto sector performance and consumer spending in an economy. History has shown that the auto industry is one highly responsive to fluctuations in the economic performance of a national economy, which gives it a unique position to reflect a number of important indicators that shine light on underlying economic trends (Korth 2008, 14). Finally, it is an example of private capital goods. There is a tendency in economics to place a large percentage of focus on the capital goods of the state, but it will be valuable in this case to focus on a household indicator of capital good spending.

### **3.5 Economies in Focus**

In order to give an accurate picture of the ebb and flow of production and consumption in the automotive industry, it will be important to approach this examination in a number of clear steps. First to all, it will be vital to look at the economies in which this industry plays a prominent role.

This will involve a focus on the major auto producing areas of the United States, Japan, German and the EU15 (an amalgam of fifteen prominent western European economies, made up of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Sweden and the United Kingdom). Before moving forward, it is necessary to discuss briefly what makes these selections relevant and vital to the study in focus.

There are a variety of reasons for choosing this group of economies. A first reason includes the fact that they make up the lion's share of auto industry producers in the world. The American auto industry has a storied position as a pioneer in the early development of the automotive industry, and holds some of the largest and most prominent auto manufacturing and sales companies in the world. This also gives a strong representation for the North American sector of the industry. There are also evident reasons for selecting to focus on the Japanese automotive industry. In the latter part of the twentieth century, and prominently through the latest long wave of economic growth, the Japanese auto industry has proven itself capable to take on the largest world players in the industry, and has established itself as a member of the elite players in the automotive world. In addition to the particular characteristics of the domestic industry, the focus upon Japan will allow for a picture of a large segment of the East Asian economic region. In choosing the third region in focus, Germany, there are also self-evident reasons for its inclusion. For the better part of the twentieth and into the twenty first century, the German automotive industry successfully established itself as one of the industry standards in automotive production. It holds some of the world's most successful brands from the luxury arena, right down to the front line economy class vehicles. The inclusion of this country's industry is a must in terms of a discussion of automotives. The final selection to be in the focus of this study, is the EU15 region. Although the German automotive industry has been included in the study as a representative of the Western European region, there are a number of prominent players in the EU15 block which play a strong role in the industry's global dynamic. Prominent auto producing economies in this economic block include Italy, France, the United Kingdom, Spain, Sweden and Germany which, although already represented, must be included once again. This will serve to give an accurate picture of the industry dynamic in this third prominent region in the industry dynamic.

### 3.6 Economic Indicators

The second important delineation in presenting the areas of focus for the study deals with economic indicators which will be under examination. The first section of data analysis will come from a market analysis database which provides a number of macro data about the motor vehicle industry in selected regions and domestic economies. The reports provide information dating from 1979 to 2004, with statistics for all the regions in question. They provide accurate industry data, in current prices. From these reports, it will be possible to gain a delineated data breakdown of a number of indicators of the overall industry. A first of these indicators is the value added performance of the selected regional or nation. This allows for a precise picture of the performance of this industry in simply value added terminology. A next indicator will be the value added deflator growth rate. This will allow for an understanding in the variation of value added growth over the time period. A third indicator which will be usefully produced by this data source, is the total hours worked for the selected regions. This will provide an idea of the change in the time needed to produce the varied performance in the industry. In addition to total hours, it will be useful to look to hours worked per employee. With these two hours worked indicators, it will be possible to understand the way in which shifts in industry growth and performance rate to the time logged by its workers. The final set of economic indicators which will give important insight into the industry are the labour productivity figures for the areas in question. In looking to labour productivity per person engaged, and per hour worked, we will be able to see exactly how the industry's workers have contributed to the success or failure of growth figures over the time period in question. This series of data indicators will provide an initial understanding of the performance of this industry over time. The next section will provide further indications of the dynamic over this time period.

The accompanying data section which will be presented and analysed, provides some up to date statistics and information on the industry as it reacts to the difficult financial times of the 2008



and early 2009 period of economic downturn. Through up to date statistical information, there will be an outline presented of the state of the US automotive market during this period. This will include sales and production figures for the various manufacturers, both foreign and domestic, over this time period. In addition to the US statistics, some data will be put forward on the overall status of the main Japanese automotive firms in the current climate. This will provide further information of the situation as it stands in the current climate.

The analysis of this variety of sources and data will provide an accurate picture of the state of the industry from past to present over this long wave cycle. Through analysis of macroeconomic data on the national and regional level, as well as through a focus on data of production and consumption, further information will be divined. With a final look at the current state of the industry today, it will be possible to gain a better understanding of trends over this time period as we attempt to unravel the relationship of this industry to overall growth trends in the entire economy.

## **4. Economic Growth Data Analysis**

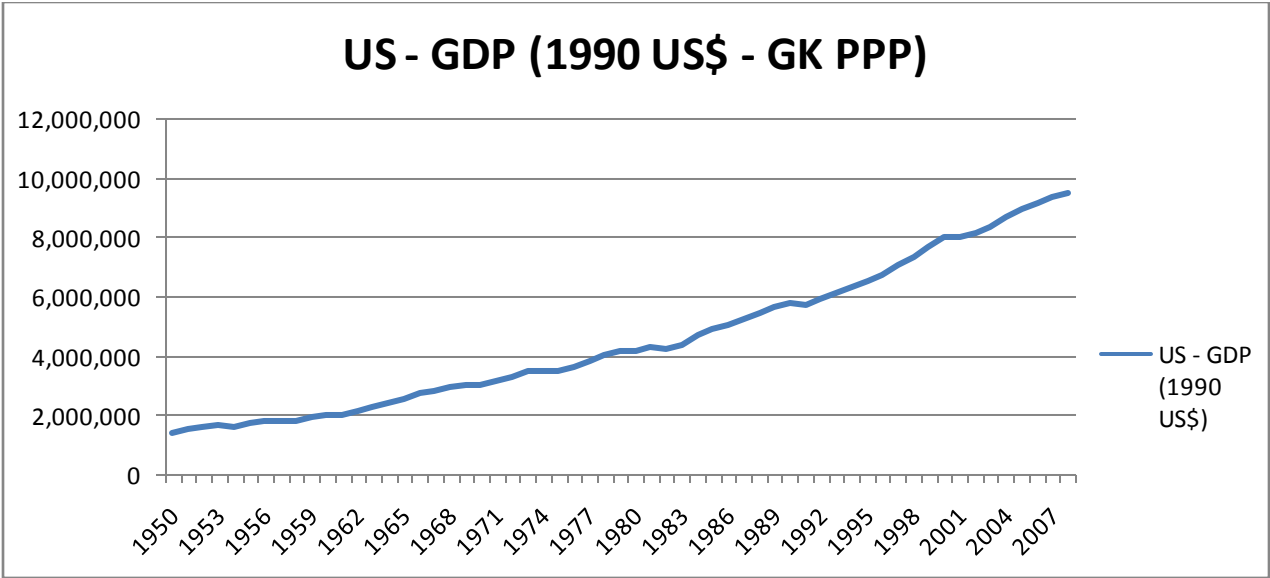
In this section, I will present macroeconomic data for the economies in focus. I will divide the section by the economy. It must be noted that all GDP figures will be expressed in 1990 US dollars converted at Geary Khamis PPP's.

### **4.1 United States Data**

It is important to begin the data section with the most prominent and largest economy in the world, that of the United States. The first data that will provide insight into US macroeconomic trends lies in the total GDP over the time period in question. Figure 1 depicts the GDP progress of the US economy from 1950 until 2008. In analyzing this data, it is clear to see a cyclical pattern of downturns in economic growth revolving around the pattern of the Juglar cycle (Evans, 2001. 64). The Juglar cycle, as referred to in Schumpeter's Business Cycle theory,

outlines the trend of approximately ten year cycles in economic growth trends. This trend shows the most pronounced pattern particularly in the latest long wave of economic growth, beginning in the early 1970's.

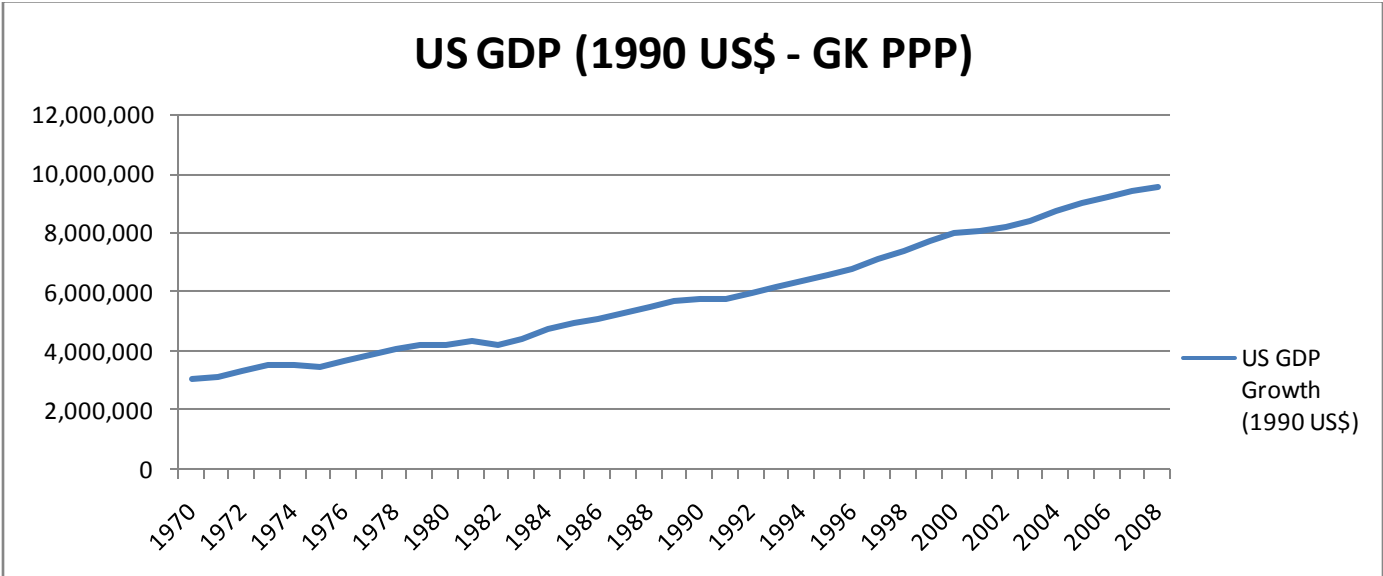
**Figure 1 – US GDP growth in 1990 US dollars, 1950-2008.**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

Figure 1.1 shows the same GDP growth trend, in the period from 1970-2008. What is shown more evidently in this timeframe, is the pronounced pattern of cyclical downturns implied by the Juglar cycle over the latest long wave cycle. As Schumpeter outlines in his theory, this patterns tends to reappear in a fairly continuous cyclical cycle. In following the trend line of this graphical representation, the latest downturn should be materializing around the current period, which the international financial system has produced in recent months.

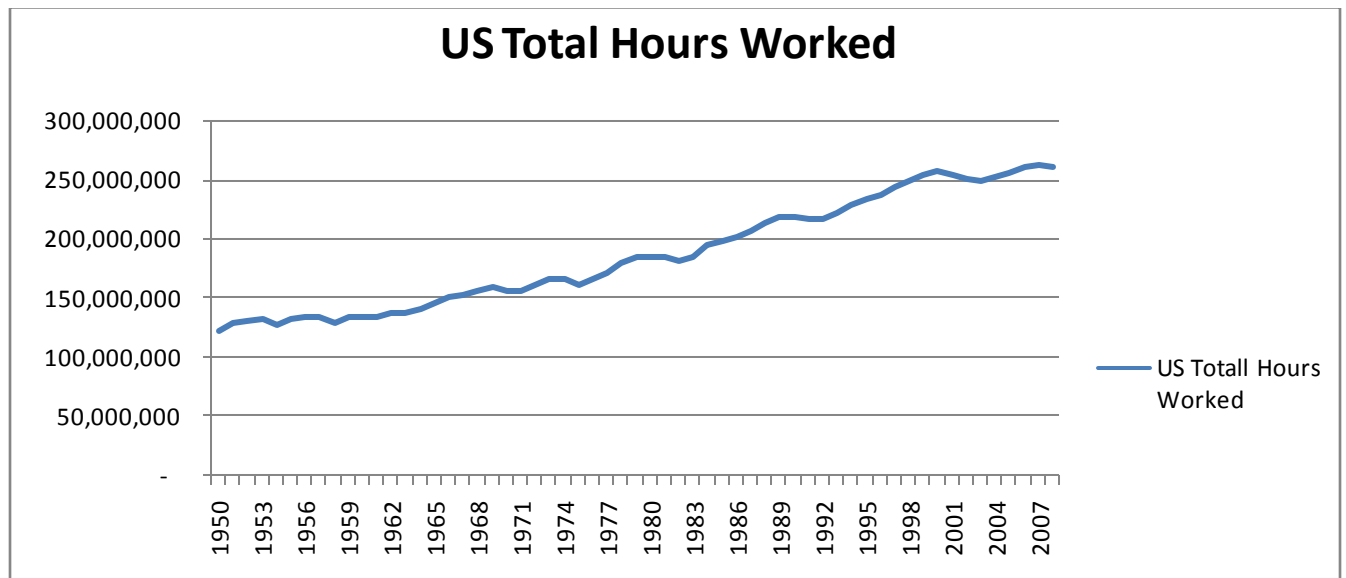
**Figure 1.1 – US GDP growth in 1990 US Dollars, 1970-2008.**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

The next step in the data presentation is to look at the hours worked figures. Figure 1.2 shows the total hours worked figures over the last half of the twentieth century, from 1950-2008. As we can see from the data, there is a steady increase in the total hours worked, with some dips along the way.

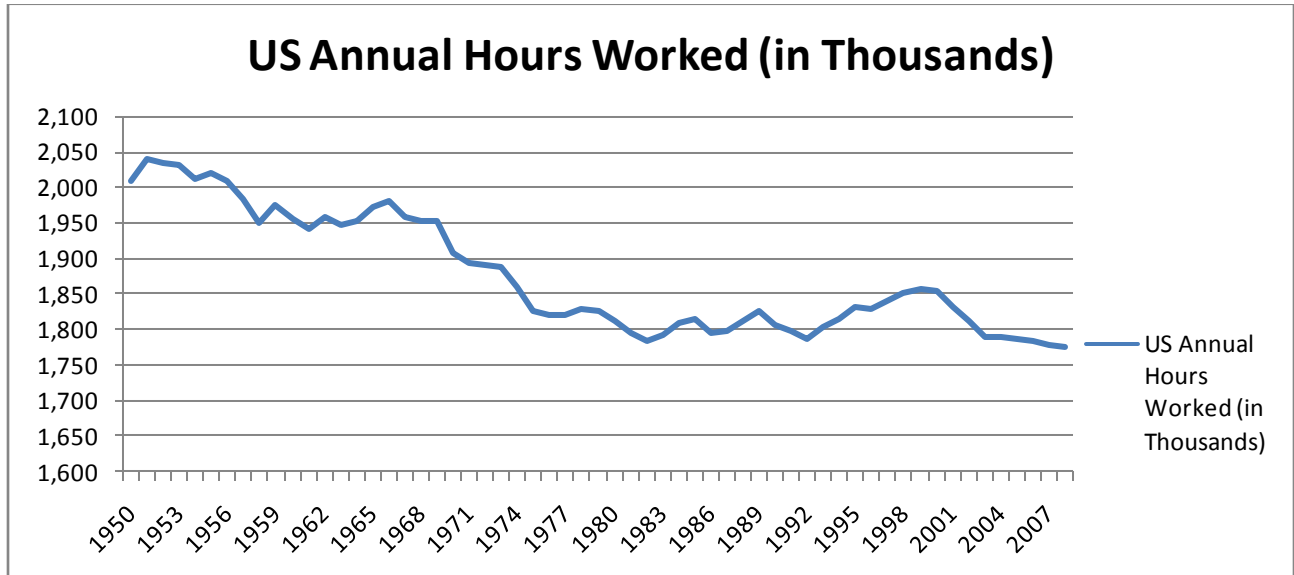
**Figure 1.2 – US Total Hours Worked**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

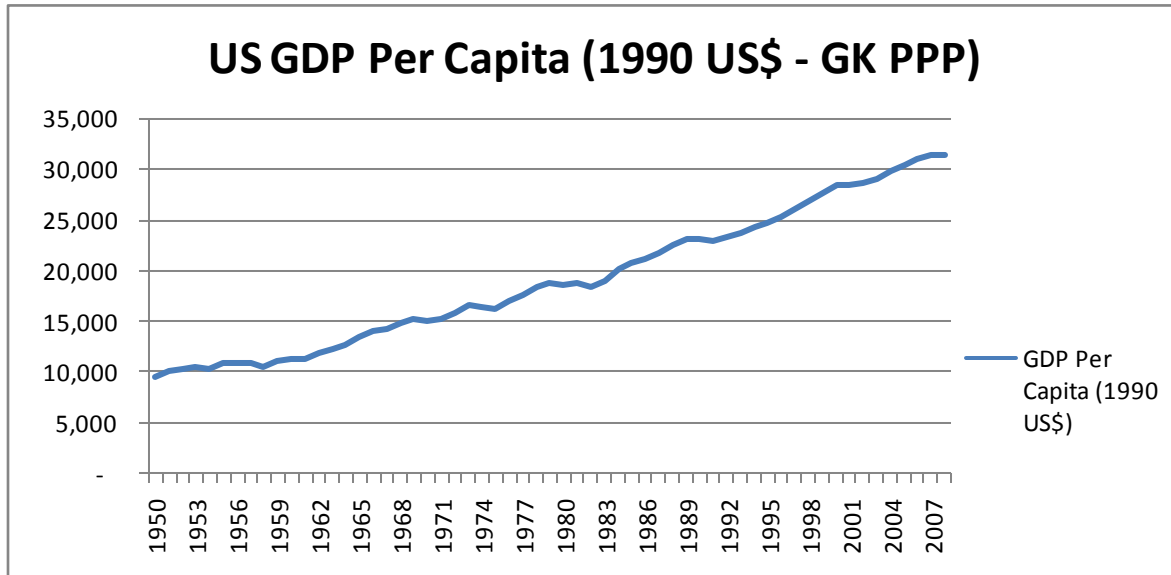
In addition to the total hours worked figures, there is another indication of hours worked which illuminates the discussion. When we are looking at hours worked, it is useful to not only look at the total hours worked, but also at the annual hours worked. Figure 1.3 gives an indication of hours worked on an annual basis recorded in thousands. This figure gives a slightly different picture than the raw total hours worked data. This shows a steady trend of decreasing annual hours worked over the time period. There is a particularly sizable decrease in annual hours worked in the time directly following the innovations of the 1970's, which it is argued ushered in a new age in economic processes. As we have seen in figures 1 and 1.1, there was a steady increase in GDP over the time period in question, while the annual hours worked decreased. This implies an increase in productivity, which is central to Schumpeter's analysis. It will be useful at this point to look deeper into productivity figures and more specific GDP analysis.

**Figure 1.3 – US Annual Hours Worked (in thousands)**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

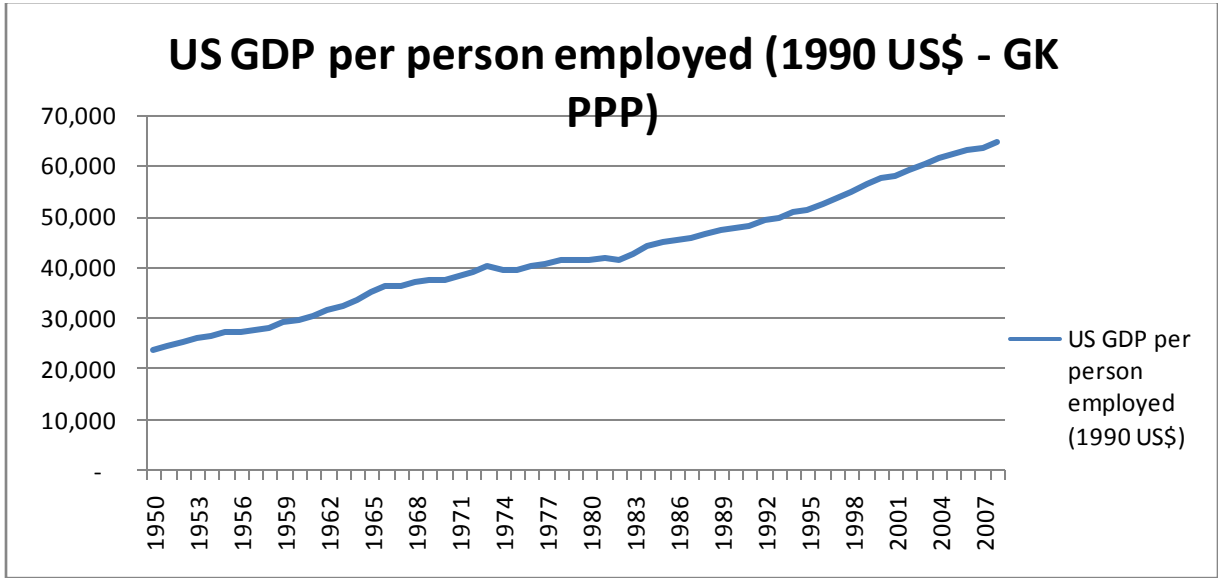
**Figure 1.4 – US GDP Per Capita (1990 US\$)**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

Figure 1.4 depicts the evolution of GDP per capita during the last half of the twentieth century, giving some telling information. The GDP per capita shows a generally gradual increase over the time period in question. There are, as there were in the raw GDP figures, signs that a Juglar cycle has been repeating itself in roughly decade long increments over the time period. What we can also see is, from around the 1983 point onward, we see an acceleration of growth in per capita GDP. If we are to infer the trend in terms of Schumpeterian analysis, this could express subsequent waves of economic growth, both primary and secondary, leading from the influx of technology following the innovations of the mid nineteen seventies. This gives possible weight to the analysis of Schumpeter’s claims in the American context.

**Figure 1.5 – US GDP per person employed (1990 US\$)**

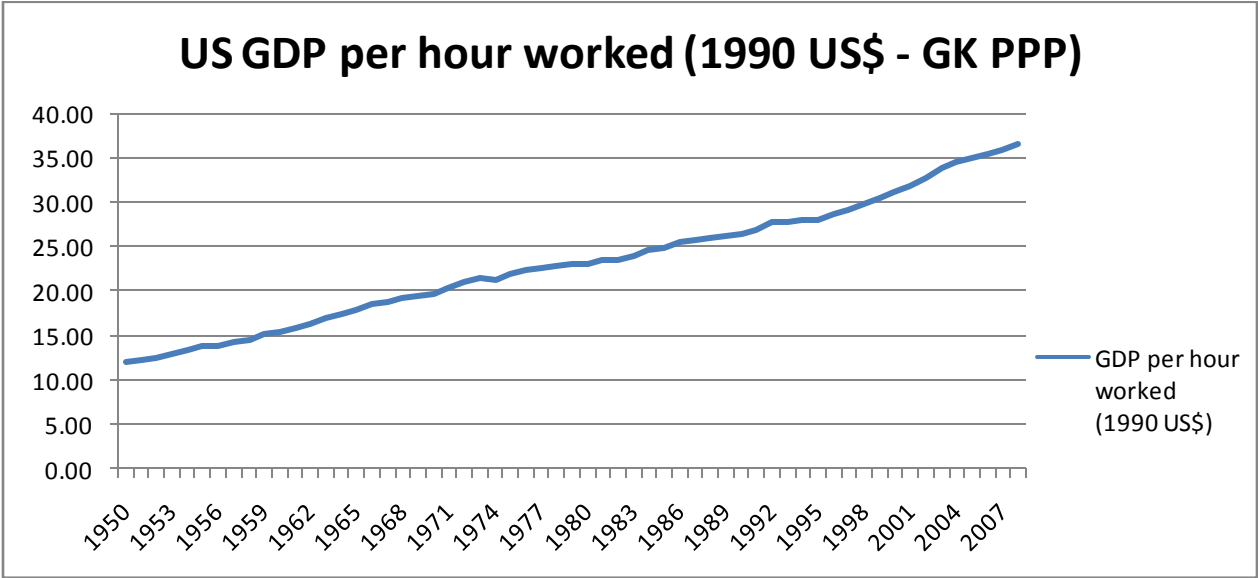


Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

In looking at figure 1.5, we can see GDP per person employed showing a similar trend to the overall GDP and GDP per capita figures. As the period begins, we have a strong steady trend of economic growth from the nineteen fifties onward until the structural crises of the nineteen seventies. This period of tumult ushers in a decade of stagnation, and for some brief periods, negative growth in GDP per person employed. But as the nineteen eighties enter into roughly their second quarter, GDP per person employed begins a steadily rapid rise into the most recent

figures for two thousand and eight. In Schumpeterian terms, this could be a process of innovation, followed by a sustained period of growth in prosperity on an individual worker basis.

**Figure 1.6 – US GDP per hour worked (1990 US\$)**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

In looking to GDP per hour worked in the US economy, we can see a somewhat different trend. Figure 1.6 depicts GDP figures in the context of a per hour worked basis. What we can see from this graphical representation, is less of a fluctuation in figures in comparison to the other GDP statistics. This trend line represents a relatively constant increase in GDP per hour worked over approximately sixty years of US economic activity. Although there are periods of slight downturns, for instance in nineteen seventy three, the peaks and valleys are less substantial, giving an impression of a more steady stream of increased growth on a per hour worked basis.

From these statistics, we can see a steady rise in both overall GDP growth, and in measurements relative to micro level indicators. At the same time as the overall economy is experiencing growth in a series of indicators, we can see decreases in the overall statistics of hours worked on an annual and total basis. What we can infer from this statistical sampling, is an overall picture

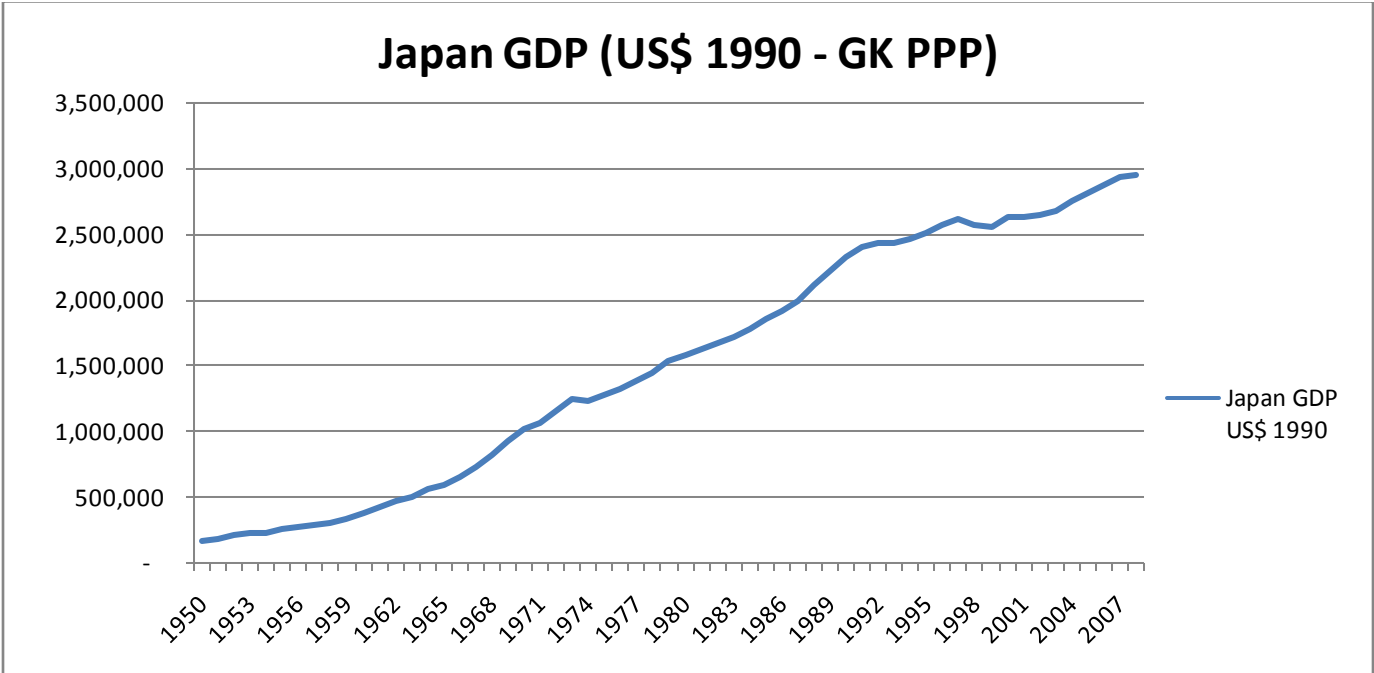
of productivity increases over the time period under focus. In the discussion section to follow, it will be possible to understand these conclusions with reference to Schumpeter's business cycle theory

## 4.2 Japan Data

It is now important to shift focus towards the Japanese economic indicators. As one of the largest economic actors in the world, and the traditional economic leader of Asia, the Japanese economy is an important indicator of economic performance in the far eastern region of the globe. In assessing the Japanese economy's economic performance over the last half of the twentieth century and into the twenty first, it is vital to go step by step through the leading indicators which will outline economic performance. Overall GDP level is an important place to begin this analysis. Figure two depicts the evolution of the Japanese economy over the time period in the form of nineteen ninety American dollars. What we can see in looking to these figures is a picture of generally rapid economic growth, particularly in reference to the American data we have just observed. In the Japanese GDP performance, the trend line is less indicative of the ten year Juglar cycles that were quite evident in the American data. Nevertheless, we do see GDP figures fluctuation in a wave-like pattern over the time period in question. These cycles appear to flow in longer time periods, where 1973 shows a brief economic downturn, followed by a sustained period of growth that flows into the beginning of the 1990's. The 1990's usher in a period of tumult in the Japanese GDP performance, as growth falls into a period of stagnation that lasts well into the 2000's. During the 1990's, the Asian financial crisis weighed heavily on Asian economies. This phenomenon did not exclude the Japanese economy, as is clearly evident in the figures. But, towards the more recent time period, the Japanese economy has shown some recovery. Although these overall GDP figures are illuminating, it will be useful to enter into an analysis of more relative GDP indicators.



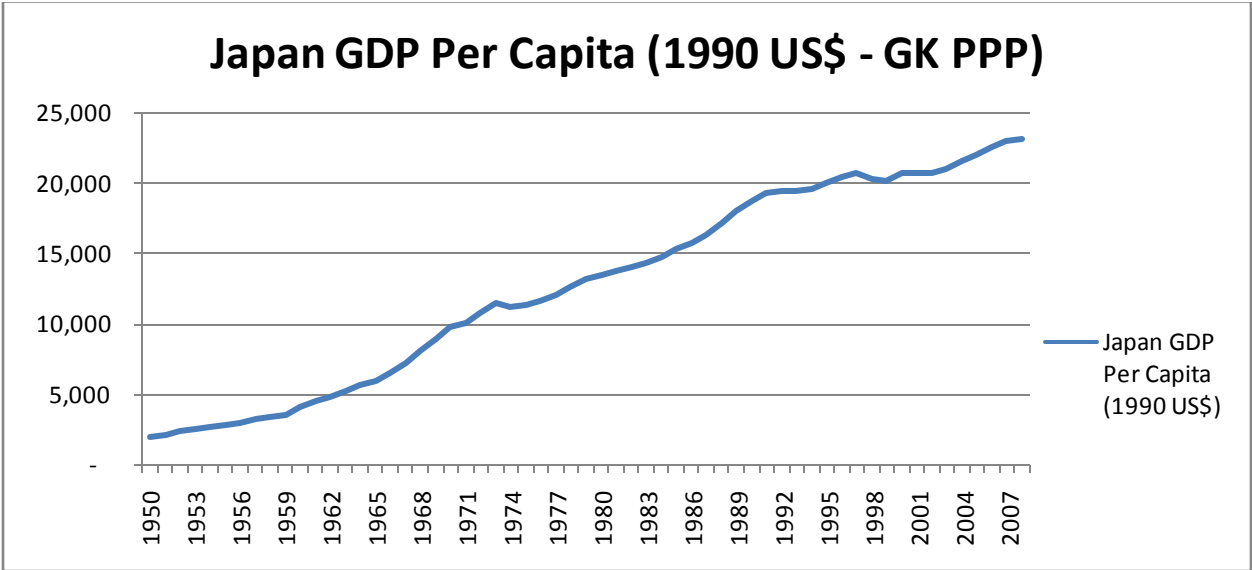
**Figure 2 – Japan GDP in 1990 US Dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

GDP indicators on a relative basis will provide some context to the overall figures, and are of use at this point in the analysis. Figure 2.1 illustrates the GDP per capita figures. We can see that they represent a similar trend line to the overall GDP statistics. The crises of the 1970's and 1990's are evident.

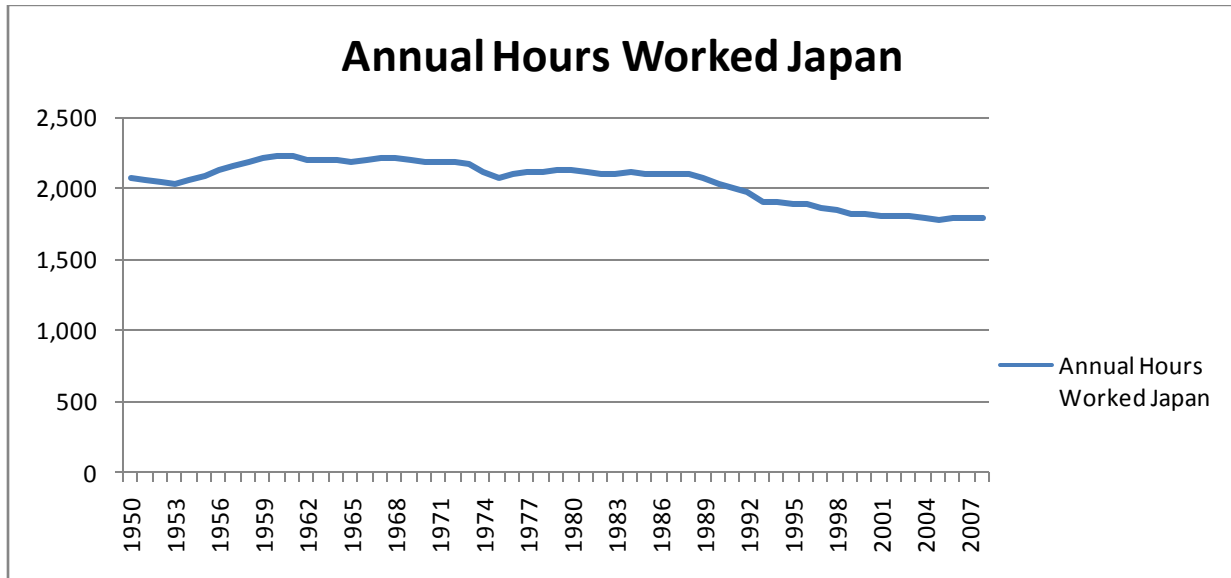
**Figure 2.1 – Japan GDP per capita in 1990 US Dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

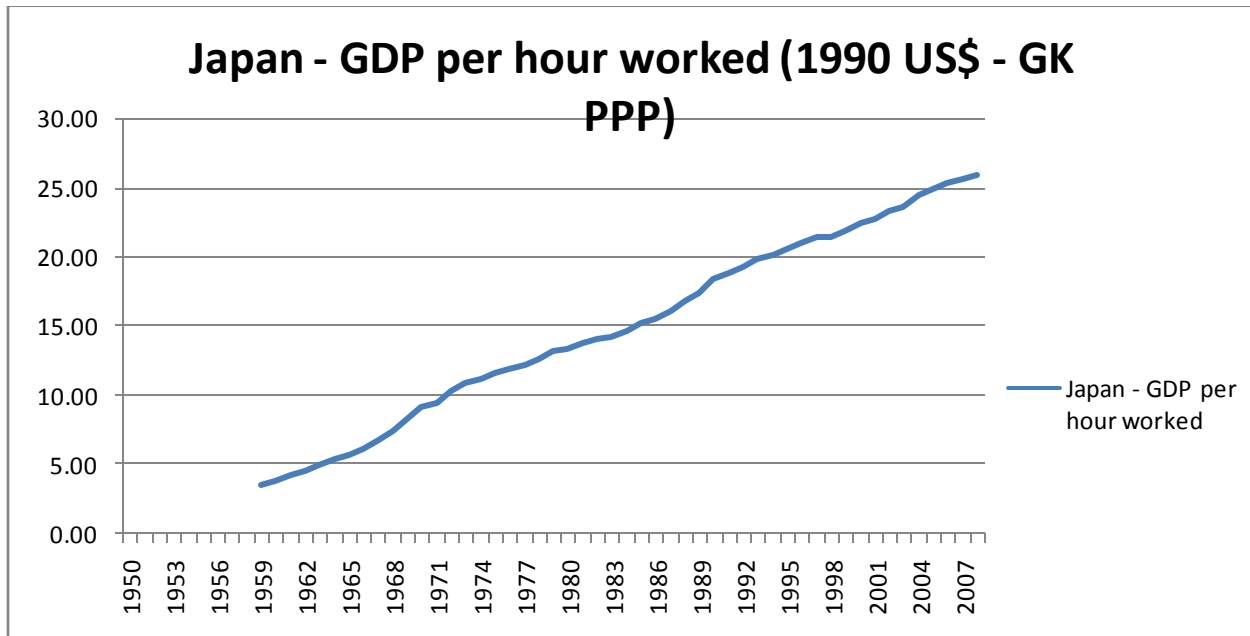
Now that the overall picture of GDP has been presented, it will be useful to look into some figures that describe the productivity picture. If we look to the hours worked figures, they are a first important indication of productivity in the Japanese economy. Figure 2.2 shows the annual hours worked from 1950-2008. The trend line of the hours worked figures present three distinctive waves over the time period. Beginning in 1953, after a decrease in hours worked, we see a general increase until the crisis of the early 1970's. The crisis results in a downturn in hours worked to begin with, and introduced a period where although there are some initial increases, the overall number of hours worked decreases to 1993. At this point we see another dip in the figures, which is followed by another brief increase which leads into a period of further decreases in hours worked. This brings the total to the lowest point over the roughly sixty year period in terms of annual hours worked. Next, it will be beneficial to see how the hours worked figures corresponds to GDP growth.

**Figure 2.2 – Japan Annual Hours Worked**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

**Figure 2.3 – Japan GDP per hour worked in 1990 US Dollars**

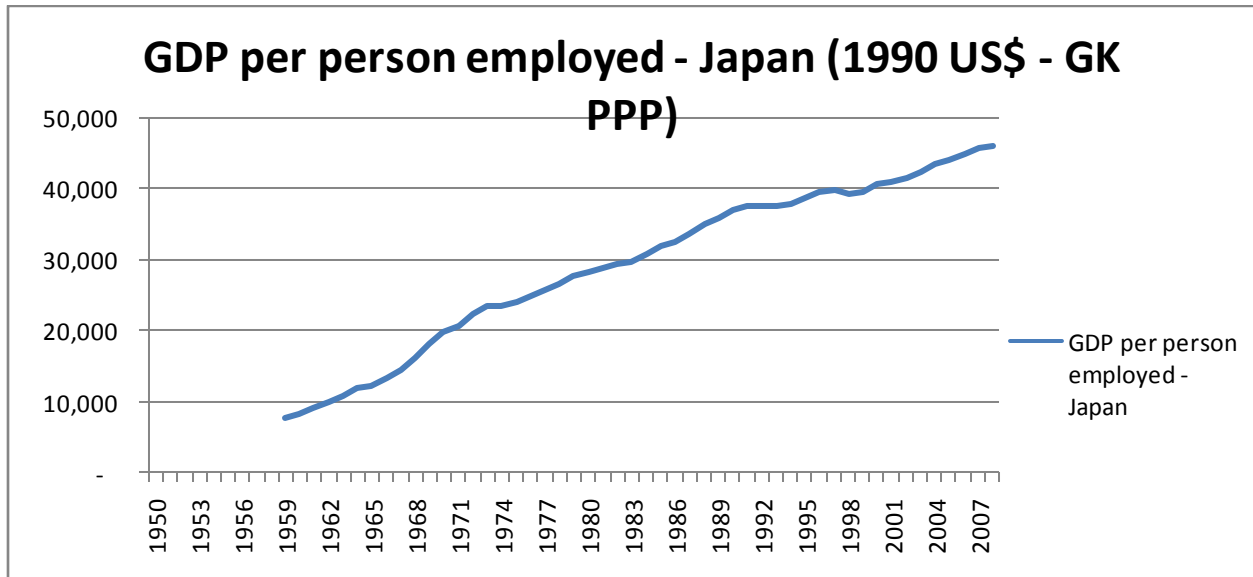


Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

The correspondence of GDP to hours worked gives us a strong indication of productivity performance. As figure 2.3 shows, in terms of the Japanese economy, productivity is generally

on a steady rise over the time period in question. There are small moments of wavering in the trend, but overall the trend shows a strong performance in overall productivity.

**Figure 2.4 – Japan GDP per person employed (in 1990 US dollars)**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

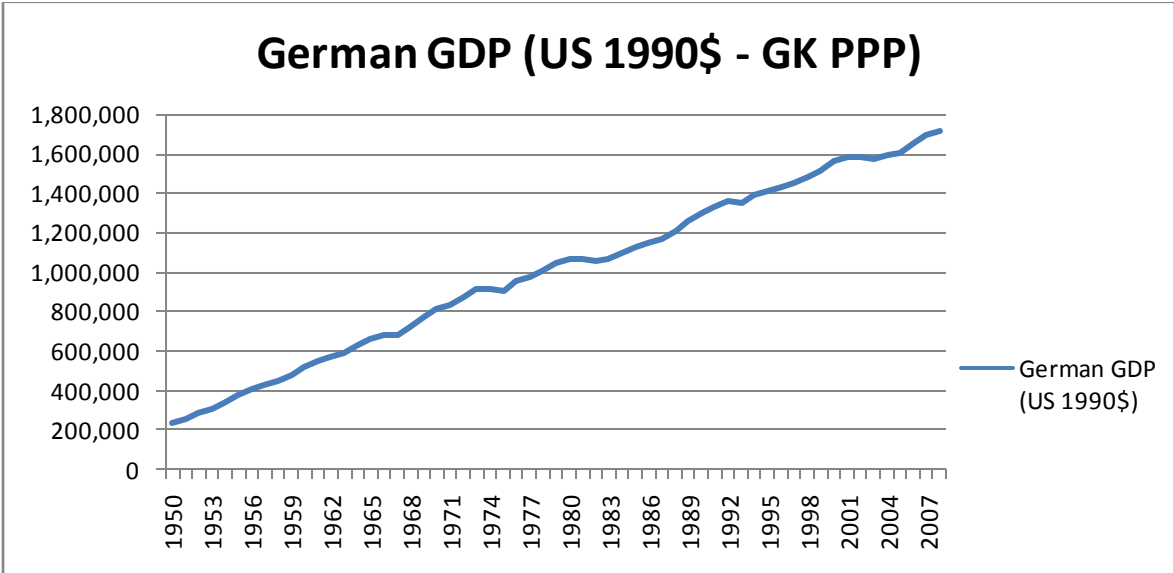
The final graphical representation for the Japanese economy gives further indication of the trend in productivity figures. Figure 2.4 illustrates GDP figures on a per person employed basis in 1990 US dollars. The picture given by these overall figures presents a general trend of increasing growth and productivity in the Japanese economy, with a decrease in the rate of growth following the Asian financial crisis. As the overall annual hours of workers decrease, we see a gradual rise in GDP figures on a per capita, per hour, and per worker basis. This implies a strong productivity increase, but we will discuss in the analysis section exactly how this performance fits with the other economies examined, and Schumpeterian business cycle theory.

### 4.3 German Data

Now that the US and Japan data, it is important to look to our third economy in focus, Germany. The German economy is the largest in Europe and one of the largest in the world. Along with the US and Japan, what happens in the German economy has wide reaching effects on its region and beyond. It will be useful at this time to consider the same indicators of economic performance as have been used in the other two economic comparisons. It must be noted that the German data has been extrapolated in order to arrive at an approximation of unified German totals over the entire time period. As the east was under Soviet rule, data is scarce for this time period, and whatever data is available is largely unreliable. As a result, West German data has been compared with the Unified tallies over ten years, and an approximation is made of the contribution of East Germany to a Unified total.

GDP totals are a useful place to start in evaluating German economic performance. Figure 3 gives total GDP statistics from 1950 to 2008 in 1990 US dollars. In analyzing the trend line of the GDP statistics, we can see a pattern of waves of growth, followed by periods of stagnation and even regression over the time period. Although not as clear as the US data, there is a notable Juglar cycle, as economic downturns generally happen in ten year periods. We can see these downturns in 1973, 1984, 1993 and 2000. This follows a pattern that links quite closely with Schumpeterian Juglar cycle analysis. This will be discussed further in the analysis section. Beyond the raw GDP data, it will be beneficial to look at some adjusted GDP data at this point.

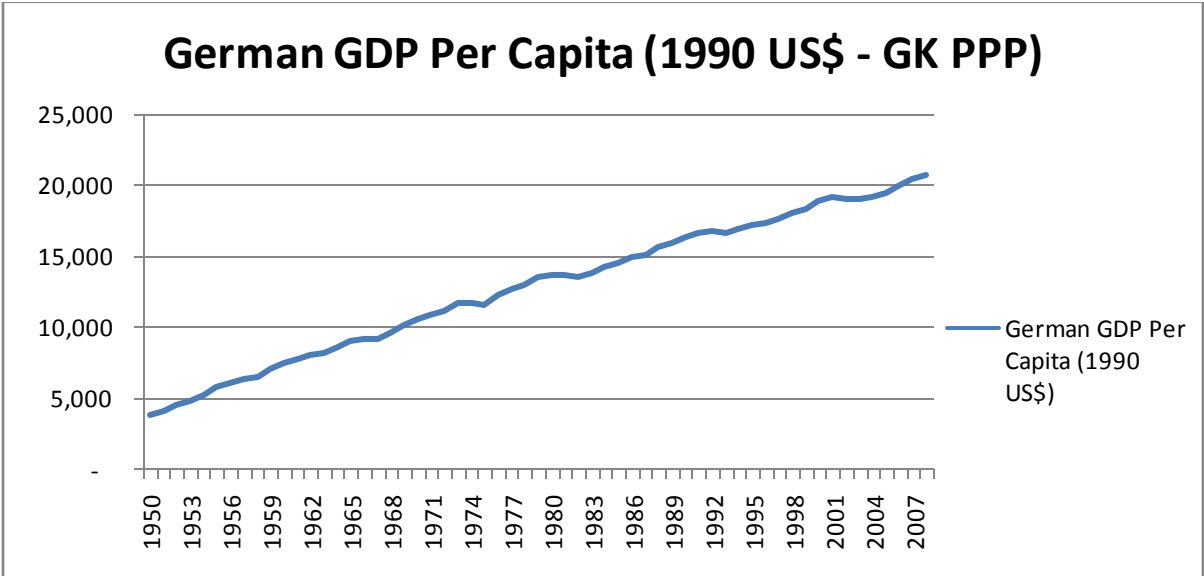
**Figure 3 – German GDP in 1990 US Dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

Figure 3.1 shows GDP performance for Unified Germany on per capita basis in 1990 US dollars. As is evident in the graph, there is a steady increase in the level of GDP per capita, just as there is in overall GDP. What this graphical representation also has in common with its non-per capita counterpart is a trend that notes the periodical crisis points referred to earlier as Juglar cycles. We can see these crisis points most distinctly in the early part of each decade beginning in the 1970’s. This implies that these downturns not only affected overall GDP, but also GDP on a per capita basis. Now that the raw GDP figures have been outlined, it is necessary to look at statistics which point to productivity figures.

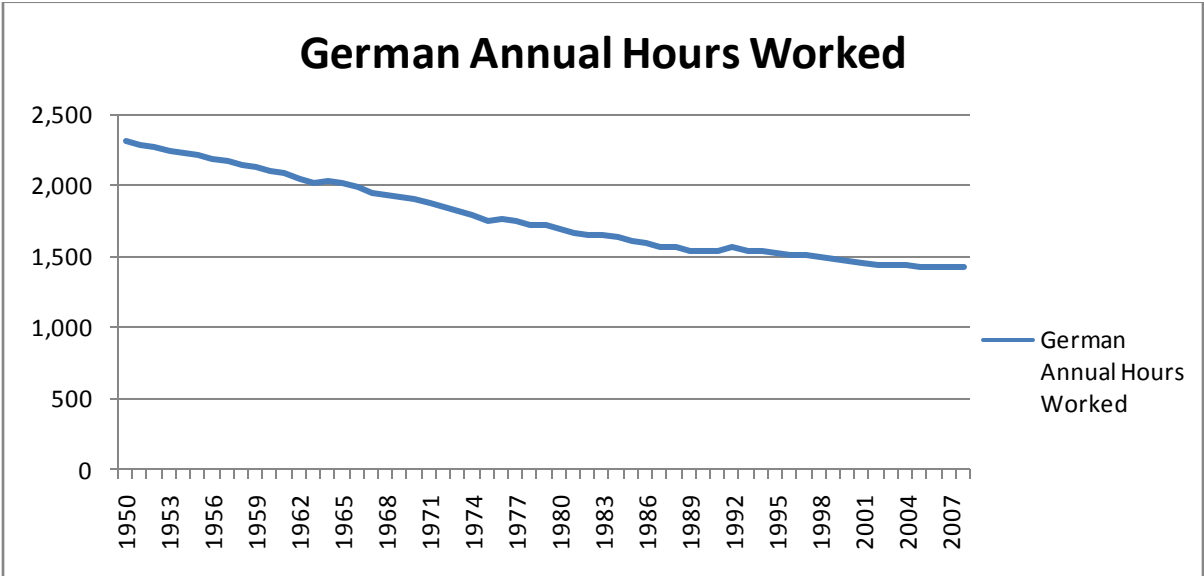
**Figure 3.1 – German GDP Per Capita in 1990 US Dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

In attempting to assess productivity, that amount which is worked over time provides a sufficient indicator of rises and falls in labour production. Figure 3.2 outlines the German hours worked on an Annual basis over the time period in question. As we can see, there is a relatively steady decrease in the overall annual hours worked over time. Although the descent of the annual hours worked is quite gradual, we can see moments on a ten year basis where this is a shock and instant dip in the figures. This would suggest a Juglar cycle in hours worked that corresponds to overall dips in economic production.

**Figure 3.2 – German Annual Hours Worked**

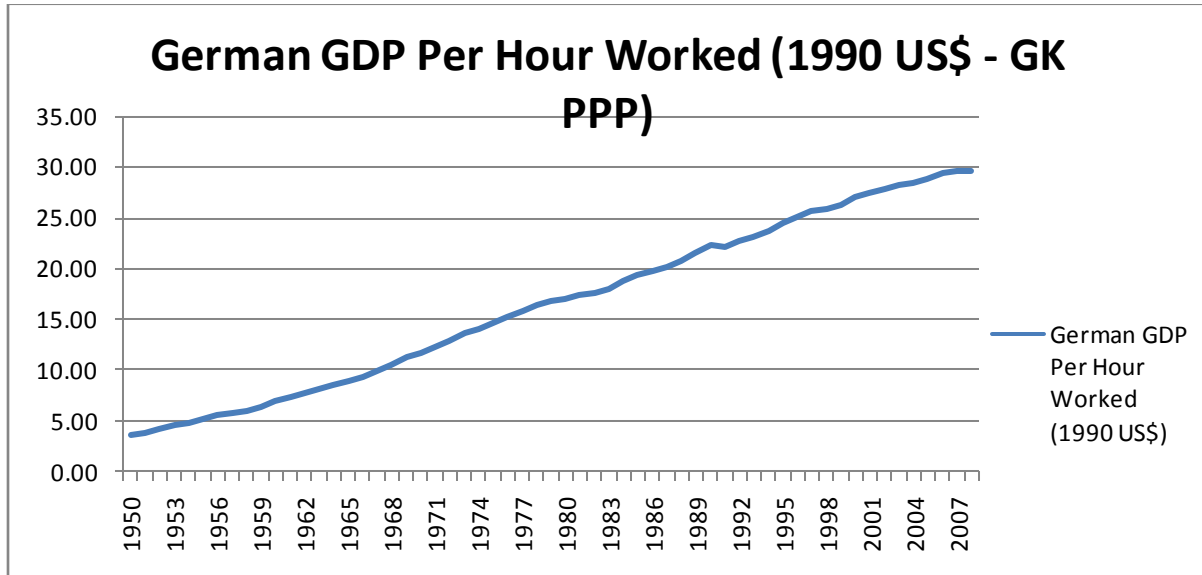


Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

Looking to hours worked is not sufficient as an indicator alone. What we must also look to is how the GDP ranges as the hours work change over time. Figure 3.3 gives such an indication, as it presents German GDP per hour worked over the time period in 1990 US dollars. What we can see, is almost an inverse curve of the annual hours worked figures. GDP per hour worked is on a steady increase, although there are the ten year dips which have been represented in the other graphs. This suggests a strong productivity increase which accounts for decreasing annual hours worked with a corresponding increase in overall GDP and GDP per hour worked.



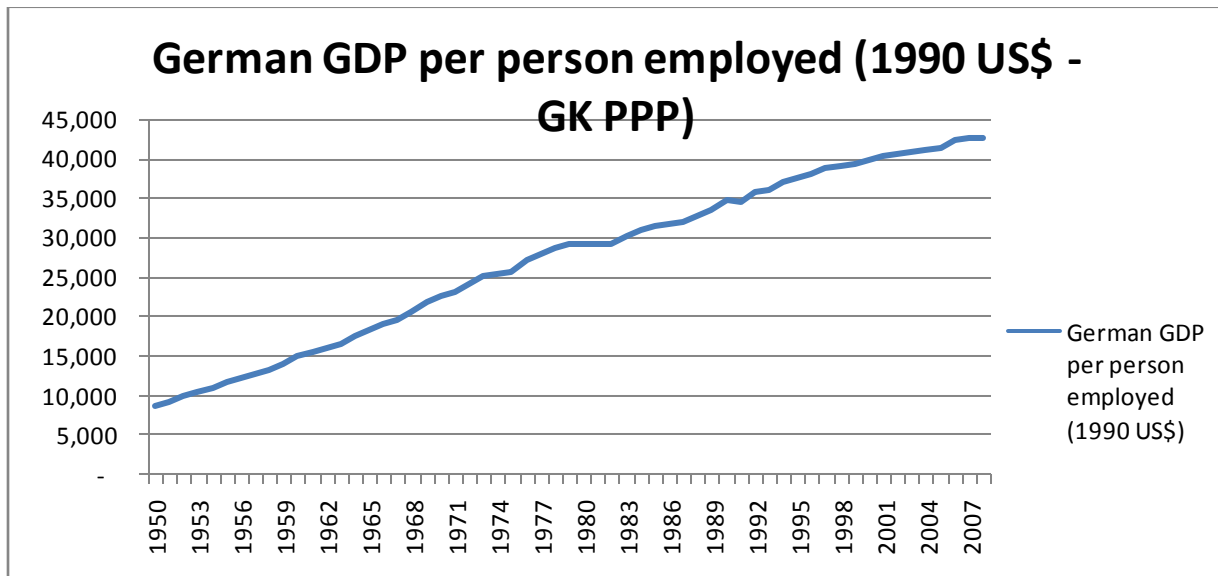
**Figure 3.3 – German GDP per Hour Worked in 1990 US Dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

The final graphical representation that will illustrate the growth trends in Germany over the period in question lies in figure 3.4. This graph represents German GDP per person employed in 1990 US dollars. This graph mirrors the others that have been presented so far. Showing increases in GDP on a number of levels, in a basically cyclical upward pattern. What all of these graphical representations have shown is a general trend of an increase in GDP, while other indicators in hours worked decreased. This implies that the German economy has experienced considerable growth over the time period in question, while increasing productivity simultaneously. In the discussion section, there will be an analysis of exactly what macro trends can be divined from this series of data inputs.

**Figure 3.4 – German GDP per Person Employed in 1990 US Dollars**



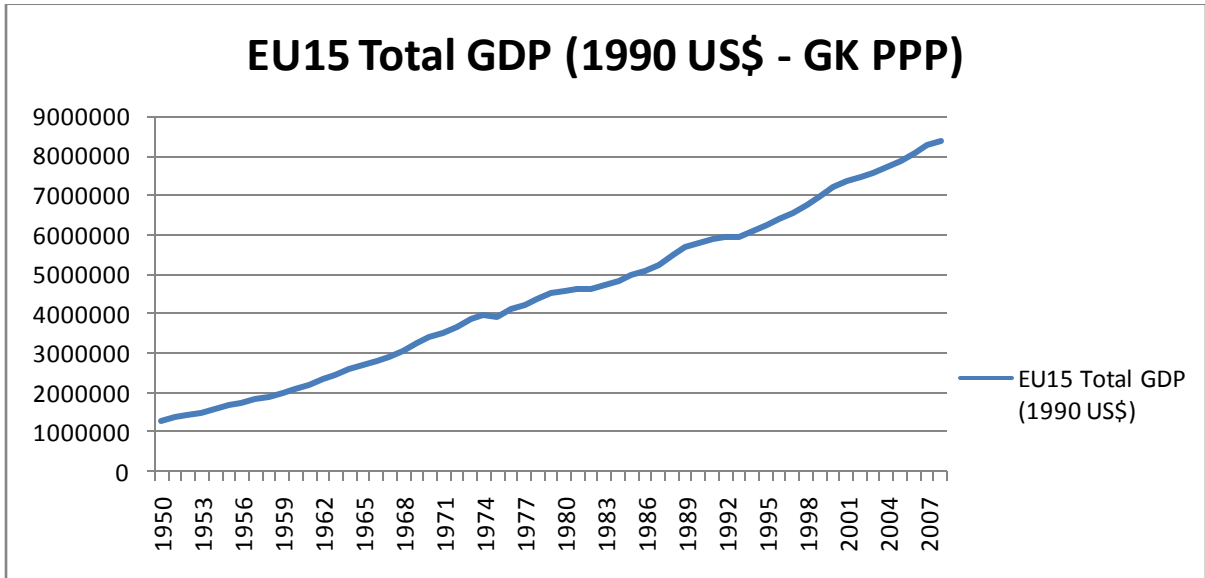
Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

#### 4.4 EU15 Data

The final economy which will be presented for analysis in the study is that of the EU15 countries. As has been stated previously, the EU15 is an amalgam of 15 Western European countries in the European Union, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Although Germany has already been included in the study, it is important to go beyond Germany to see the Western European region as a whole, as it is made up of a number of strong and influential economies united by the European Union. As we have done with the other economies in focus, we will go through GDP and productivity indicators to ascertain exactly how these economies have grown over the past six decades. It should be noted that the German contribution to the dataset has been extrapolated to account for shortcomings in the Soviet era figures, and also that for the GDP per hour and per person employed the first decade of the data was omitted due to incomplete figures.

The first indicator with will illustrate economic performance, lies in GDP figures. Figure 4 presents totals for GDP output for the EU15 in 1990 US dollars. What we can see clearly is a strong period of economic growth which has a seen a great creation of wealth over the period. We can see, in addition, the trend of cyclical movements in growth over the period, described as Juglar cycles by Schumpeter. This matches the trends seen in the majority of the other economies we have examined.

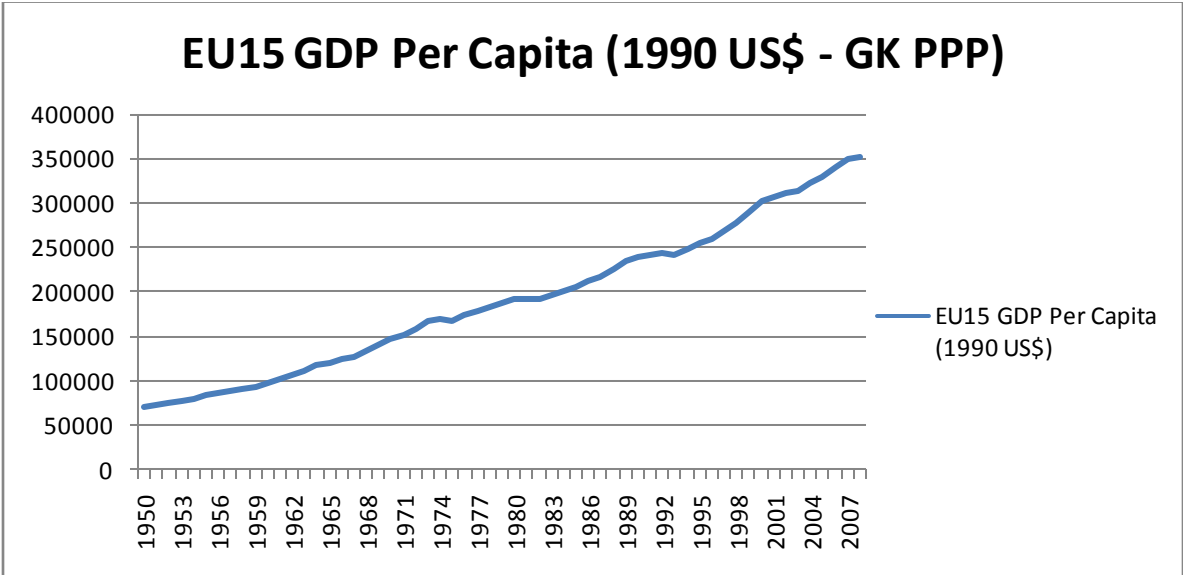
**Figure 4 – EU15 Total GDP in 1990 US Dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

It is important to look not only at GDP figures, but to look at them on a per capita basis. Figure 4.1 presents the EU15 per capita GDP in 1990 US dollars over the time period in focus. What we can see is a similar trend in growth, but with an increased volatility in slope from the previous graphical representation. We see cyclical rises in growth patterns, conforming to the previous patterns observed, and a general trend towards strong economic growth.

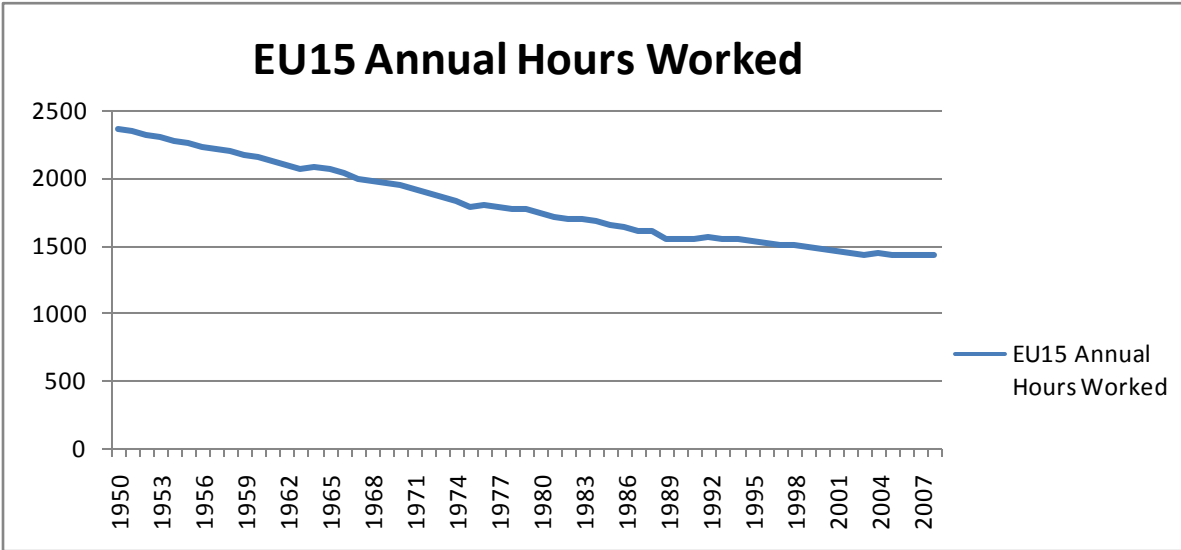
**Figure 4.1 – EU15 GDP per capita in 1990 US Dollars.**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

As we have done in the previous sections, we will go beyond raw GDP data to look at indicators of productivity increases. In looking at the annual hours worked figures, we can see from Figure 4.2 the representation over the time period. This graph shows a gradual decrease in total hours worked, in a wave like pattern common to all the regions in observation in this study. We can see the cyclical patterns fluctuation with the peaks and valleys of economic performance over the time period.

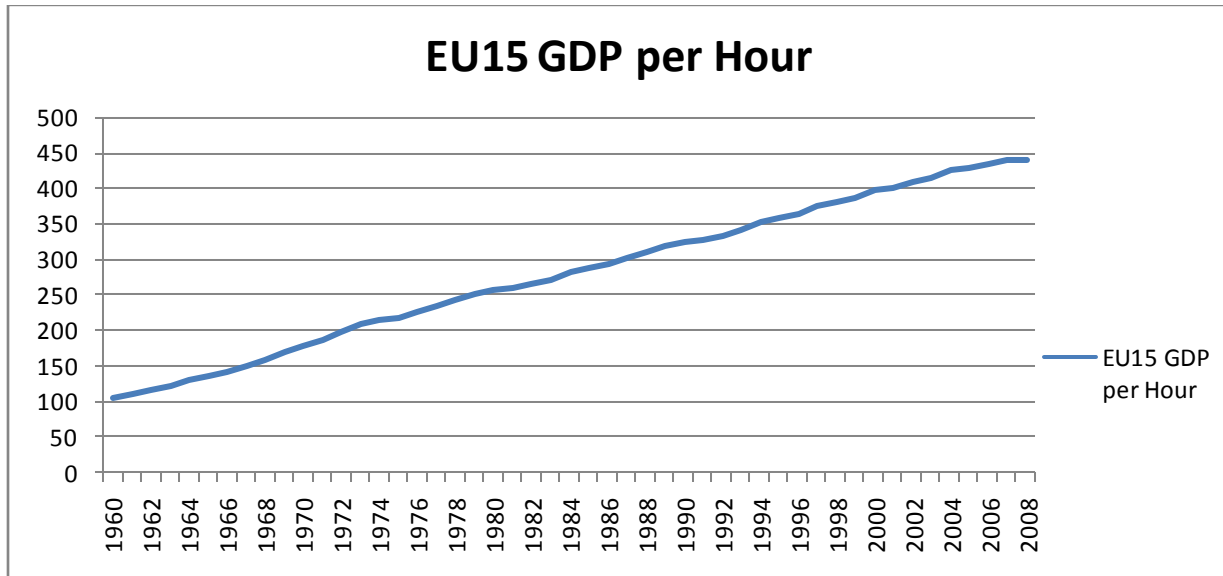
**Figure 4.2 – EU15 Annual Hours Worked**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

If we correspond the annual hours worked with the GDP per hour worked, we can come to further conclusions about the regional performance. Figure 4.3 depicts the GDP per hour worked of the EU15 over the time period in question in 1990 US dollars. What we can see is a gradual increase in the GDP per hour. This suggests an increased productivity performance, as hours worked decreased, and GDP per hour increased.

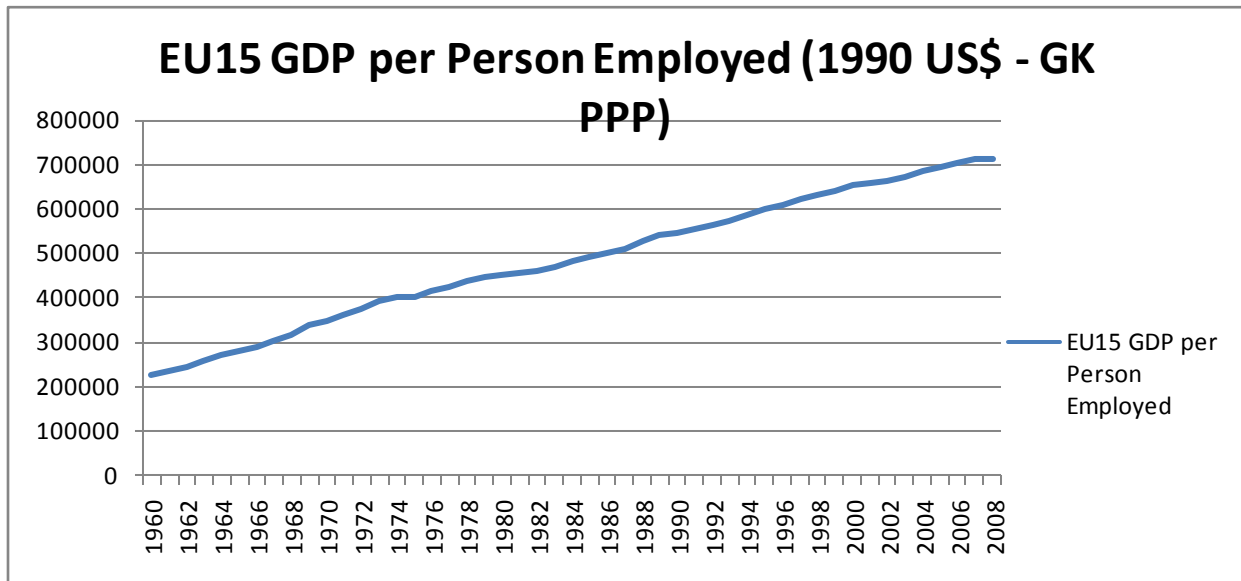
**Figure 4.3 – EU15 GDP per hour in 1990 US dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

Finally, it is relevant to look at GDP per person employed in the region. Figure 4.4 depicts this trend over the time period, showing GDP per person employed in 1990 US dollars. What we see is a corresponding trend of increased GDP per employee over the time period (excluding the early period with insufficient data). This underlines the trend presented in the other indicators. This overall picture presents an image of a strong increase in economic growth over the time period, alongside increases in productivity as well. This implies that this economic block was a strong performer, and benefitted from increased economic performance over the time period. In the discussion section, there will be a presentation of analysis of these trends in relation to the theories in question.

**Figure 4.4 – EU15 GDP per person employed in 1990 US dollars**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

## 5. Auto Industry Data

Now that the macro growth figures have been presented, it is necessary to look at the figures for the automotive industry. As has been stated before, the section will be divided into three parts. Each part will be divided by the economy in focus.

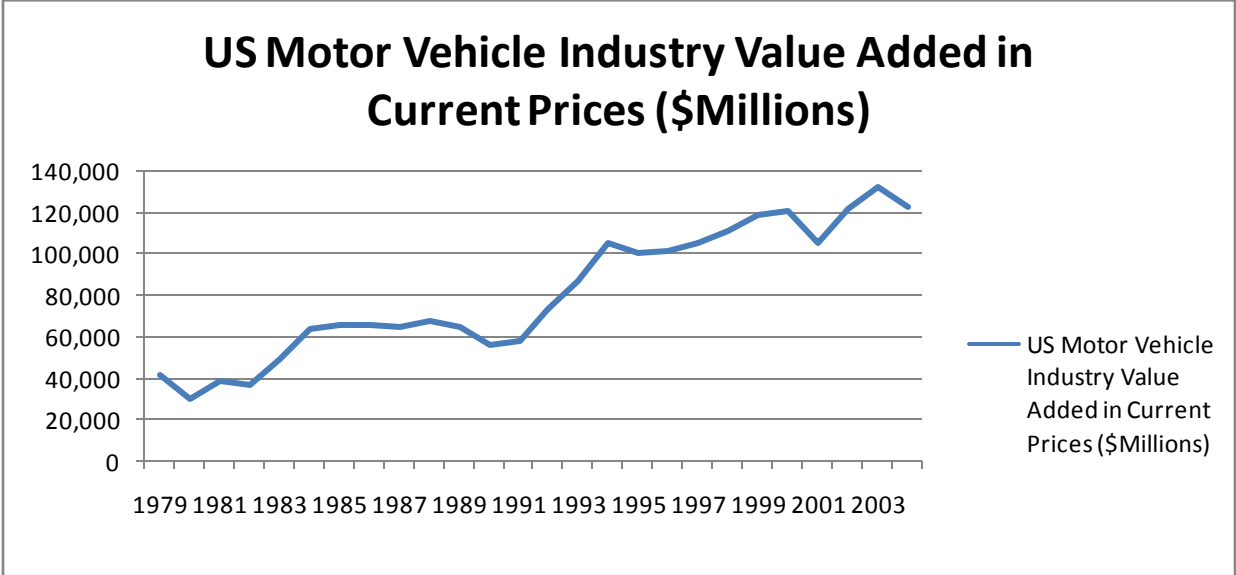
### 5.1 Motor Vehicle Industry

The first section of data looks at the motor vehicle industry as a whole. The motor vehicle industry is comprised of the consumer automotive industry, but also includes commercial vehicles. Although this extra category is included, the commercial vehicle segment is but a fraction of the consumer industry. It is for that reason that this sector can be included without significantly altering the data or the findings.

**5.2 United States Data**

In attempting to track the evolution of the automotive industry, there are a number of relevant indicators. A first of these indicators upon which this study will focus is the value added tracking. Figure 5 tracks the evolution of the value added in current prices for the motor vehicle industry from the period of 1979 to 2004 and records the findings in millions of US dollars. As we can see in the graphical representation, the value added in the industry has steadily risen in peaks in valleys over the time period in question. What we can actually see in a general pattern of ten year downturns (although the growth in the meantime is not constant). We can see that at the input points of approximately 1980, 1990 and 2001 the downturn in value added reaches its depth for the relevant growth cycle. The relevance of this trend will be analyzed in the discussion section to come.

**Figure 5 – US Motor Vehicle Industry Value Added in Current Prices (Millions of US Dollars)**



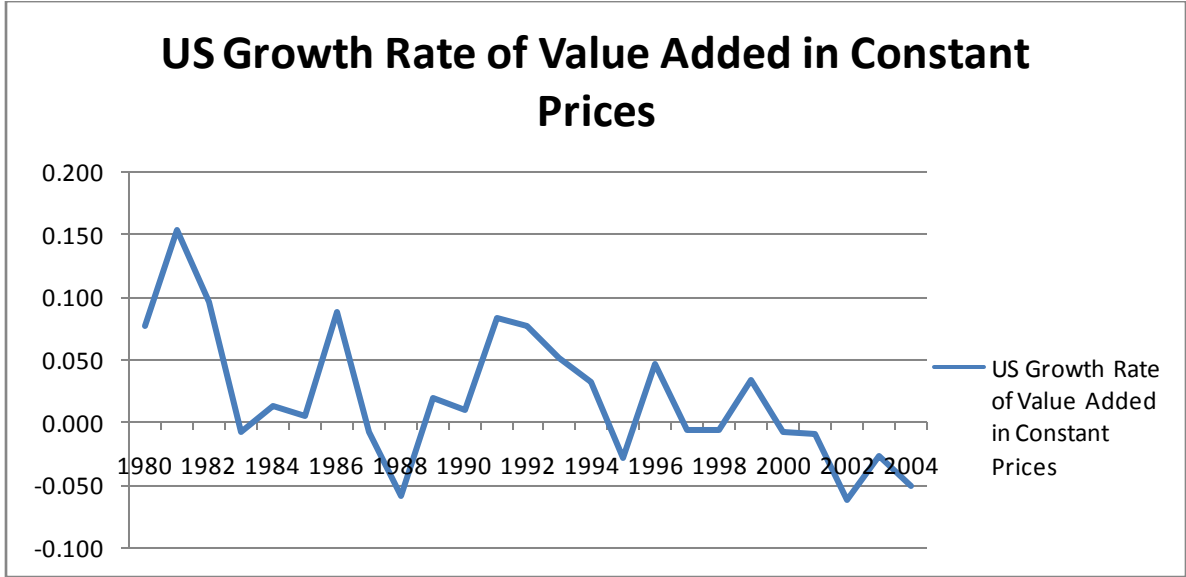
Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006,

<http://www.ggd.net/>



The next major data set that can provide some insight into the dynamic of the industry is the value added deflator growth rate. Figure 5.1 profiles the US motor vehicle industry value added deflator growth rate during the same time period, and gives some insight. The fluctuations of the rate in growth are quite drastic. At the same time, the peaks in which the growth rate is the highest fall at approximately in a five year cycle. We can see that the relative peak growth rates fall at the 1981, 1986, 1991, 1996, 2000 and 2003 respectively. Although the variations are quite dramatic in the graphical representation, there is the possibility of some type of trend there that will also be discussed in a later section.

**Figure 5.1 – US Motor Vehicle Industry Growth Rate of Value Added in Constant Prices**

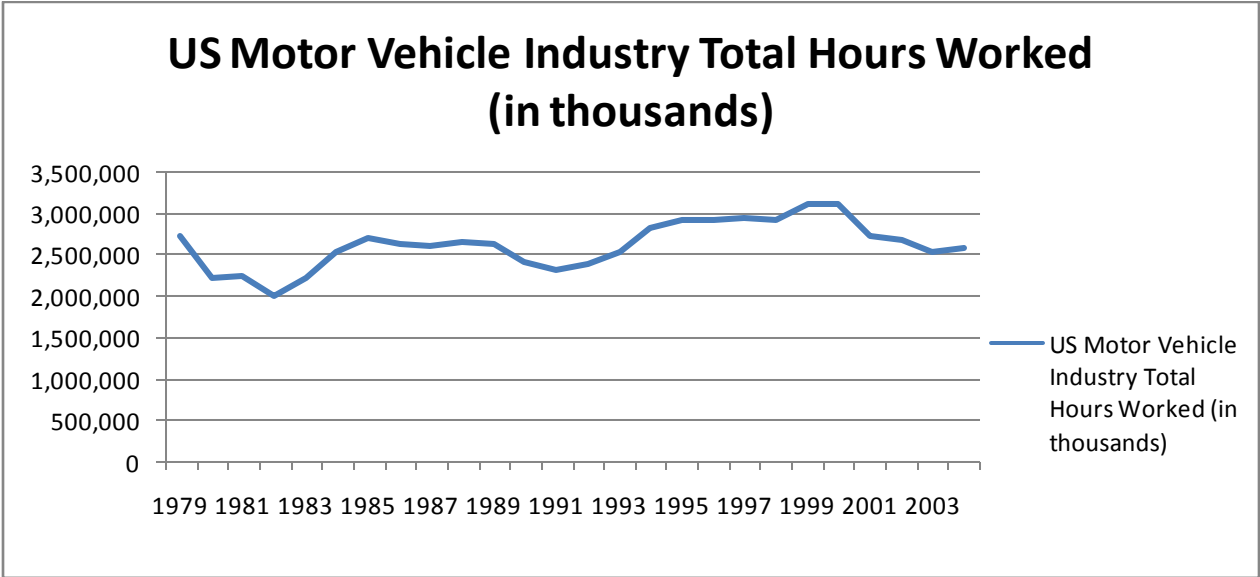


Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006, <http://www.ggdc.net/>

The next set of indicators attempt to evaluate productivity levels over this time period. The first indicator which will be examined is the hours worked in the industry. Figure 5.2 charts the US motor vehicle industry total hours worked in thousands. What we can see in this graphic is wide variance of figures between the first to the last data point, but what we also find is that the overall hours worked in a mean average stays fairly constant. To be exact, the total hours worked at the beginning of the series is approximately 2 700 000, and in the final point it is 2 600 000 (Figure 5.2). Although the fluctuations are dramatic, if we are to divine a trend we can

see that there are the peaks of some minor upward trends at five year intervals, loosely corresponding to the previous indicators' trends.

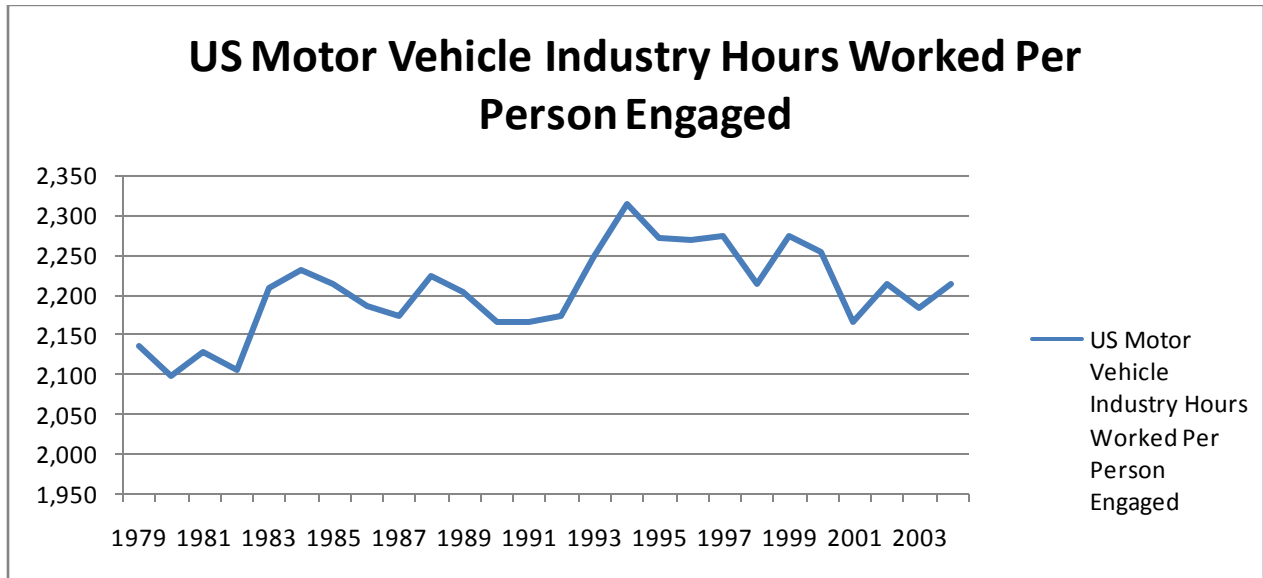
**Figure 5.2 – US Motor Vehicle Industry Total Hours Worked in Thousands**



Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006, <http://www.ggdc.net/>

Following the total hours worked figures, there's one other hours indicator that illustrates labour output figures. Figure 5.3 – presents US motor vehicle industry hours worked per person engaged. Once again we see a trend line that is quite sporadic in terms of its fluctuations. Although the fluctuations are quite dramatic, the final destination of the trend line falls not as significantly out of place from its beginning in comparison to the heights that it reaches. It is now important to look at how labour productivity compares to these hours worked figures.

**Figure 5.3 – US Motor Vehicle Industry Hours Worked Per Person Engaged**

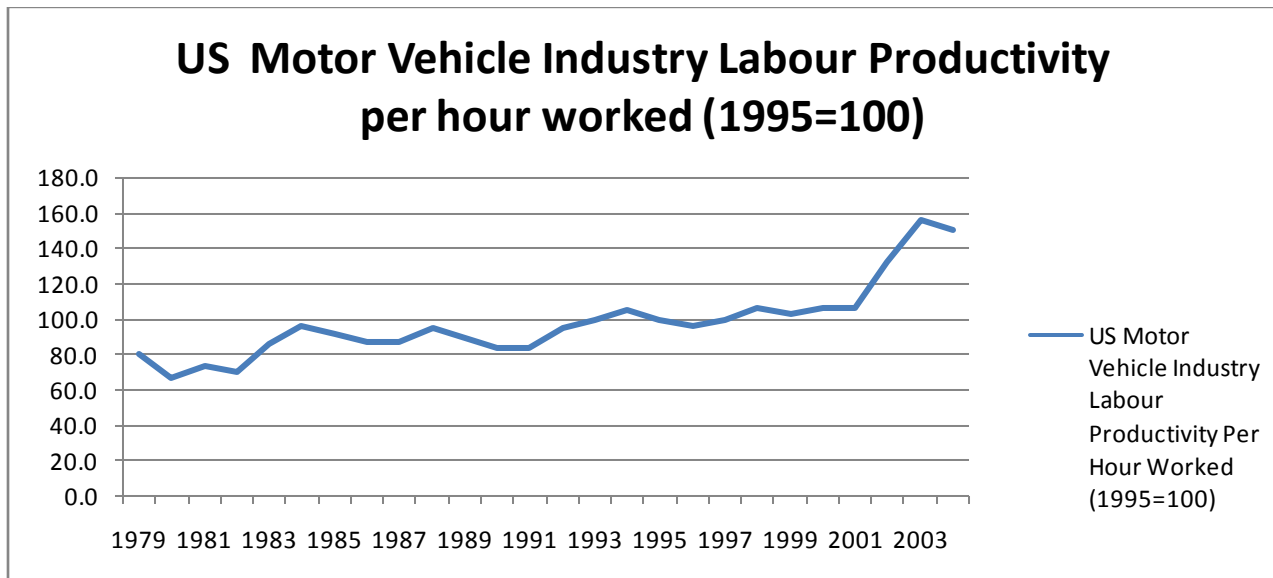


Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006,

<http://www.ggdc.net/>

In looking at the hours worked figures, it is important to present a comparison in terms of productivity over this time. Figure 5.4 illustrates US motor vehicle industry labour productivity per hour worked, with 1995 equalling 100. What we can see from the graphical representation is a fluctuating trend which concludes with a dramatic rise in productivity over the last four years of the series. If we are to deride any type of trend from this graph, we can see that fluctuations between increases and decreases in production oscillate on a roughly 4-5 year basis, reaching their peaks in roughly 1980, 1984, 1988, 1994, 1998 and 2003. This possible trend holds a similarity to other trends seen so far in the statistics for the US, but that will be discussed later.

**Figure 5.4 – US Motor Vehicle Industry Labour Productivity per Hour Worked (1995=100)**

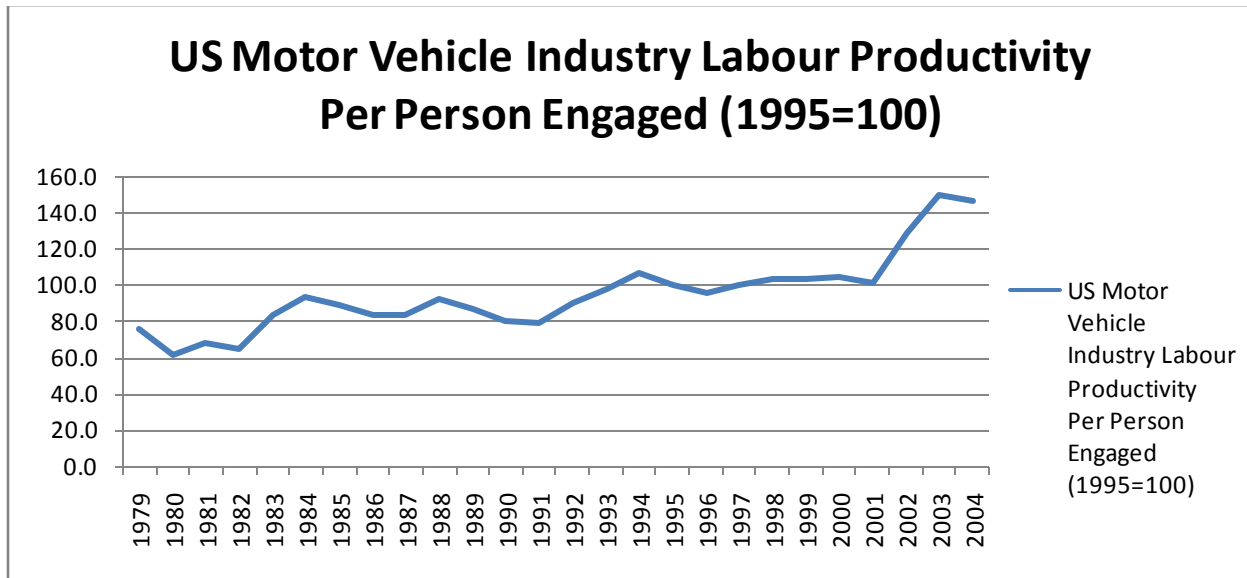


Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006,

<http://www.ggdc.net/>

The final data set which illuminates the dynamic of this industry revolves around data of productivity on a per employee basis. Figure 5.5 presents the US motor vehicle industry labour productivity per person engaged, where 1995 equals 100. In observing the trend of this graph, there are a number of compelling qualities. In general, the trend line of this graph shows a number of similarities to the previous statistics on productivity. The oscillations of the graph also bear a similarity to the previous statistics, showing a roughly recurring trend of the heights of labour productivity reoccurring at four to five year periods. This trend presents itself in 1984, 1988, and 1994. Also we can see a sharp rise in productivity towards the final inputs of the data set, also in similarity to the previous figures. This data has presented a number of noteworthy trends that bear further discussion and analysis, which will follow in the discussion section to come. At this point, it is important to shift to the next economy in focus, Japan.

**Figure 5.5 – US Motor Vehicle Industry Labour Productivity per Person Engaged (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006,

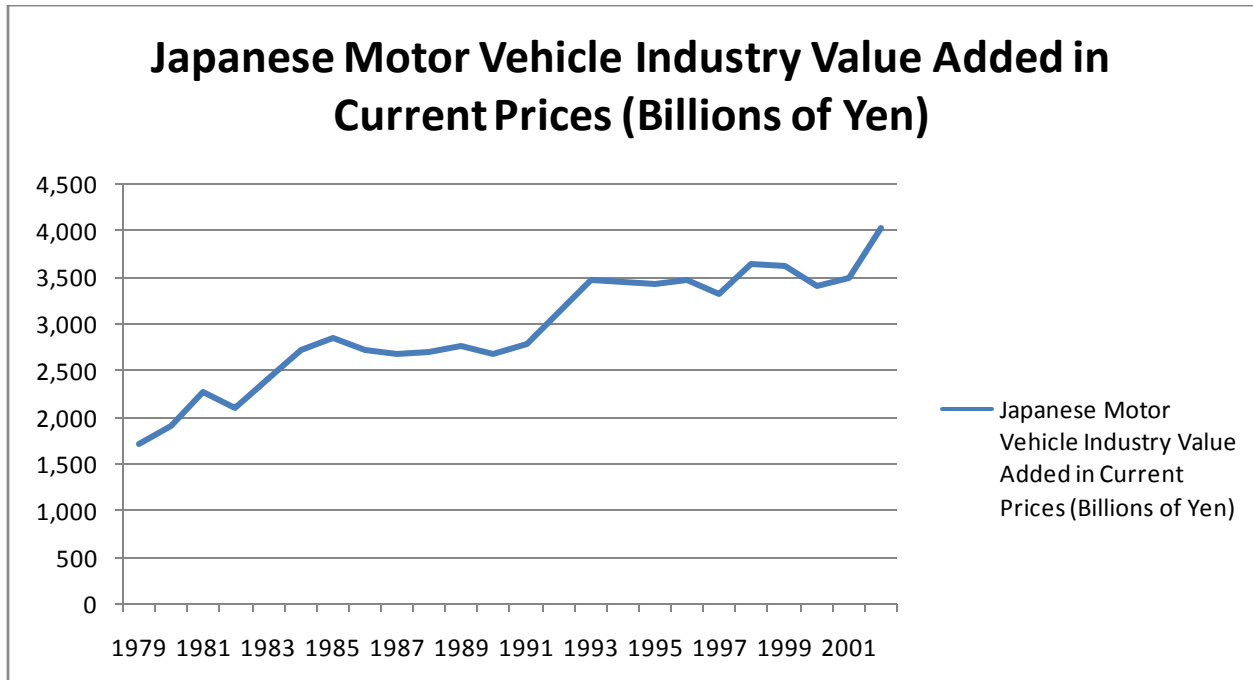
<http://www.ggdc.net/>

### 5.3 Japan Data

The Japanese motor vehicle industry is one of the most powerful and significant players in the world. In attempting to shed light on the dynamics and trends in this industry, it will be useful to analyze data within the same indicators used in the US analysis. The first of these indicators deals with value added. Figure 6 represents the Japanese motor vehicle industry value added in current prices. Although the figures are presented in billions of Yen, rather than US dollars, what is more important is not the raw value of the industry, but its trends over the time period in question with reference to the other industries under focus. What we see from this graph, is another series of fluctuations which drive the industry to more than double its value added over the period in question. We can clearly see, as we've seen in the US data, a trend of oscillations up and down over this period. If we are to infer a trend in this case, we can see the peaks in the trend occurring at a roughly four to five year period over time. These peaks occur in 1981, 1985,

1989, 1993, 1998 and 2002 respectively. This presents a trend that must be investigated further in relation to other indicators in the Japanese industrial data.

**Figure 6 - Japanese Motor Vehicle Industry Value Added in Current Prices (Billions of Yen)**

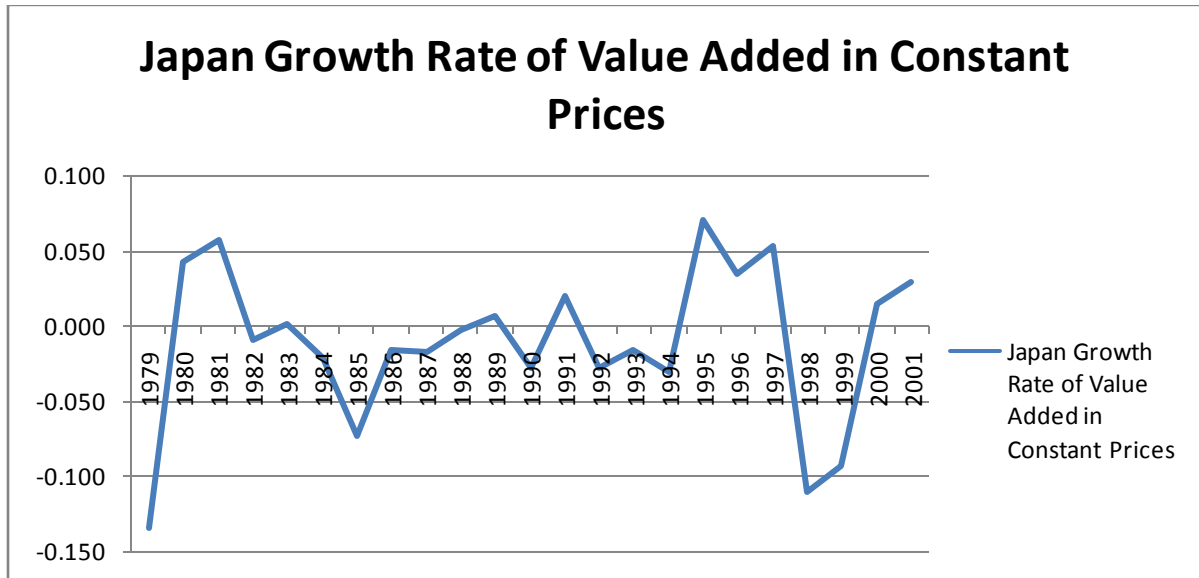


Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005,

<http://www.ggdc.net>

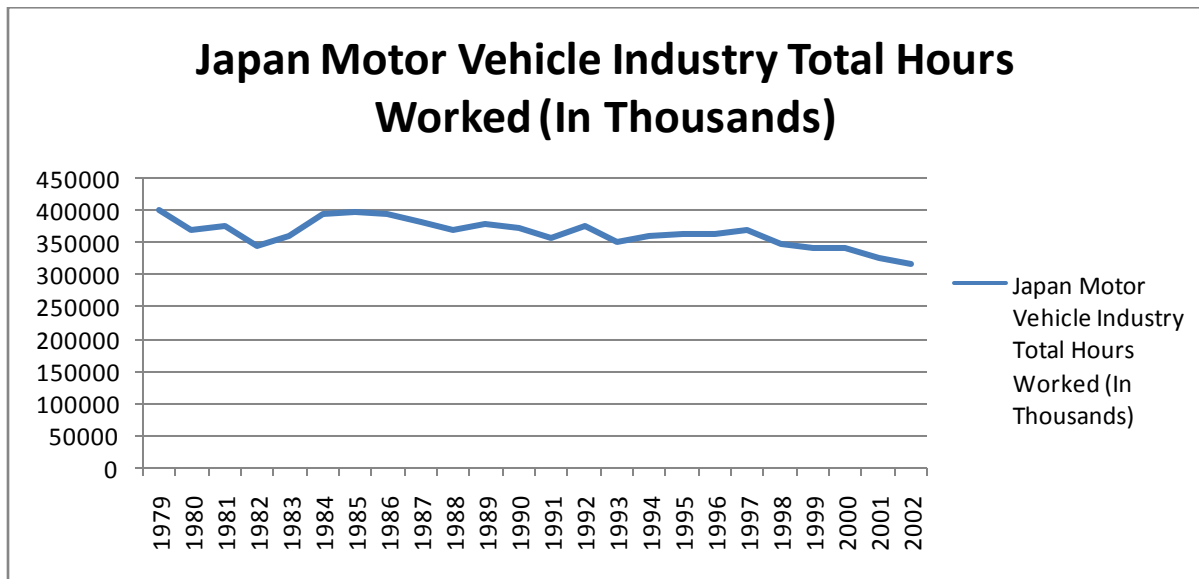
The next data set which merits focus, deals with the growth rate of the value added over the time period. Figure 6.1 depicts the Japanese motor vehicle industry growth rate of value added in current prices over a roughly twenty year period. What we can see from this graphical representation is a wide variety of growth rate performance over this period of over two decades. We see the absolute peaks in value added growth in 1981 and 1995. This data also requires further attention in the following section for discussion. In addition to investigating value added indicators, it is important to shift the focus now to productivity indicators.

**Figure 6.1 - Japan Motor Vehicle Industry Growth Rate of Value Added in Constant Prices**



Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005,  
<http://www.ggdc.net>

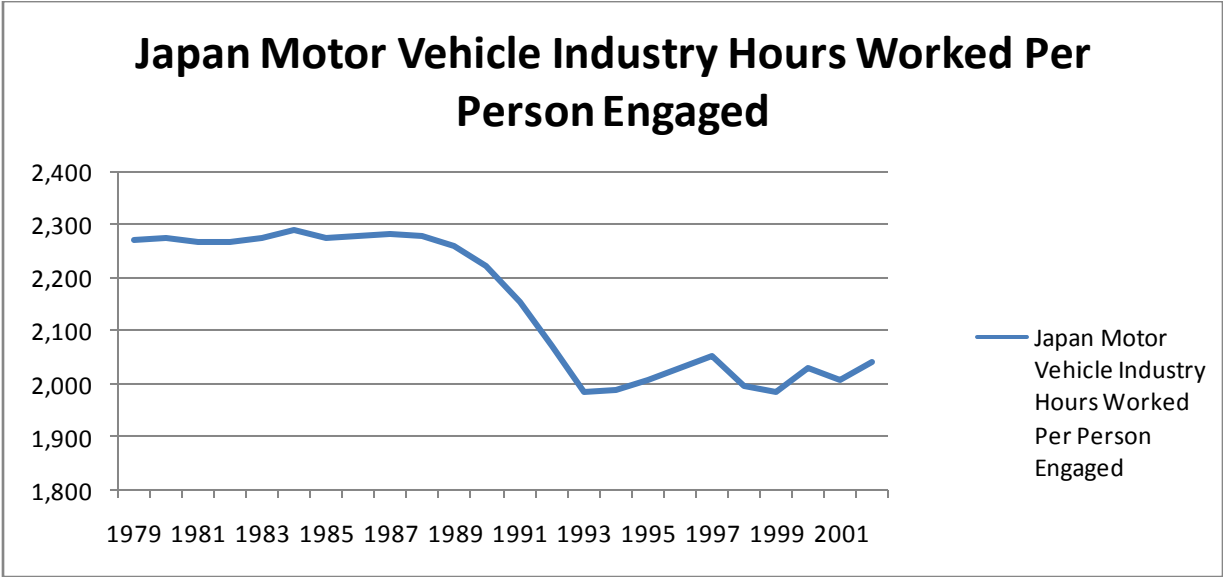
**Figure 6.2 - Japan Motor Vehicle Industry Total Hours Worked (In Thousands)**



Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005,  
<http://www.ggdc.net>

In addressing productivity indicators, it is important to first look at hours worked statistics. Table 6.3 depicts the Japanese motor vehicle industry hours worked per person engaged statistics. As can be seen from the graph, there is a sharp decline in the hours worked per person engaged during this more than twenty year period. Although there are oscillations in increasing and decreasing trends over the last decade under focus, the general trend can be seen as a declining hours worked per person engaged over the time period, falling from just under 2,300 in 1979 to just over 2,000 in 2002. At this point, we must ask the question of productivity with regard to these workers.

**Figure 6.3 - Japan Motor Vehicle Industry Hours Worked per Person Engaged**

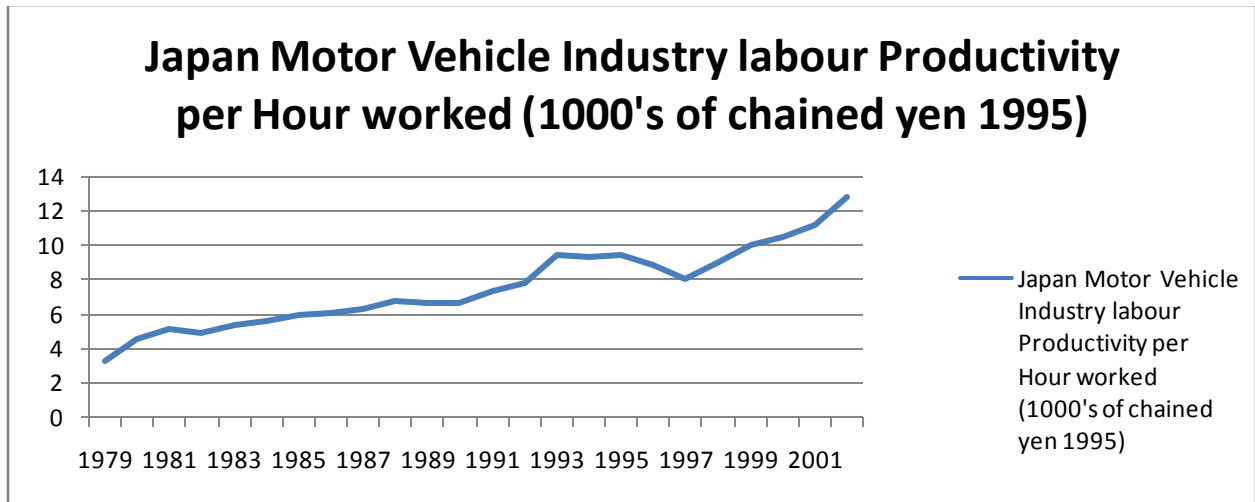


Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005, <http://www.ggdc.net>

In looking at raw labour productivity figures, there are some clear trends to divine. Figure 6.4 offers an account of the Japanese motor vehicle industry labour productivity per hour worked, in thousands of chained yen of 1995. What we can see is a steady but not unrelenting drive upwards in productivity statistics, virtually quadrupling performance over this timeframe. Although there is a slight downturn in productivity between 1993 and 1997, we can see the industry rise to new heights by the end of the data points. Now that we've seen this staggering performance in hours worked figures, it is useful to look to the figures on a per worker basis.



**Figure 6.4 - Japanese Motor Vehicle Industry labour Productivity per Hour worked (1000's of chained yen 1995)**

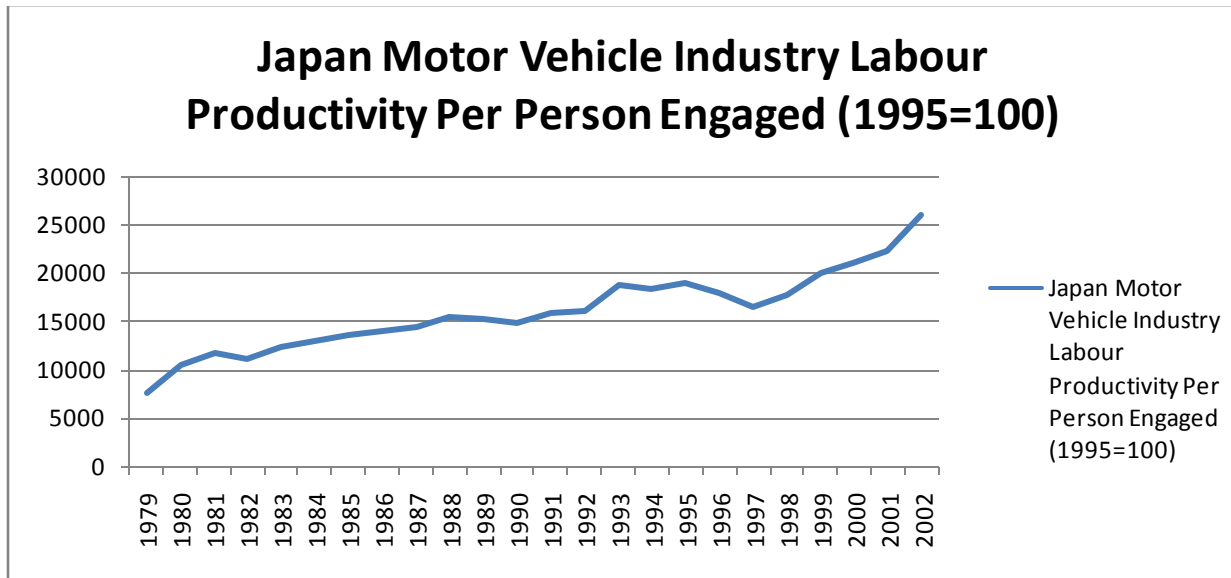


Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005,

<http://www.ggdc.net>

The figures for labour productivity on a per person engaged basis also signal an impressive performance over the period in question. As is depicted in figure 6.5, productivity virtually quadruples over the time period. These figures show a similar decline over the period of the mid 1990's, but overall the productivity is exemplary over the time period in the Japanese Industry. These figures present a picture that warrants further discussion, which will take place in the discussion section to come. Now that these figures have been presented, it is important to look to another giant in the global motor vehicles industry, Germany.

**Figure 6.5 - Japan Motor Vehicle Industry Labour Productivity per Person Engaged (1995=100)**



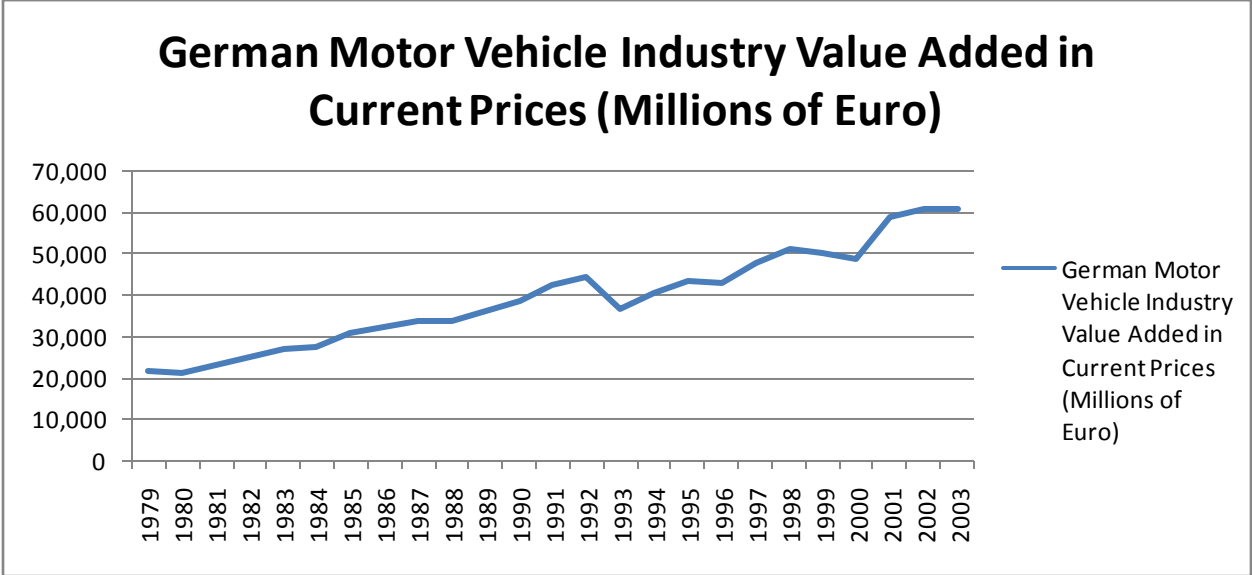
Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005, <http://www.ggdc.net>

### 5.4 German Motor Vehicle Data

Now that the American and Japanese motor vehicle industries have been presented, it will be useful to look at the German industry. The German motor vehicle industry is one of the strongest in the world, and there is little explanation required as to why it should be included in this study. In assessing the activity of this industry over time, it will be important to look at similar indicators to the ones presented so far in the other industry studies. The first of these indicators in the value added statistics. Figure 7 depicts the German motor vehicle industry value added recorded in millions of Euro in current prices. What we can observe via this graphic is a steady rise in value added over roughly the first half of the time period, followed by fluctuations in approximately three year increments through 1992, 1995, 1998 and 2002.

Although these fluctuations do take place, the industry is still brought to triple the height of the value added in the initial year of the data set.

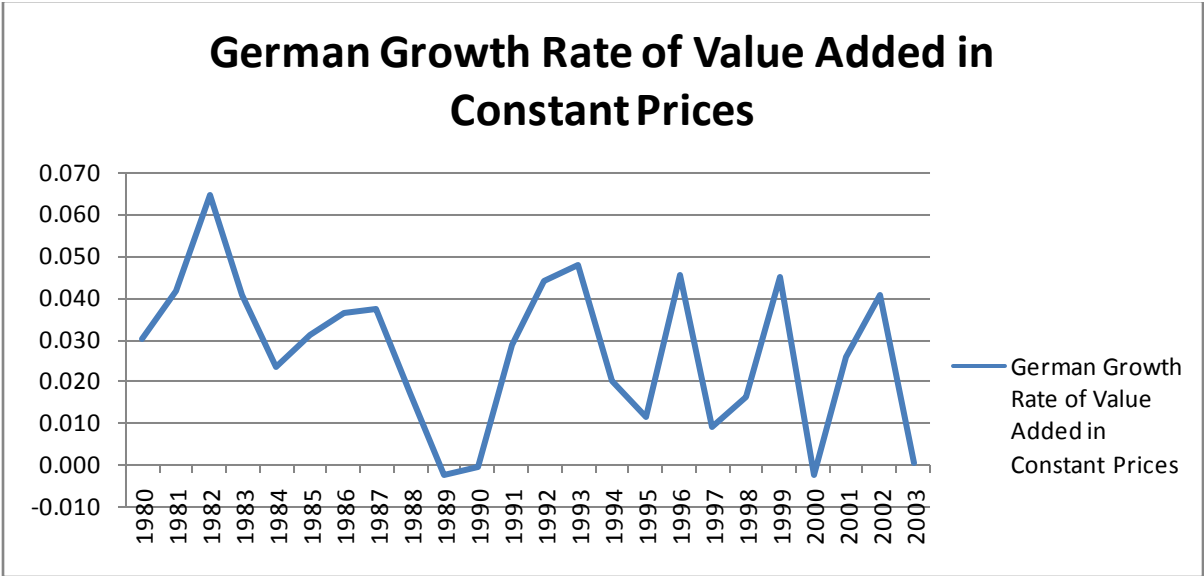
**Figure 7 - German Motor Vehicle Industry Value Added in Current Prices (Millions of Euro)**



Source: Groningen Growth and Development Centre, 60-Industry Database – Unified Germany, March 2006, <http://www.ggdc.net/>

In looking to the value added data in terms of growth rate, more insight can be deduced. Over the period depicted in Figure 7.1, we can see dramatic fluctuations in the value added deflator growth rate for the industry. In looking to possible trends, we can see that the initial fluctuations that are the most dramatic oscillate in a five year cycle, whereas from 1993 on, we see more short run fluctuations in a roughly three year cycle. Going beyond the value added figures, it is now important to look to productivity statistics in order to gain a full view of industry movements.

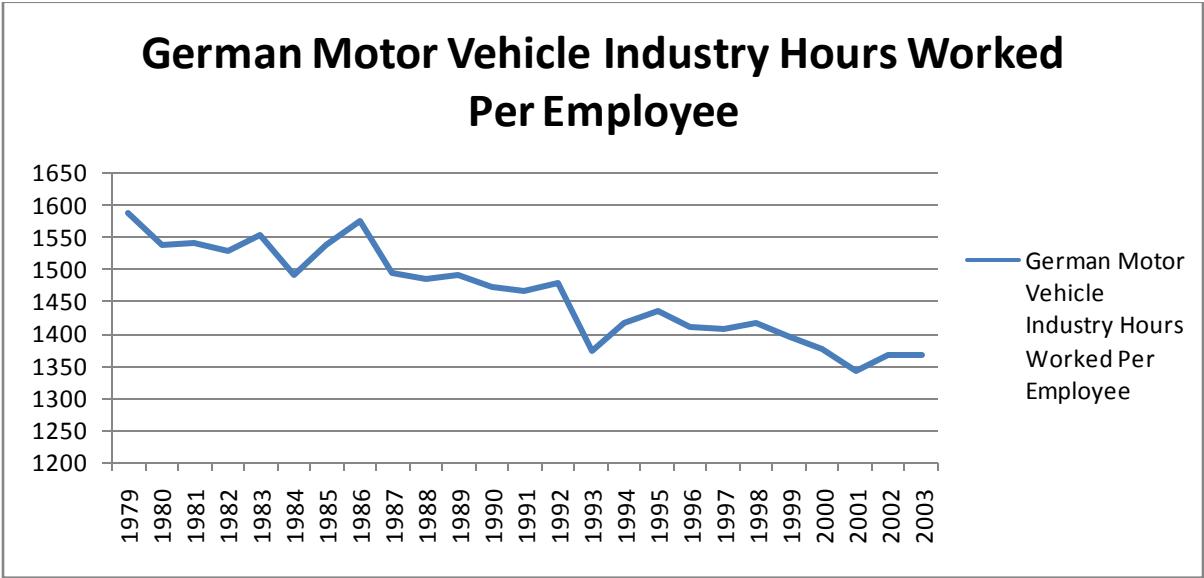
**Figure 7.1 - German Motor Vehicle Industry Growth Rate of Value Added in Constant Prices**



Source: Groningen Growth and Development Centre, 60-Industry Database – Unified Germany, March 2006, <http://www.ggdc.net/>

The hours worked per employee gives a first important insight into labour output over the time period of the industry. As figure 7.2 depicts, hours worked per employee over time fall fairly steadily. Although they fluctuate along their descent, the final indicator is approximately ten percent lower than the initial hours worked figures. In terms of a trend, the descent fluctuates in a rather varied manner.

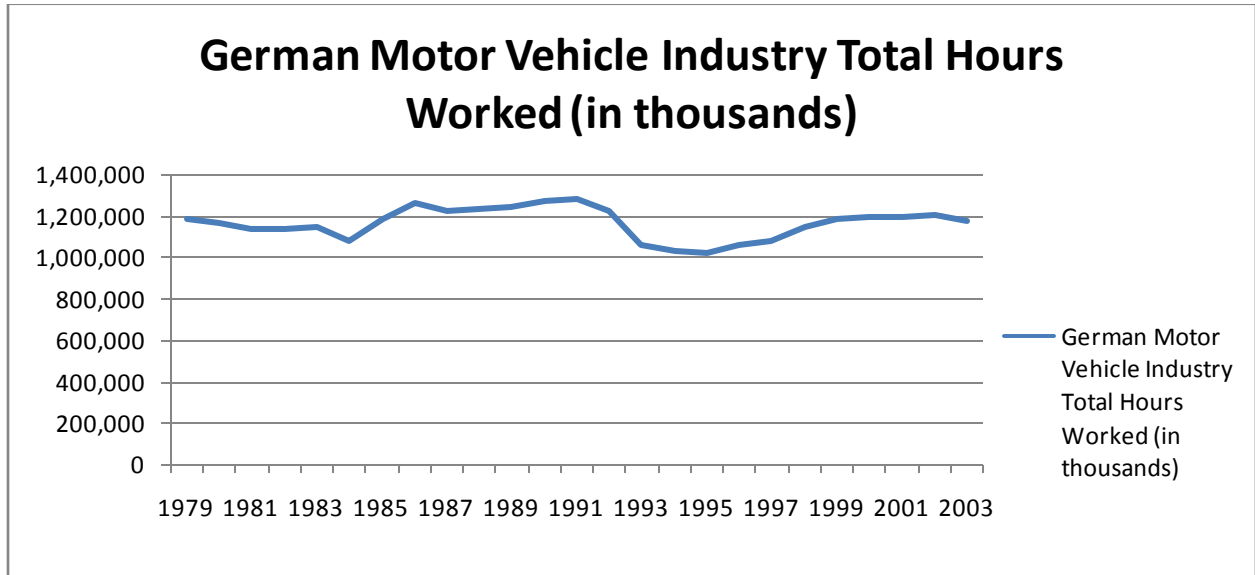
**Figure 7.2 - German Motor Vehicle Industry Hours Worked Per Employee**



Source: Groningen Growth and Development Centre, 60-Industry Database – Unified Germany, March 2006, <http://www.ggdc.net/>

Looking to total hours worked in the German motor vehicle industry is another important step in analyzing its dynamic. We can see in figure 7.3 that although there is a fairly dramatic fluctuation in hours worked over the time period, the end result is relatively similar to the initial data point in the series.

**Figure 7.3 - German Motor Vehicle Industry Total Hours worked (in thousands)**

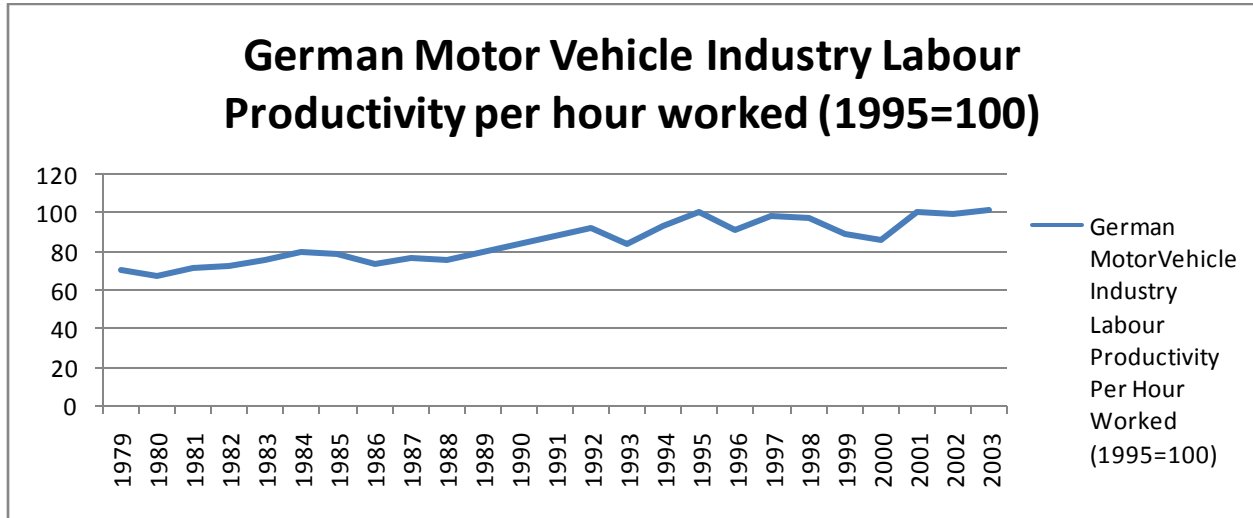


Source: Groningen Growth and Development Centre, 60-Industry Database – Unified Germany, March 2006,

<http://www.ggdc.net/>

Looking to labour productivity statistics is an important final step in evaluating the industry. As we can see from figure 7.4, although there is fairly constant fluctuation in the labour productivity per hour worked statistics, there is very little gain in overall productivity from the first to the last market indicator. Furthermore, in looking to labour productivity on a per person engaged process in figure 7.5 a similar trend can be deduced. Fluctuations, which mark the results for both indicators, fluctuate in a long run fashion until the 1990's, where they seem to move on a roughly three year basis. That said, the overall productivity level does not make substantial progress over the period in question. The German statistics provide useful indicators which will be examined further in the discussion section. Now that the German case has been presented, it will be essential to look the final production region in the study, the EU15.

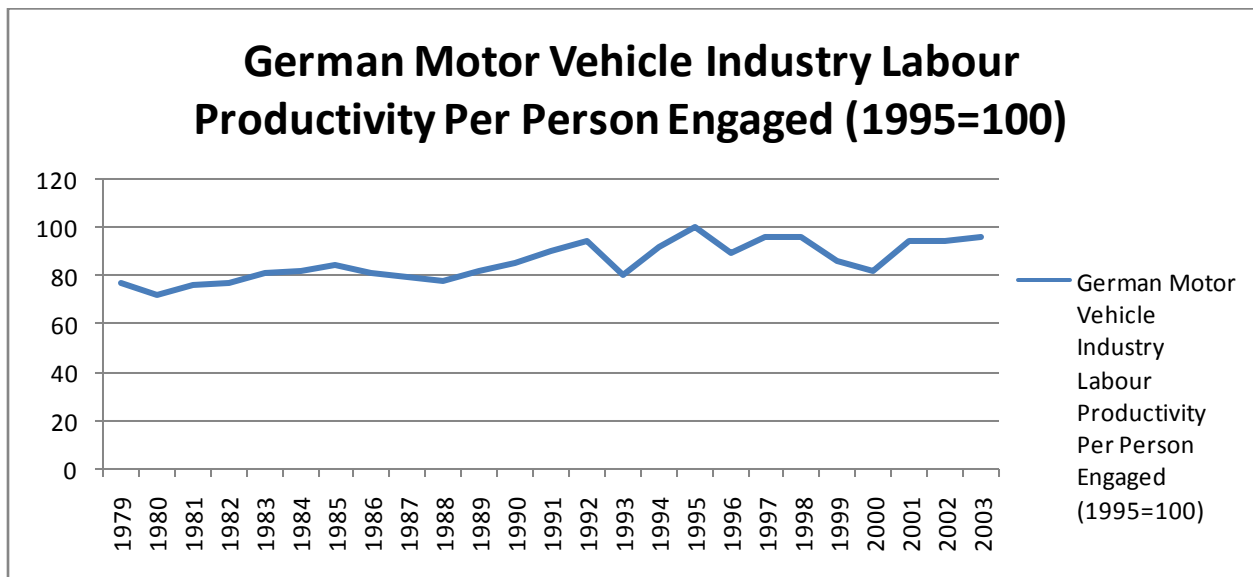
**Figure 7.4 - German Motor Vehicle Industry Labour Productivity per hour worked (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database – Unified Germany, March 2006,

<http://www.ggdc.net/>

**Figure 7.5 - German Motor Vehicle Industry Labour Productivity per Person Engaged (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database – Unified Germany, March 2006,

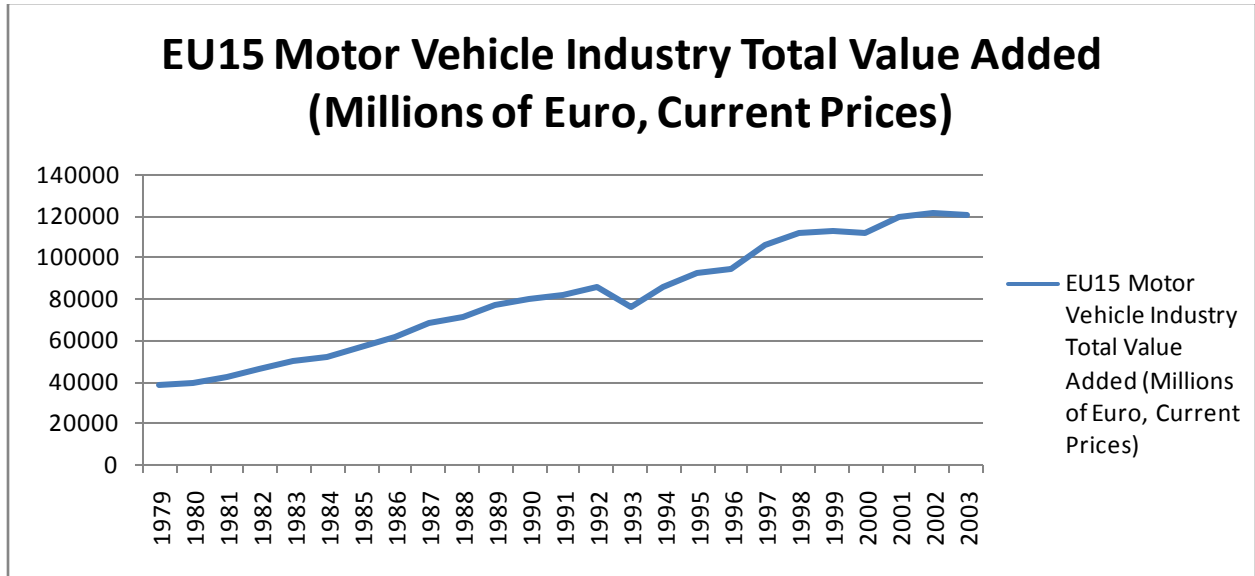
<http://www.ggdc.net/>

## 5.5 EU15 Motor Vehicle Data

Now that the three major domestic industries motor vehicle industries have been presented, it is vital to include the region that makes up the lion's share of the remaining dominant automotive firms in the world, the EU15. In attempting to evaluate the state of the industry over time, it will be useful to review the same economic indicators one final time. The first of these indicators deals with total value added, and is present in figure 8 in millions of Euro of current prices. As we can see from the graphic, value added proceeds on a generally stable trend upwards over the first half of the data set and, following the downturn of the early 1990's, proceeds upwards again in a more cyclical movement of roughly 3 years from height to height. In looking to the value added deflator growth rate for the same period presented in figure 8.1, we can see growth follow a fairly tumultuous path from higher levels in the early period, to more rapidly moving cycles of peaks and valleys. This presents a picture of the industry as experienced smooth and steady growth over the early period, and a more tumultuous period from 1993 on, while still progressing with growth. Now it is important to look to productivity and labour output figures.



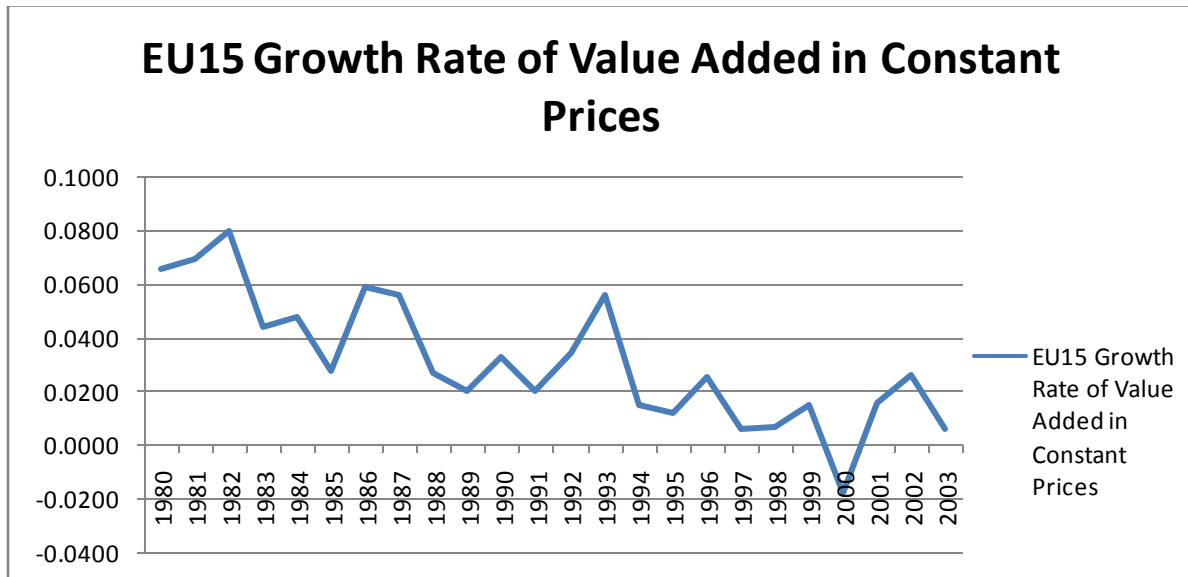
**Figure 8 - EU15 Motor Vehicle Industry Total Value Added (Millions of Euro, Current Prices)**



Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005,

<http://www.ggdc.net/>

**Figure 8.1 - EU15 Motor Vehicle Industry Growth Rate of Value Added in Constant Prices**

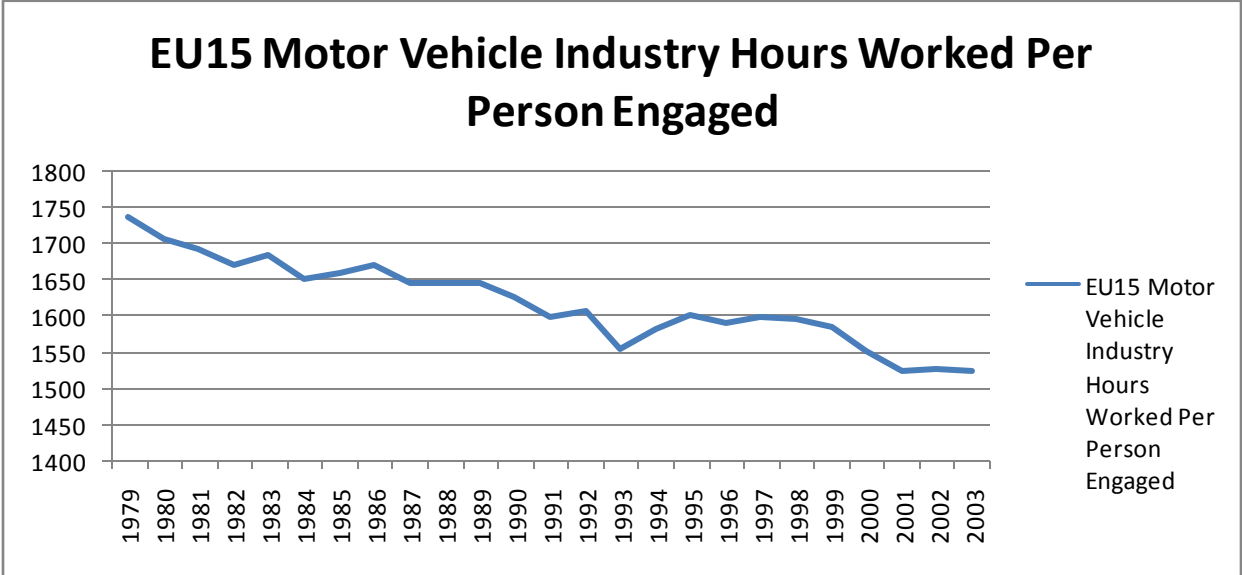


Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005,

<http://www.ggdc.net/>,

In looking to tables 8.2 and 8.3, we can see a similar trend in hours worked per person engaged and total hours worked in the industry for this region. As we see, although there are slight turns up and down along the trend, the picture presented by the two graphics denote a fairly steady and dramatic decrease in both hours worked per person engaged and total hours worked. Hours worked per person engaged falls by roughly ten percent, while the total hours worked figure falls by roughly twenty five percent. We see a decrease in hours worked, but now we must look to how this affects productivity.

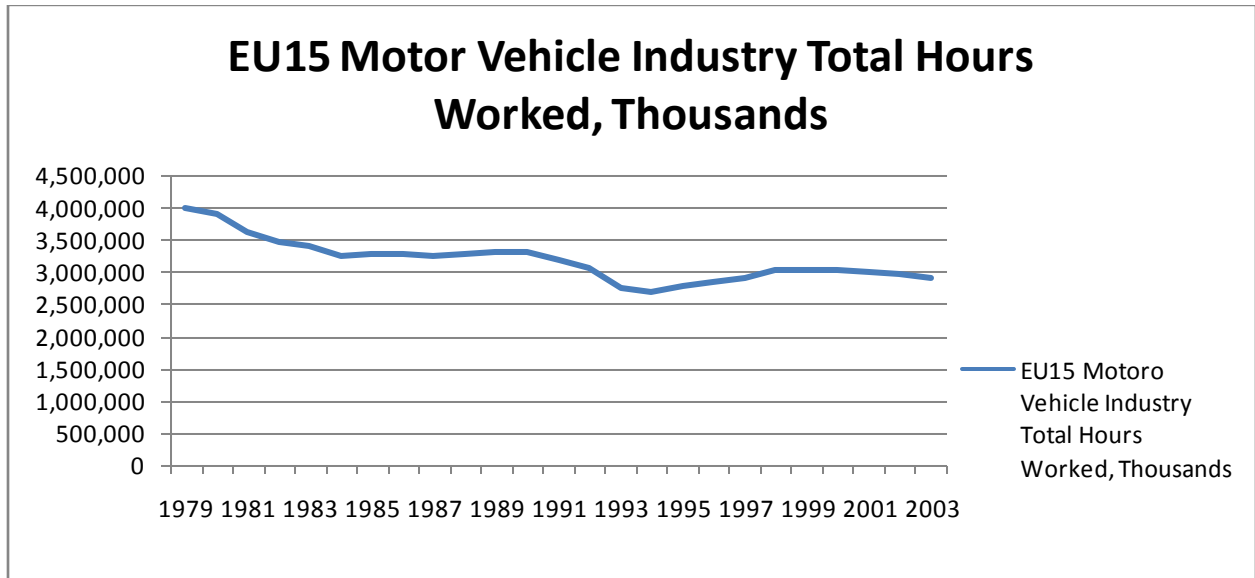
**Figure 8.2 - EU15 Motor Vehicle Industry Hours Worked per Person Engaged**



Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005,

<http://www.ggd.net/>,

**Figure 8.3 - EU15 Motor Vehicle Industry Total Hours Worked, Thousands**

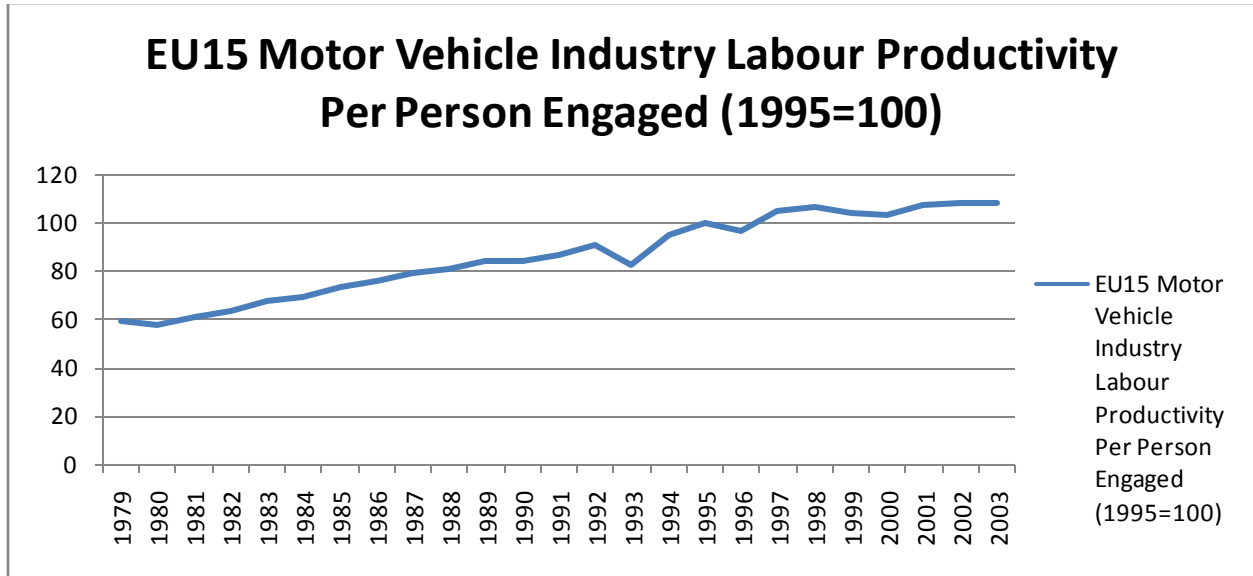


Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005,

<http://www.ggdc.net/>,

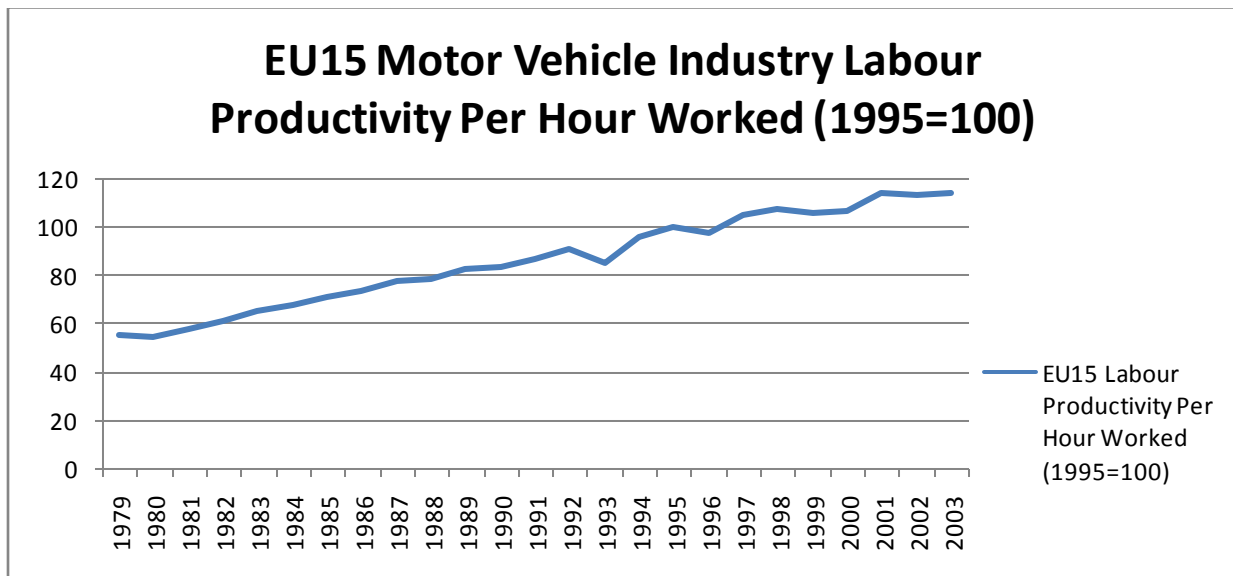
In looking at labour productivity figures, we see some healthy results for the EU15 region. In looking to labour productivity per person engaged in figure 8.4, we can see productivity virtually double over the time period in question. We can see the same trend in productivity per hour worked in figure 8.5, as both trend lines follow a gradual rate of growth before 1992, and a more tumultuous one after. Nevertheless, this movement is a movement towards excellent results in productivity achievement over the time period.

**Figure 8.4 - EU15 Motor Vehicle Industry Labour Productivity per Person Engaged (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005, <http://www.ggdc.net/>,

**Figure 8.5 - EU15 Motor Vehicle Industry Labour Productivity per Hour Worked (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005, <http://www.ggdc.net/>,

This variety of statistical representation for the different economies and regions offers a wide variety of trends and dynamics within the motor vehicle industry. These trends merit an in-depth analysis, which will be accomplished in the discussion section to come. Before it is possible to move-on to the analysis section, it is necessary to present further description of the dynamics the industry with a presentation of some further statistical phenomena.

**5.6 Current State of the US Auto Industry**

Now that some of the background has been presented on the dynamic of the car industry over the previous decades, it will be useful to provide a brief snapshot of the industry as it stands during the currently calamitous economic times in the world’s largest economy. A good place to start in presenting the state of the industry lies in the production figures for the United States. Table 1 depicts the production figures for light vehicle production in the beginning of 2009 as it compared to the same period one year prior. If we look at the month of April alone, 2009 has experienced a 44 percent drop in production across the various firms from one year earlier. If we look to the entire period of January until April in comparing the previous year with the current one, the situation is even direr. The various producers have been forced to drop production by more than 50 percent, seeing a drop from production of over 3 million cars to just over half that figure. But it is not only production which has been affected by the current situation. Sales in the US over this time period are another important indicator which must be examined next.

**Table 1 – US Light Vehicle Production in periods of 2008 versus the same periods in 2009.**

	<b>April 2009</b>	<b>April 2008</b>	<b>% Change</b>	<b>Jan-Apr ‘09</b>	<b>Jan-Apr ‘08</b>	<b>% Change</b>
<b>Total US</b>	448,355	805,918	-44.4%	1,597,386	3,317,445	-51.8%

“North American Production Summary – April, 2009” Ward’s Auto World <http://wardsautoworld.com> Penton Media inc.

During the current period of economic crisis, light vehicle sales have been a major casualty of the crash. Table 2 presents some US light vehicle sales figures comparing periods of 2009 with the same periods in the previous year. When we look to total sales for the month of April, the industry has experienced a drop of almost 35% compared to the previous year. Once again, the year to date figures are even more startling for industry actors. From the months of January to April 2009, total light vehicle sales have plummeted by slightly more than 37%. This has been a drop in close to two million light vehicles during this period, which is unavoidably a serious situation for any actor in the industry. In looking only to total sales, the picture isn't fully painted in terms of our study. Therefore, the next step is to look at US light vehicle sales in terms of the representative firms of some of the countries in the focus of our study.

**Table 2 – US Light Vehicle Sales Totals in period during 2008 versus the same period in 2009.**

	<b>April 2009</b>	<b>April 2008</b>	<b>% Change</b>	<b>Jan-Apr '09</b>	<b>Jan-Apr '08</b>	<b>% Change</b>
<b>Total US</b>	817, 287	1, 243, 547	-34.3%	3, 014, 335	4, 805, 907	-37.3%

Source: "US Light Vehicle Sales Summary – April 2009" Ward's Auto World <http://wardsautoworld.com> Penton Media Inc

In terms of the parameters of the study which is undertaken here, raw industry sales figures do not provide the full range of information which is relevant. Therefore it is essential to address table 3, which outlines light vehicle sales divided by firms which originate from three of the regions in our study. In looking at these figures, automotive firms of certain origins have done better than others. In looking at the group of firms that was least affected by the economic downturn, the German firms ranked at the top with a mere 28% loss in April 2009 versus 2008, and an even more impressive (under the circumstances) reduction in sales of a mere 24.7% from January to April of 2009 compared to one year prior. The Japanese were the in the middle in terms of performance in the context of the big three US national automotive groups. Nevertheless, Japanese firms experienced a loss of 35.9% in April 2009 compared to one year earlier, and the comparable January to April figures of 2008 compared to 2009 saw a 35% reduction in sales for the latter year. This leads us to the group of automotive firms that performed the most poorly in their own domestic market, American firms. The April sales

figures saw a reduction in sales of 36.2% over the same month on year prior, which could barely be closer to the sales reductions for the Japanese firms. But where the American firms performed dramatically worse than their foreign counterparts, was in the year to date figures, where sales figures dropped a staggering 43.7% in the January to April 2009 figures in comparison to the same period one year before.

**Table 3 – US Light Vehicle Sales by Firm in periods of 2008 versus the same periods of 2009**

	<b>April 2009</b>	<b>April 2008</b>	<b>% Change</b>	<b>Jan-Apr '09</b>	<b>Jan-Apr '08</b>	<b>% Change</b>
<b>American</b>	380, 839	596, 811	-36.2%	1, 355, 054	2, 406, 993	-43.7%
<b>Japanese</b>	313, 119	488, 630	-35.9%	1, 203, 277	1, 857, 466	-35.3%
<b>German</b>	60, 447	84, 418	-28.4%	219, 779	291, 997	-24.7%

Source: “US Light Vehicle Sales Summary – April 2009” Ward’s Auto World <http://wardsautoworld.com> Penton Media Inc

One final US figure that illustrates the positions which the automotive firms find themselves in within the US market, is the list of most popular models selling in the year to date. Table 4 provides the list of the top selling models in the year to date of 2009, and what is indicated does not bode well for certain producers. The top five automobile models selling in the US in 2009 to date are not produced by domestic producers, but rather exclusively by Japanese automotive firms. The situation is not completely disastrous in this context for American firms, and they still produce the proceeding four models in positions six to nine on the list, followed by one automobile produced by a South Korean firm.

**Table 4 – Best Selling Cars in the US market (Jan-Apr 2009) Source: Ward’s Auto Info Bank,**

<b>Model</b>	<b>Firm</b>	<b>Country of Origin</b>
Camry	Toyota	Japan
Accord	Honda	Japan
Corolla/Matrix	Toyota	Japan
Civic	Honda	Japan
Altima	Nissan	Japan
Malibu	Chevrolet	US
Fusion	Ford	US
Impala	Chevrolet	US
Focus	Ford	US
Sonata	Hyundai	South Korea

Source: “US Light Vehicle Sales Summary – April 2009” Ward’s Auto World <http://wardsautoworld.com> Penton Media Inc

These figures for the consequences to automotive firms of the current economic downturn outline an alarming situation for the various actors in the industry. It must be concluded that the industry is particularly susceptible to the fluctuations in the overall health of the economy. Analysis for the automotive section as a whole will be drawn in the discussion section that is to follow.

## **6. Discussion**

Now that an extensive array of information has been presented on the topic, it will be necessary to provide some analysis of trends that can be derived from this data in relation to comparisons between the economic growth data, the automotive data, and Joseph Schumpeter’s seminal theory present in his work *Business Cycles*.



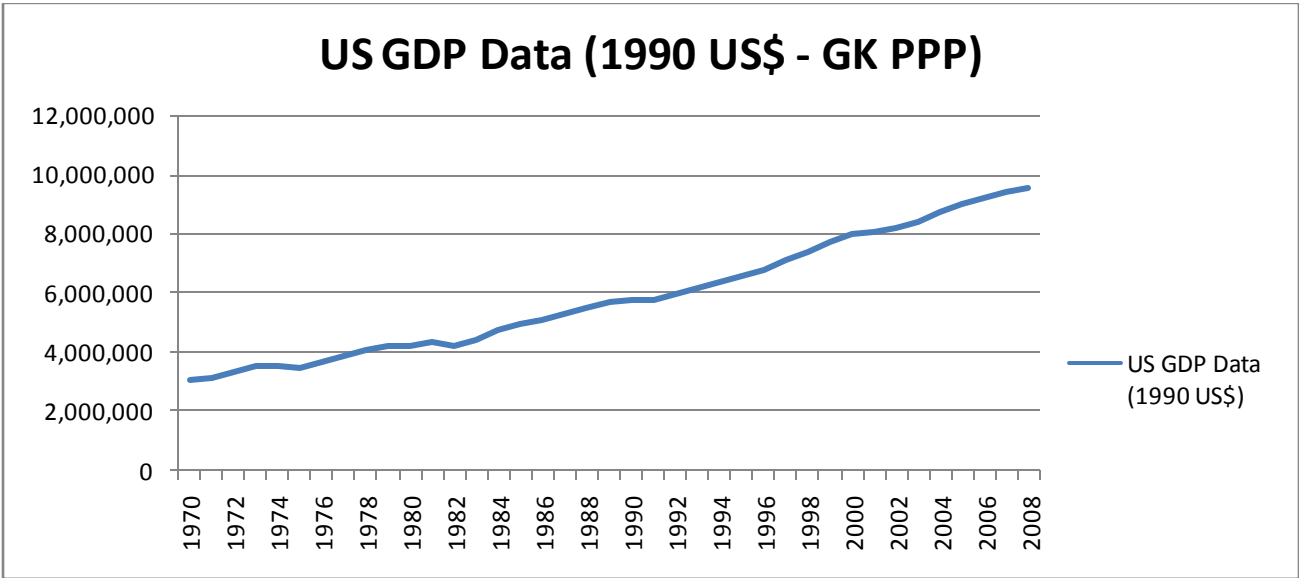
## 6.1 Juglar Cycles

One of the most pronounced trends that can be derived from the data presented is the existence of so-called Juglar cycles. In his *Business Cycles* work, Joseph Schumpeter outlines a method by which incremental changes in economic growth tendencies are delineated by time and are generally named for the economists that were influential in discovering their existence. The Juglar cycle is one of those cycles, as the concept outlines a roughly ten year cycle of economic growth followed by brief periods of downturn and market correction. It must be noted that there is considerable debate surrounding the validity of Juglar cycle analysis. Although this does not discount the validity of attempting to observe these trends, the debate must be considered in evaluating the results.

## 6.2 Juglar Cycles in US GDP Data

In the graphical representations of long term US economic growth, it is clear to see ten year patterns of growth, followed by brief downturns, as described by Schumpeter as the Juglar Cycle. These downturns can be clearly observed on figure 1.1, which depicts growth during the latest long wave, from 1970-2008. Significant downturns can be noted in 1973, 1981, 1990, and in 2000. This roughly denotes what can be called Juglar Cycles.

**Table 1.1 (recreated) – US GDP Data in 1990 US dollars from 1970-2008**

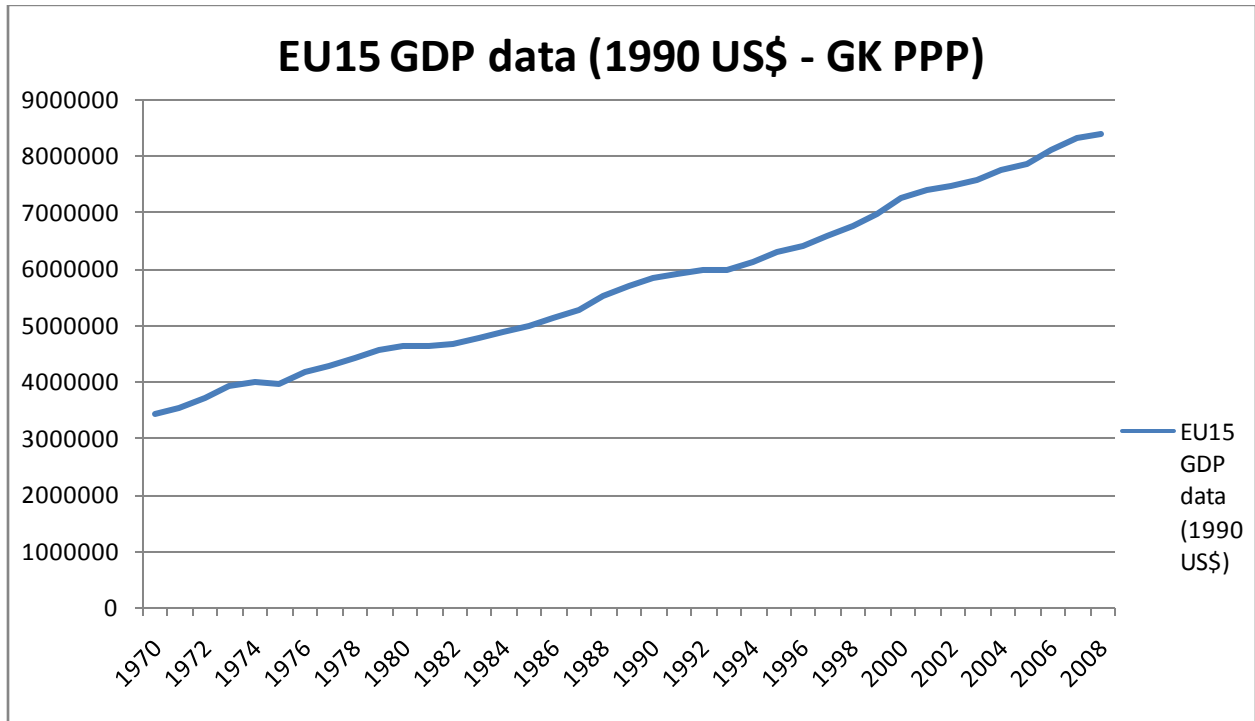


Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

**6.3 Juglar Cycles in EU15 GDP Data**

If we are to continue our observations of Juglar cycles in our GDP data, the EU15 case is another important example. As can be observed in figure 9, in looking at GDP growth over the long wave cycle from 1970 to 2008, there are clearly cyclical fluctuations around a pattern that generally conforms to Schumpeter’s Juglar cycle analysis. The pattern can be observed in what can be called cyclical economic downturns, which are shown to occur roughly in 1973, 1980, 1990 and 2000.

**Figure 9 – EU15 GDP data from 1970 to 2008(in 1990 US dollars)**

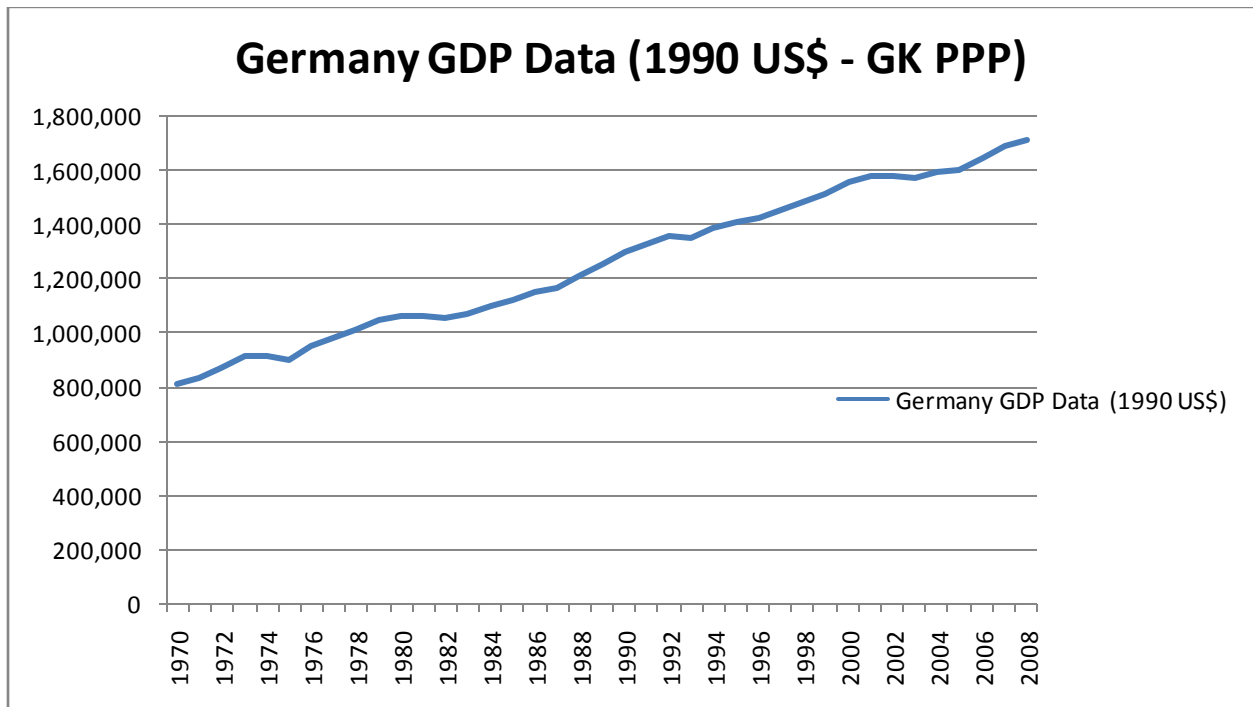


Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

#### **6.4 Juglar Cycles in German GDP data**

The third economy in our study that can also be seen to conform to the trend of Juglar waves of growth is that of Germany. As we can see from figure 9.1, in the period of 1970 to 2008 there are clear oscillations of roughly ten years of economic growth followed by downturns. These can be observed roughly in 1973, 1980, 1992 and 2001. Now that these trends have been observed in the GDP data, it is important to look to the motor vehicle industry data to see if we can observe any commonalities.

**Figure 9.1 – Germany GDP data from 1970 to 2008 (1990 US dollars)**



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2009.

### 6.5 Juglar Cycles in Motor Vehicle Data

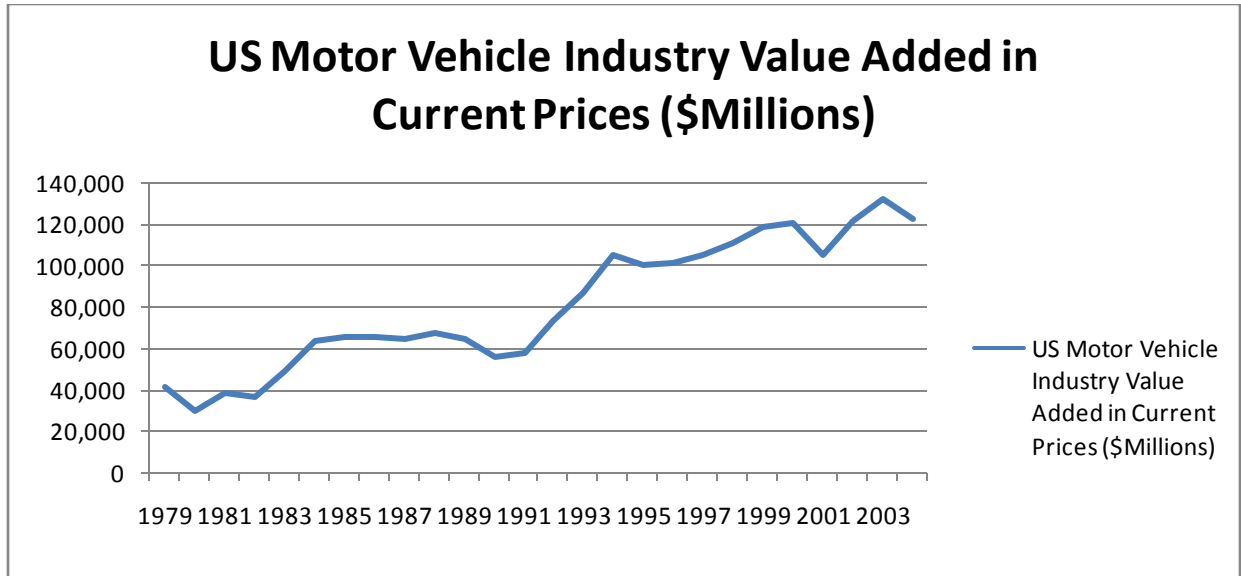
As we have seen indications of Juglar cycle trends in the GDP data, it is important to now look to see if we can observe similar trends in the automotive data.

### 6.6 Juglar Cycles in US Motor Vehicle Value Added

If we look to US motor vehicle value added data, there is the possibility of observing some potential trends that unite the data with GDP data for the time period. In looking to figure 5 (recreated below), it is possible to observe a mild trend of ten year cycles in value added downturns. In observing the graphic, we can see that there are three points in which value added indicators have sunken to their lowest levels. These depths of value added are noted to reach

their depths in 1981, 1990 and 2001. This would seem to fit the Juglar cycle trend, as described by Schumpeter, and noted in the previous data.

**Figure 5 – US Motor Vehicle Industry Value Added in Current Prices (Millions of US Dollars)**

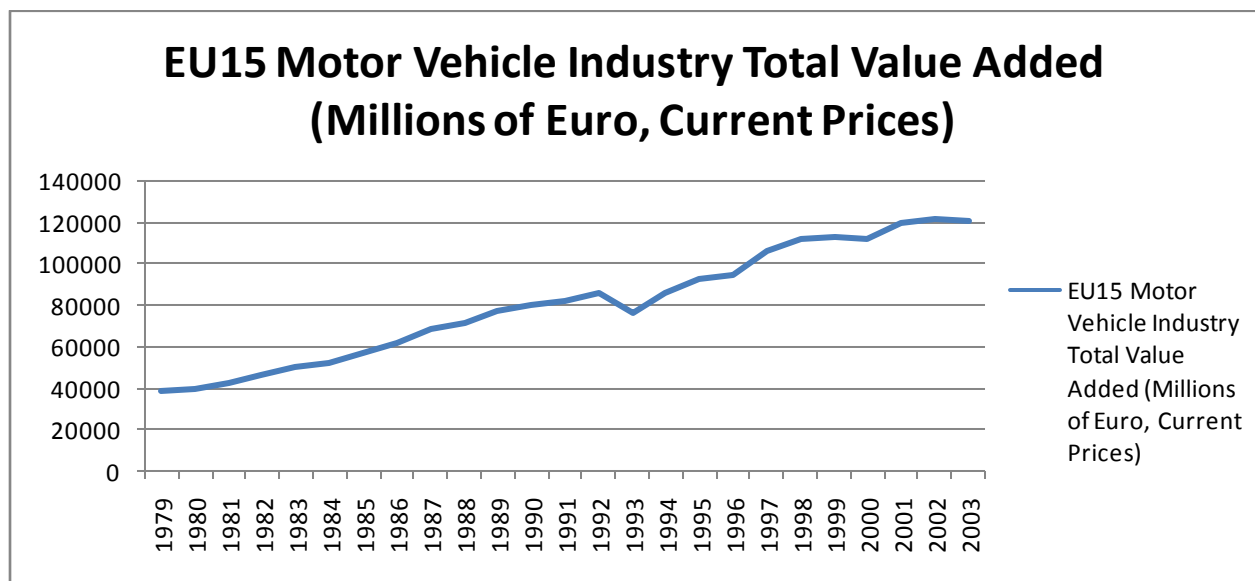


Source: Groningen Growth and Development Centre, 60-Industry Database - US, September 2006, <http://www.ggdc.net/>

### 6.7 Juglar Cycles in EU15 and Japanese Motor Vehicle Data

If we are attempting to uncover this Juglar cycle trend in other motor vehicle industry data, it is necessary to observe the value added indicators for the EU15 and Japanese industries. The EU15 data in GDP shows a slight trend towards the cyclical Juglar performance, and as we look to the motor vehicle data for value added. In observing downturns of value added in 1984, 1993, and 2000, with an additional downturn in 1996 that does not conform to the trend, there is a slight trend towards roughly ten year cycles of downturns in growth.

**Figure 8 - EU15 Motor Vehicle Industry Total Value Added (Millions of Euro, Current Prices)**

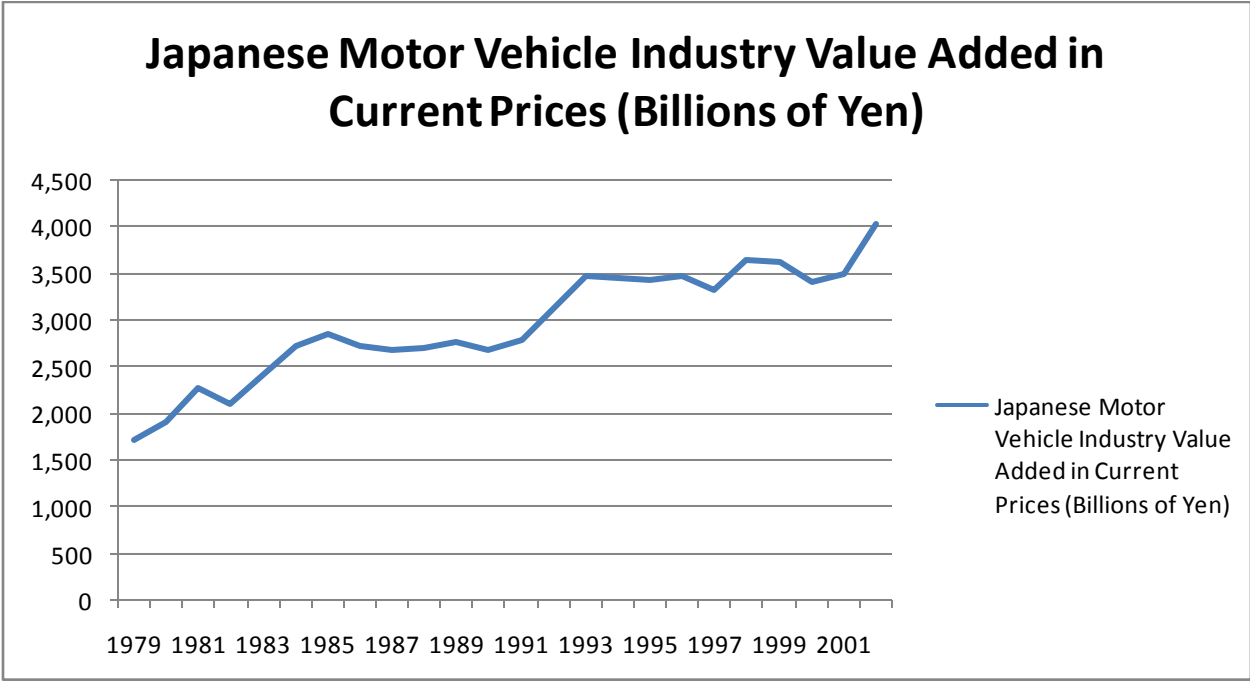


Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005,

<http://www.ggdc.net/>,

Finally, the Japanese value added is the final motor vehicle data set to observe. Although there are no discernable Juglar cycle trends in Japanese GDP data, the motor vehicle data produces a slightly different result. In observing the value added performance over the time period in question, we can see downturns in the Japanese industry 1982, 1990 and 2000, with an addition downturn in 1997 that falls outside the trend. The 1997 downturn can most likely be explained by the Asian financial crisis, which wreaked havoc in the Japanese economy. Overall, we can see some conformity to the Juglar cycle trend in the Japanese motor vehicle industry overall. So, as we can see, in the major economies and industries we have observed, there are some trends that show the possibility of commonality with Schumpeterian theory.

**Figure 6 - Japanese Motor Vehicle Industry Value Added in Current Prices (Billions of Yen)**



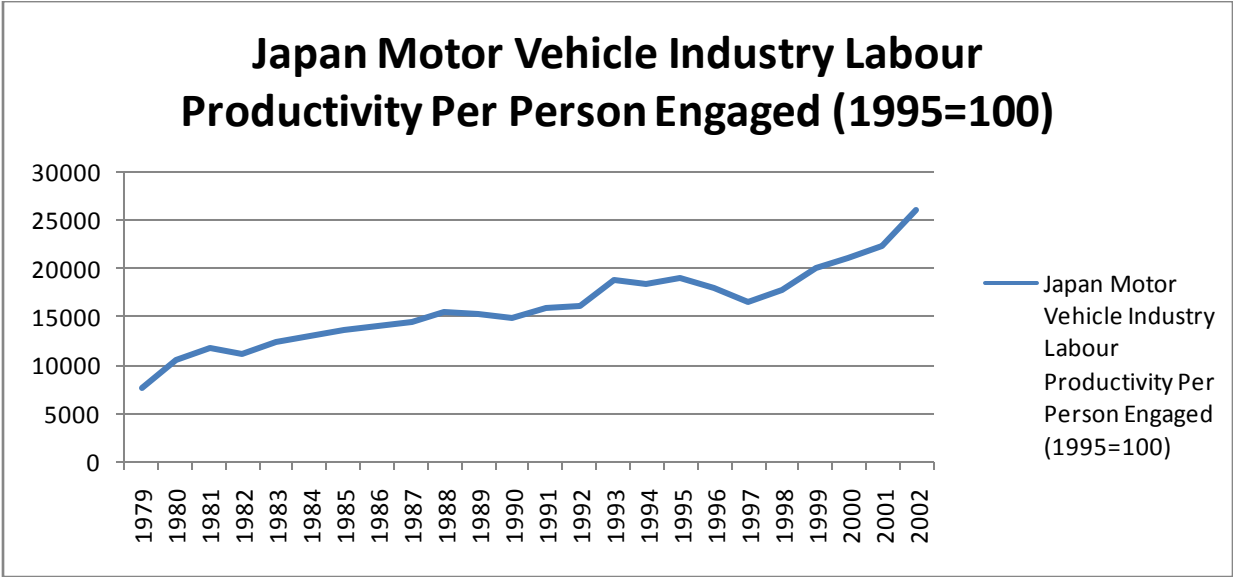
Source: Groningen Growth and Development Centre, 60-Industry Database, February 2005, <http://www.ggdc.net>

**6.8 Productivity Growth**

As we have seen in the analysis of macroeconomic data, and the motor vehicle data, productivity growth has been central to the progress of all the major economies examined, and most of the automotive industries. We can see in particular a strong upsurge in productivity as these economies and industries improve. In the book entitled “The Global Economy in the 1990’s : A Long Run Perspective” by Rhode and Toniolo, there is a discussion about the productivity rise of the 1990’s, explain the role which ICT innovations played in the productivity increases during this period (Crafts quoted in Rhode and Toniolo, 2006. 35). Crafts discusses how the innovations of the 1970’s provided the possibility for an increase in productivity which had long since been lagging behind in the leading economies of the world. It would be useful to look to how the data in our study relates to these trends.

In looking to the automotive industry data, we can see some strong confirmation of the productivity trend. Looking at figure 6.5, we can see a staggering increase in productivity in the Japanese motor vehicle industry over the time period examined. In addition to the Japanese data, the EU15 data on productivity in the automobile is another support for this trend. We can see from figure 8.4 that productivity per person engaged in the industry almost doubled over the time period analyzed. It is now important to look to how these trends relate to the Schumpeterian business cycle theory.

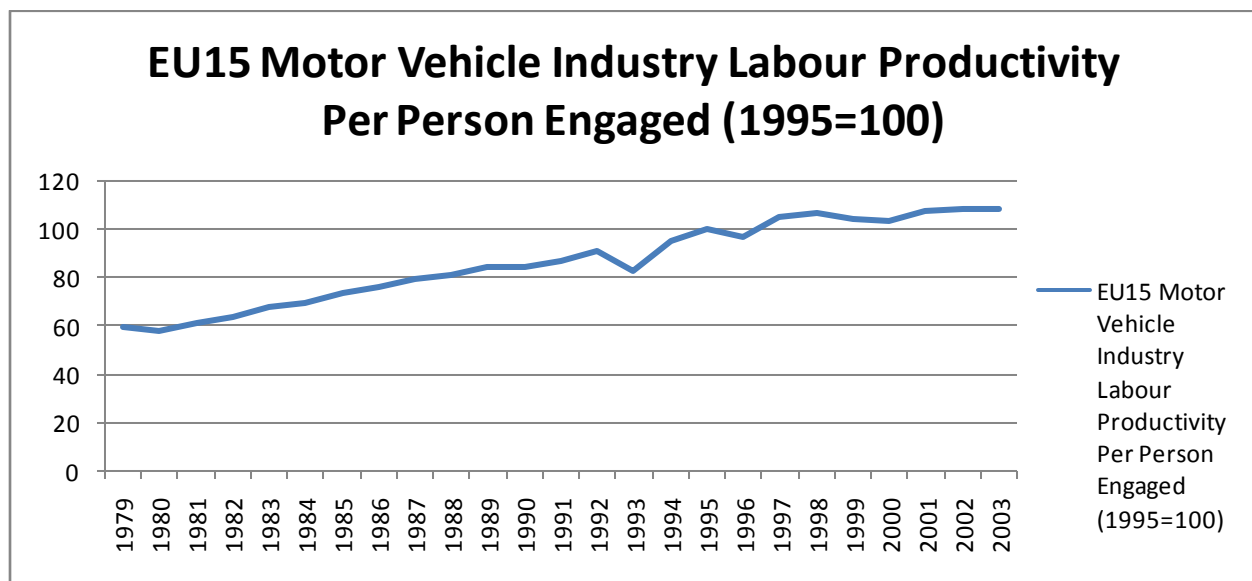
**Figure 6.5 - Japan Motor Vehicle Industry Labour Productivity per Person Engaged (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database - Japan, February 2005,  
<http://www.ggdc.net>



**Figure 8.4 - EU15 Motor Vehicle Industry Labour Productivity per Person Engaged (1995=100)**



Source: Groningen Growth and Development Centre, 60-Industry Database – EU15, October 2005, <http://www.ggdc.net/>,

In examining the ideas of Joseph Schumpeter on the issue of productivity increases, there is clearly a potential commonality between his ideas and the results in the data. The concept of productivity increases is central to Schumpeterian theory, as he outlines the process by which the economy adapts and benefits from revolutionary new technologies introduced. Under the GPT theory mentioned earlier, the micro-processor innovation would qualify as a sufficiently revolutionary technology to fuel a transformation in the economy and lead to Schumpeterian style waves of economic growth and productivity increases. In terms of this phenomenon, there is strong evidence to suggest a link between productivity gains in the economy over this time, and the theorizing of Joseph Schumpeter.

## 6.9 Economic Crisis

The concept of economic crisis is a central one in Schumpeterian theory. As we can see in the current global economic downturn, the effects of the difficulties are wide reaching. Some reports have put the current crisis as the worst in 75 years, and have forecasted serious recessions for the US, Japan and Western Europe (Altman, 2009). There are very few industries in this context that have fared more poorly than the automotive industry. If we look to tables 1 and 2, we can clearly see the devastation that has fallen upon the automotive industry during the recent economic turmoil. This denotes a strong connection between overall economic performance and the automotive industry. Just as previous downturns have affected the industry, so has the current one. This can lead to the belief that the generalities of crisis which Schumpeter applied to the overall economy may in fact hold true for the automotive industry in particular.

If you prescribe to the Kondratiev wave element of the business cycle theory outlined by Schumpeter, there is also a potential parallel with the period in question. The 1970's is known now as a decade that produced the most important innovation in recent memory, the micro-processor. If we are to chart growth from that period, it is possible to relate the downturn which precipitated the economic crisis of the 1970's, with the current economic downturn. It can be argued that growth potentials have been exhausted from the microprocessor innovation, and the economy needs a new engine of growth to fuel another long wave in the economy. Although this phenomenon is extremely difficult to quantify, there is value in attempting to analyze the previous crisis with the current one in the same framework.

## 7. Conclusion

In conclusion, this study has presented a variety of information about macroeconomic performance in a variety of economies, and industry specific data about the motor vehicle

industry in these respective areas. It has been possible to divine some potential trends in the various indicators which present the possibility to relate Schumpeter's business cycle theory of many decades ago, to the economic phenomena of today. Schumpeter's business cycle theory does not stress quantification as its primary focus, which makes this study by no means a final authoritative statement on the validity of the theory, or the possibility of its application in current economic analysis. What this study attempts to accomplish is a look at the potential correspondence of the concepts of the theories with realities in our economic world today. Future study is needed in order to test the hypothesis further and arrive at the possibility of absolute truth. Regardless, Joseph Schumpeter is one of the great economists of the twentieth century, and the academic world should keep his theories in mind, in order to illuminate the fundamental truths which have the potential to lie beneath the surface. This has been the goal of this study, and there is great hope that a small measure along this path has been achieved.

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