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Japanese Monetary Policy: The Effectiveness of Quantitative Easing

Colin James Flynn
Johnson & Wales University - Providence, cjf185@wildcats.jwu.edu

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Dr. Michael Fein, Director

Professor Jean Holt

Professor Ernest Mayo

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Abstract

The purpose of this paper is to analyze the effects of Japanese monetary policy from 2001-2010. In 2001 the Bank of Japan, Japan's central bank, began using an unconventional monetary policy tool known as quantitative easing. The desired effect of quantitative easing is to inject money directly into the country's money supply. This is accomplished through the purchasing of commercial and private financial assets, mainly bonds, by the central bank of the participating country. This paper tests the hypothesis that when the value of the Japanese yen (JPY) is lowered versus the United States Dollar (USD) that the number of Japanese goods purchased by the United States from Japan would increase. This hypothesis is based on The Law of Demand, which states that if all other factors remain equal, the higher the price of the good, the lower the quantity of demand. Japanese leaders' manipulation of the yen over recent years has generated a favorable exchange rate for exporters, according to some economists. Economic statistics such as the Bank of Japan's annual bond purchasing (quantitative easing), the USD versus the JPY exchange rate, and Japan's net exports to the United States are analyzed using correlation and regression analyses in this paper, as a means of testing the hypothesis stated above.

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Chapter I: The History of Money

What is money? Publics constantly think about it and wonder if they have enough of it. Individuals strategically map out long-term goals based around making more cash. For many, the decision to attend college is a tactical choice on the road to accumulating more coinage. College students often say that they chose to attend college "to get a good job" or "to make more money when they graduate." This idea of higher education leading to higher earnings has been supported in the CollegeBoard's annual "Education Pays" report. In 2007 the CollegeBoard reported the numerous financial benefits to an individual who receives a degree from a higher education institution including:

- Over a working life, the typical full-time year-round worker with a four-year college degree earns more than 60 percent more than a worker with only a high school diploma.
- Those with master's degrees earn almost twice as much per year, and those with professional degrees earn almost three times as much as high school graduates earn over their working lives
- Median lifetime earnings for the typical individual with some college but no degree are 19 percent higher than median lifetime earnings for high school graduates with no college experience.
- The typical college graduate who enrolls at age 18 and graduates in four years earns enough in 11 years to not only compensate for borrowing to pay the full tuition at a public college, but also to make up for wages forgone while in college. (Baum)

While there are those who truly love their jobs and are passionate about what they do, the reality is that the majority of people go to work every morning because they need the money. But

why do people *need* money? People need money because it is how folks pay for the most basic necessities of life which include water, food, shelter, and clothing. Beyond these necessities, humans use it to establish and enhance their standard of living. Many of the infinite material and social amenities that life has to offer cannot be enjoyed without money. Also, though not always the case, many people consider the amount of money that one acquires as a representation of the success that person or their family has amassed. However, knowing what money is does not necessarily give an accurate representation of its true purpose. To understand the purpose of money, it is appropriate to look at the history of this medium of exchange.

In the beginning, before the paper, coin, and credit that we exchange today, people bartered. Though no official date has been identified, bartering may have begun as early as the dawn of modern man. “Unique social order emerged only 4,000 to 5,000 years ago. From the standpoint of the 100,000-year history of Homo sapiens, civilization and money are but young and fragile reeds.” (Lehrman) To barter is essentially to trade one good for another. Two people, or two groups of people, would exchange goods and services to one another that gave them a mutual advantage. For instance, a fisherman who caught more fish than necessary to feed himself and his family, exchanged his excess fish for the surplus of another person, a farmer, who had planted and harvested more corn than what was required to provide for his family. (The Central Bank of Brazil) From around 9000 – 6000 B.C. cattle was known as the most common form of money. Cattle did not only include cows, but also sheep, camels, and other livestock. With the advent of agriculture came the use of grain and other vegetable or plant products as a standard form of barter in many cultures. (The Central Bank of Brazil) As new cultures and societies began to interact with one another, bartering became more difficult and inefficient. Some commodities, for their utility, became more sought out than others. Bartering did not provide the

transferability and divisibility that was eventually needed. For instance, if Person A had cows but needed a bow and arrows, Person A had to find Person B who not only had a bow and arrows, but also the desire for beef and was willing to give up their bow and arrows for Person A's cow. What if Person A found Person C, who had the need for beef but no bow and arrows and could only offer Person A seeds? To get Person A's beef, Person B had to find Person D who had a bow and arrows and wanted seeds. (Lehrman) As one can tell, things became complicated.

To help solve these types of problems, people began to use commodity money, which is a kind of currency based on the value of an underlying commodity. "Money evolved through a historical process not unlike that of trial and error or natural selection. Standardized and certified coins originated with an act of human creativity around 650 B.C." (Lehrman) Lydia, Asia Minor was the birthplace of the modern day coin, a creation of the well-developed Sumerian civilization. The portable and lasting coins were made of electrum, a mixture of gold and silver. Having been made of rare resources and the efforts of man, these coins became desired and cherished. They housed an intrinsic value. (Lehrman)

In 1816 gold was officially made the standard of value in England. Rules were established to allow for a non-inflationary production of standard banknotes. These banknotes represented a certain amount of gold. Banknotes had been used in England for centuries prior to the implementation of the nineteenth-century gold standard in England, but their value had never been tied directly to gold. (Redish) In the United States, the Gold Standard Act was officially enacted in 1900, which served the purpose of fixing the value of all money coined in the United States and helped lead to the establishment of a central bank. (Gold Standard Act of 1900) Most countries' economies operated on this gold-backed system until 1971, when the gold standard was ended at Bretton Woods and an entirely new system was introduced.

The new type of currency system that was introduced is known as fiat money. Fiat money does not require the backing of a commodity such as gold. The gold standard worked because of people's perception of gold. Gold for all practical purposes is not necessarily useful. A person can't eat it and it won't keep a person warm at night, but the majority of people think that gold is beautiful, and humans know other humans think it is beautiful. One can safely believe that gold is something of value. Prior to Bretton Woods in 1971, gold served as a physical token of what is valuable based on people's perception. (Einzig) In today's world, the majority of people think that money is valuable, and they know others think it is valuable because it is what is required to purchase desirable goods and services. Today, a $100 bill is something that people safely *believe* is valuable. Today money serves as a physical token of *what is valuable based on people's perception*.

Possessing paper money makes people feel secure. People know that if they have enough money saved in the bank that they can cash out and receive their claim in the now decorative bills. Understanding what money is and its purpose is fundamental to grasping its exchange on a macroeconomic scale. Had the gold standard remained in place, quantitative easing would have never been brought to the economic policy table. Goods that were once bartered between individuals and small groups are now traded between entire nations and continents. As it is common knowledge, the exponential growth in product innovation and diversity has created a constant increase in demand for trade between our world's nations.

Chapter II: The Basis for International Trade

The relationship between international trade and mercantile policy is one of the oldest branches of economic theory. Since the time of the ancient Greeks, government leaders, academics, and economists have debated the purpose of trade between nations. Intellectuals have questioned whether trading between global neighbors benefits the participating parties, or ultimately causes economic distress. Economists argue that international trade makes it possible for countries to increase production, specialize, and add to the overall supply available for consumption. In regards to the United States, The U.S. Chamber of Commerce reported that more than 38 million American jobs rely on international trade. Trade is fundamental to the success of many sectors of the U.S. economy. “The White House reports that one in three manufacturing jobs depends on exports. The U.S. Department of Agriculture reports that one in every three acres on American farms is planted for export markets.” (U.S. Chamber of Commerce) The study of international trade is of growing importance; total output of goods has increased steadily since the Second World War. The ability to increase productivity while acquiring goods and services is a trend that is likely to continue. With the creation of the internet, the world has become a much smaller place, making trading networks broader, more accessible, and more efficient. Understanding international trade has become fundamental to the success of growing economies. Countries trade due to three constant needs as explored in the study of international trade, capital flows, and microeconomics:

- The distribution of natural, human, and capital resources among nations is uneven; nations differ in their endowments of economic resources.
- Efficient production of various goods requires different technologies or combination of resources.

- Products are differentiated as to quality and other price attributes. A few or many people may prefer certain imported goods to similar goods made domestically. (McConnell, Campbell, and Brue 447)

Since its inception, supporters of international trade have struggled to reconcile two indisputable viewpoints. They have sought to balance, "recognition of the benefits of international exchange combined with a concern that certain domestic industries (or laborers, or culture) will be harmed by foreign competition." (Irwin) It is evident that in the arena of free trade there are winners and there are losers. The winners make gains from these cross border trades while the losers are damaged by a reduction in their gross domestic product (GDP). Algebraically one can see that a country's GDP is negatively affected by an increase in imports or a decrease in exports assuming all other variables remain constant via the calculation for GDP:

$$GDP = C + I + G + (X-M)$$

where:
C = consumption spending
I = business investment (capital equipment, inventories)
G = government purchases
X = exports
M = imports

While the battle between winners and losers rages on, there is one result that analysts have connected to international trade that is overwhelmingly positive. "Economists have likened free trade to technological progress: although some narrow interests may be harmed, the overall benefits to society are substantial." (Irwin) On an international scale, an example of this would be that while American car manufactures are hurt by Japan's ability to manufacture better quality cars for a cheaper price, consumers benefit from Japan's ability and American manufactures are

forced to refine their development practices and produce higher quality products at more competitive prices. Another example is China, which has been growing its export figures swiftly over the recent years. Countries that have been importing Chinese goods have been benefiting from the lower-costs. The benefits to the Chinese economy include increasing employment, rising wages for employees, and monetary profits from the goods that are sold abroad. The costs of the rise in Chinese production are mostly borne by those who work domestically in the same industries. The competition has led to job losses for American workers in the electronics and textiles industries which are most definitely worse off in the short-run. As other domestic industries have grown, such as healthcare, American workers have been forced to retain new skill sets to be suitable for new job opportunities. Textiles and electronics producers in the United States have reevaluated their production methods and have begun using more capital and technological intensive manufacturing practices. This viewpoint is supported by David Ricardo's model of absolute and comparative advantage which was first published in 1817. Ricardo's model shows that a country has an absolute advantage in the production of a good if it can produce the good at lower cost in terms of resources than that of another country. The model also explains that a country has a comparative advantage in the production of a good if its opportunity cost in terms of other goods that could be produced instead is lower than that of another country. Economic analysis shows us that regardless of which country has an absolute advantage, there are potential benefits for both countries from trade as long as the opportunity costs of one good in regards to another are different. (Ricardo).

As highlighted by Ricardo's model, the economic basis for trade is that everyone can bring something to the table, regardless of their land, labor, and capital abilities assuming varying opportunity costs. Examples include: fashions from Italy, luxury automobiles from Germany,

software from the United States, watches from Switzerland, and vodka from Russia. While it is true that all nations can find their niche for individual products, the resources of land, labor, and capital are not disbursed equally and their disbursement is not fixed. “When that distribution changes, the relative efficiency and success with which nations produce and sell goods also changes.” (McConnell, Campbell, and Brue 448)

As economies evolve factors such as labor force size change, the composition of a country’s capital supplies are transformed, new technologies may progress, and natural resource reserves are altered. As such changes occur; the relative productivity with which a country can yield particular goods will also change.

Chapter III: The Basics of Monetary Policy

What is monetary policy? “Monetary policy has lived under many guises. But however it may appear, it generally boils down to adjusting the supply of money in the economy to achieve some combination of inflation and output stabilization.” (Mathai) In essence, monetary policy is a set of tools or guidelines that a country’s central bank or government uses to optimize their economy. In the United States and Japan, a central bank determines the plan of action for economic growth.

In the United States the Federal Reserve determines and executes economic policy. The Federal Reserve is the caretaker of the U.S. economy. It is the bank of the U.S. government and, as such, it regulates the nation's financial institutions. The U.S. is home to the world’s largest economy, making the Federal Reserve one of the most powerful and influential establishments on earth. (Hassett) The Federal Reserve is a component of the Federal Reserve System. The Federal Reserve System is composed of a central governmental agency in Washington, D.C. (the Board of Governors) and twelve regional Federal Reserve Banks in major cities throughout the United States. The duties of the Federal Reserve System are to conduct monetary policy, regulate banking institutions, protect the credit rights of consumers, maintain the stability of the financial system, and provide financial services to the United States government. The Federal Reserve was created by Congress in 1913 to combat the instability in the U.S. banking system. (*The Federal Reserve System: Purposes & Functions*) It is important to note that the Federal Reserve is independent from the U.S. government. While there is a strong relationship between the Federal Reserve and the U.S. government, the U.S. government does not simply ask for money and have their wish granted by the Federal Reserve. There have been numerous times throughout history where the Federal Reserve has denied the U.S. government of funding. Former Federal Reserve

Governor Frederic Mishkin wrote in an op-ed coauthored with Anil Kashyup of the University of Chicago about the importance of the Federal Reserve's independence:

> "Economic theory and massive amounts of empirical evidence make a strong case for maintaining the Fed's independence. When central banks are subjected to political pressure, authorities often pursue excessively expansionary monetary policy in order to lower unemployment in the short run. This produces higher inflation and higher interest rates without lowering unemployment in the long term. This has happened over and over again in the past, not only in the United States but in many other countries throughout the world." (Thoma)

Political pressures can lead the Federal Reserve to make policies based on short term political expediency as opposed to making policies based on the needs of the broader economy. An example of this would be the possibility that if a politician was in control of the money supply, they could manipulate the economy in an attempt to increase their chances of getting reelected. "If votes depend upon output growth, as they seem to, then the politician can pump up the money supply around six months before the election so that output will peak just as the election is held. Then, the politician could plan to reduce the money supply just after the election to avoid having inflation problems down the road." (Thoma)

Traditionally the Federal Reserve has three tools in its monetary policy toolbox. These tools are open-market operations, the discount rate, and reserves requirements. Open-market operations are the buying and selling of U.S. government securities in the financial markets. The Federal Reserve typically purchases short-term treasury securities with new money that it prints.

This act influences the level of reserves in the banking system by increasing the demand for treasuries and lowering the interest rate. The main reason open-market operations are used is because they supply the banking system with liquidity. Ultimately, open-market operations increase the supply of money, decrease banks demand for reserves, and drive down the price of money by lowering the federal funds rate. The federal funds rate is the rate at which banks borrow reserves from each other. Open-market operations are the most valuable and effective tool that the Federal Reserve possess. (*The Federal Reserve System: Purposes & Functions*)

The discount rate is officially known as that primary credit rate. It is the interest rate at which an eligible depository institution may barrow funds, typically for a short period, directly from the Federal Reserve Bank. “The law requires that the board of directors of each Reserve Bank establish the discount rate every fourteen days, subject to review and determination by the Board of Governors.” (*The Federal Reserve System: Purposes & Functions*) The discount rate is usually lower than the federal funds rate, although they are closely related. The discount rate is important because it is a visible announcement of change in the Fed's monetary policy and it gives the rest of the market insight into the Fed's plans. (*The Federal Reserve System: Purposes & Functions*)

Lastly, the reserve requirement is the amount of liquid funds that a bank or depository institution must keep on hand in reserves against deposits in the institution’s accounts. The reserve requirement controls the amount of money banks can create through loans and investments. Reserve requirements help the Federal Reserve conduct open market operations by helping to ensure a foreseeable demand for Federal Reserve balances and thus enhancing the Federal Reserve’s power over the federal funds rate. (*The Federal Reserve System: Purposes & Functions*)

The Bank of Japan is the central bank of Japan. While the Federal Reserve System in the United States aims to regulate banking institutions, protect the credit rights of consumers, maintain the stability of the financial system, and provide financial services to the United States government, the Bank of Japan decides and implements monetary policy with the aim for maintaining price stability. (*Outline of Monetary Policy*) The Bank of Japan defines price stability as the overall level of prices for various goods and services. Bank of Japan officials believe that by, “implementing monetary policy, the Bank influences the formation of interest rates for the purpose of currency and monetary control, by means of its operational instruments, such as money market operations.” (*Outline of Monetary* Policy) Money market operations in Japan are the equivalent of open market operations in the United States. Changes in policy are determined by the Policy Board of the Bank. The basic stance for monetary policy is decided by the Policy Board at Monetary Policy Meetings. At Monetary Policy Meetings, the Policy Board discusses the overall economic and financial environment. It is at these meetings that the Policy Board determines the guideline for money market operations and the Bank's monetary policy stance for the near future. The Policy Board also announces decisions immediately after the meeting has concluded. Based on the Policy Board’s determinations, the Bank sets the amount of daily money market operations, selects types of operational instruments, and provides and absorbs funds in the market. (*Outline of Monetary Policy*) The Bank of Japan Act states that the Bank's monetary policy should be "aimed at achieving price stability, thereby contributing to the sound development of the national economy.” (*Outline of Monetary Policy*)

In 2012, Japan ranked as the world’s fourth-largest economy, measured on a purchasing power parity basis that adjusts for price differences and the third largest economy in the world in terms of nominal gross domestic product. (CountryWatch) Gross domestic product, or GDP, is

the monetary value of all the finished goods and services produced within a country's borders in a specific time period, though GDP is usually calculated on an annual basis. It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory. (Callen) The Bank of Japan is also independent like the Federal Reserve in the United States. The Bank of Japan Act States that, “The Bank of Japan's autonomy regarding currency and monetary control shall be respected. Of course, it is important that the Bank's monetary policy and the basic stance of the government's economic policy be mutually harmonious, and thus it is stipulated that the Bank shall always maintain close contact with the government and exchange views sufficiently.” (Bank of Japan Act)

It is evident that autonomy from the government is essential to the success of central banks. In an era of rapid globalization, it is necessary for central banks to communicate as their decisions and actions have countless impacts on the global economy. This means that the Bank of Japan must make policy actions based on the monetary decisions of the Federal Reserve and vice versa. Both banks, along with all nations’ central banks, must work in harmony to achieve their individual and collective economic goals. Both the Federal Reserve and the Bank of Japan are using a new extension of open market operations called quantitative easing to help support their economic recoveries from the 2008 global financial crisis.

Chapter IV: The Gold Standard, Fiat Money, & Quantitative Easing

A gold standard uses gold, directly or indirectly, as money. In 1900 the United States government affirmed its commitment to a gold standard. The gold dollar was made the standard unit of account, and all forms of currency issued by the U.S. government were to be upheld at equivalence with it. For the first time, a gold reserve for government-issued paper notes was officially customary. Greenbacks, silver certificates, and silver dollars continued to be legal tender, and were convertible in gold. Treasury notes were discontinued and evoked. (Elwell) Japan also joined the gold standard three years earlier in 1897. (Nussbaum)

Open-market operations were developed in Britain in the late 1800's and early 1900's, at a time when the gold standard was in operation. At this time, open-market operations were not a logically necessary part of the gold standard. (Mayes) In the unadulterated concept of the gold standard, the national quantity of money was determined by the supply of gold, and changes in the money supply were largely determined by international gold flows. In that system, there was no necessary role for central banking, or for discretionary monetary policy. Open-market operations were created specifically in order to adequate the involuntary functioning of the gold standard. Central banks used open-market operations to increase interest rates when they wanted to guard their gold reserves, in order to avoid the monetary retrenchment that would have occurred if a gold depletion had been allowed to happen. (Mayes)

Since the end of the gold standard in 1971, the United States and Japan have operated on a fiat currency, which is not backed by any precious metal or other commodity. As mentioned earlier, this is a result of the Bretton Woods System. The fiat money system has a number of advantages. Milton Friedman, often regarded as the twentieth century's most prominent advocate of free markets, embraced the political actuality that holding a gold standard together in

boundless international conferences was imaginary. The advantage of allowing the market to determine the level of the dollar against other currencies is that it allows policymakers to concentrate on national economic intentions rather than their balance of payments. (Harrison) In essence, by ending the gold standard, an opening was made for free markets to truly be free and for central banks to establish unrestricted monetary policies. By ending the gold standard, central banks were now able to freely manipulate their money supplies to best benefit their respected economies.

Detlev S. Schlichter, author of *Paper Money Collapse – The Folly of Elastic Money and the Coming Monetary Breakdown* and former J.P. Morgan & Co., Merrill Lynch, and Western Asset Management portfolio manager, is an Austrian School economist. Austrian school economists believe that business cycles are created by government involvement in the economy. This means that when legislators force interest rates down to falsely low levels, firms invest too much capital in long-term and speculative lines of production compared to actual consumer demand. If these investments turn out unfavorably, companies must decrease output in those lines, which causes a contraction in the economy. (Menger) In a recent article titled *There Will Be No End to 'Quantitative Easing'* and interview with Reuters Insider Tevelvision, Schlichter highlighted the effects of the removal of the gold standard in 1971 and the use of quantitative easing in the United Kingdom. Schilchter notes that the gold standard was an interference to unrestricted money creation. In the past, whenever the United Kingdom's government needed more funding, the Bank of England was, "conveniently absolved of any of its contractual agreements to redeem in specie (money in the form of coins rather than notes), and kindly asked to fund the state through the creation of new money." (Schlichter) However, once the gold standard ended, the Bank of England was able to create money with little interference. "From

1965 to 2007, the pound lost more than 90 percent of its purchasing power." (Schlichter) This meant that when the global financial crisis hit in late 2007 early 2008, generations of British investors were trapped in a frantic struggle to recuperate the real value of their savings. Such tenacious financial degradation created an unsustainable economy with few checks and balances in the money creation process. (Schlichter)

Though not used until 30 years after the gold standard had ended, the monetary policy tool known as quantitative easing was made possible only after the end of the gold standard. Quantitative easing can be thought of as an extension of open market operations. Quantitative easing increases the money supply by flooding financial institutions with capital, in an effort to promote increased lending and liquidity. (Avent) Open market operations were restricted by the gold standard. These restrictions would have made it impossible for a country such as the United States or Japan to participate in something such as quantitative easing, as it would have devastated global exchange rates and created rampant inflation. Quantitative easing's effects in the presence of a gold standard would be hindered by the laws of supply and demand. In this hypothetical instance, as new money is created, the participating economy's gold supply would remain constant; making each newly produced dollar worth less and less and causing prices to rise upwards. This effect is known as inflation.

Just like open market operations, quantitative easing occurs when the central bank of a nation purchases securities in order to increase its money supply. The belief is that inflating the central bank's balance sheet will give the economy a boost. For example, the economy of the United States was in a recession after the 2008 financial crisis. To help kick-start a recovery, stimulate economic activity, and boost consumer confidence the Federal Reserve created new money. The Federal Reserve then went and purchased, and continues to purchase, commercial

and private financial assets such as bonds from other banks in the country. The difference between open market operations and quantitative easing is that open market operations are used to control the federal funds rate. But what about when the federal funds rate is at zero and the Federal Reserve wants to pump even more money into the economy? These continued open market operations while this key rate is at or near zero is what is known as quantitative easing.

Another key difference between open market operations and quantitative easing is that when the Federal Reserve purchases these commercial and private financial assets, it is pumping money into the economy in a more direct way than when it purchases treasuries during open market operations. In essence, the Federal Reserve is still printing money but it is buying different assets with this new money. While the Federal Reserve of the United States has diversified its asset purchases into controversial securities like mortgage backed securities, the Bank of Japan has focused on bond purchases such as corporate debt. The main difference between the two central banks' activities was that Ben Bernanke, former Federal Reserve Chairman, wished to ease credit markets and incentivize banks to begin lending again. Bernanke purchased these controversial assets because they are the assets that led to the recent financial meltdown and he wished to restore consumer confidence by showing consumers that these markets are now safe again. (*"Press Release" Federal Reserve Board*, 2008) Japan on the other hand was looking to simply inject money into its money supply in hopes of boosting a stagnant and nearly deflating economy that hinges on exports. (Mishkin)

Chapter V: The Reliability of Economic Principles

As outlined by Adam Smith in his 1776 text *The Wealth of Nations*, the law of supply and demand is a theory explaining the interaction between the supply of a resource and the demand for that resource. The law of supply and demand defines the effect that the availability of a particular product and the desire (or demand) for that product has on price. Generally, if there is a low supply and a high demand, the price will be high. In contrast, the greater the supply and the lower the demand, the lower the price will be. The law of supply and demand is not an actual law but it is a well confirmed and understood recognition that if there is a lot of one item, the price for that item should go down. It is the base to any economic understanding. (Smith)

However, there are instances where the law of supply and demand as defined above does not act accordingly. To help support the notation that economic theories do not always respond as assumed; this paper observes the instances of Veblen goods and a recent unexpected uptick in Britain's economic recovery.

In regards to Veblen goods, Thorstein Veblen, an institutional economist known for his book *The Theory of the Leisure Class*, established that a Veblen good is a good for which a rise in the price of the good results in an increase in the quantity demanded. However, a Veblen good is not an inferior good. The increase in consumption of a good, when the price of the good increases, is due to a perception that a higher price makes consuming the good more desirable, perhaps conveying higher status. (Veblen) Examples of Veblen goods include high-end wines, designer handbags, famous pieces of artwork, and luxury cars. This effect has been known as the "snob effect." (Veblen)

While theory sets the guidelines for what should happen, theory does not always properly predict the future, as was newly the case in Britain's recent unforeseen increase in its economic

recovery. The global financial crisis has challenged some of the economic profession's most cherished assumptions. For five years the British economy had continually failed to act as predicted by theory, and continues to do so with growing evidence. Britain's economy is growing faster than almost any other major Western economy. (Nixon) Many of Britain's efforts were ineffective in jump-starting the country's economic growth post global financial crisis. The following are examples of Britain's monetary policy's ineffectiveness:

- Forecasters expected the Bank of England's money-printing program, in which it bought government bonds equivalent to 20% of gross domestic product, would trigger a recovery; yet output remains 3% below its peak in late 2007.
- Forecasters expected the 20% depreciation in the pound since the start of the crisis to spark a recovery in exports, yet this also did not happen.
- Forecasters expected that the faltering economy would stoke unemployment, which in turn would cause output per worker to rise. Yet unemployment only rose modestly to 8% while productivity is still 4.4% below pre-crisis levels.
- Forecasters also believed that a weak economy would be grounds for lower inflation. Yet since 2007, it has averaged nearly a percentage point above the Bank of England's 2% target and well above rates in other European countries. (Nixon)

With all of this negative data it is extremely surprising that the third quarter of 2013 GDP data showed that Britain's economy grew by .8% compared with the previous quarter. Growth could be heading for 5% year over year, according to Rob Wood, chief United Kingdom economist at Berenberg Bank, a German based multinational financial institution. (Nixon) As of July 2013, the International Monetary Fund (IMF) was so pessimistic about Britain's recovery that it

actually suggested that Britain loosen it deficit strategy. While many economists debated over Keynesian demand-side solutions, it turns out that the real issue was the lack of supply of financial services. According to Kevin Daly, senior economist at Goldman Sachs, healthy companies were deprived of the credit that they needed to expand, and that relief has come in the second half of 2013. (Nixon)

Veblen goods and the unexpected recovery of Britain's economy are just two examples of how economic theories do not always play by the rules. The 2008 financial crisis was an event that global financial markets had never experienced. The effects are lingering and economists are in a gray area in terms of how to respond. The issues are not black and white and the solutions are even more difficult to uncover, even for some of the world's top economists such as those of the International Monetary Fund as displayed in the case of Britain. Quantitative easing is still a relatively new tool and its effectiveness still remains to be seen. Is quantitative easing just an artificial crutch for struggling economies? How does a central bank exit quantitative easing? Will the tapering of capital inflows into the financial system cause a negative economic shock and return consumer confidence to its 2008 levels? These are all important questions that remain to be answered. The effectiveness of quantitative easing is still a topic up for debate. In fact, for nearly 10 years Japan claimed that the tool, which they were the first to use, was useless. (Ho)

Lok Sang Ho, Professor of Economics and Director of the Centre for Public Policy Studies at Lingnan University in Hong Kong, expressed his opinion on the matter in October 2012. Ho noted that some academics believe that quantitative easing will only cause inflation to rise and will not actually help the real economy. He noted that many of these researchers allude to the Bank of Japan's efforts from 2001 to 2010 as evidence for quantitative easing to be unsuccessful. Indeed, Japan tried to implement quantitative easing well before Ben Bernanke of

the Federal Reserve did. And yet, Japan's economy continues on a lost road, while the Nikkei (Japanese stock market) is merely a shell of what it once was. (Ho) Japan's efforts did not pan out favorably because the Bank of Japan failed to subdue the excessive strength of the yen, a key factor for Japan's economy as the country relies on its exports. Cheaper currency means cheaper foreign goods, which in turn causes an increase in exports. Quantitative easing is only effective when it acts upon variables that affect market, business, and consumer behaviors. The liquidity injections must also be in substantial doses so that that they can deter any counterproductive factors that may rear their head. (Ho)

To understand the effectiveness of quantitative easing in Japan, it is necessary to understand the economic structure of the country. The country does not have a typical economy as it is heavily dependent on manufacturing and exporting and lacks organic growth. (Country Watch) Japan's dependence on foreign demand remains a major issue as the country fights deflation and structural employment issues. Quantitative easing was introduced to help increase foreign demand with hopes of inflating the currency's value versus that of the dollar, while creating a desired quantity of reserves (hence, "quantitative easing"). The Bank of Japan hoped that their actions would raise asset prices and end deflation. (The Economist) To examine the effects of Japan's quantitative easing efforts and help determine if the Bank of Japan's initiatives were misguided, a correlation and regression analysis of the Bank of Japan's annual bond purchases (quantitative easing), the Japanese Yen versus the USD exchange rate, and total imports from Japan to the United States in terms of USD may produce some evidence as to the success of Japan's economic policy.

Chapter VI: Overview of Correlation & Regression in Statistical Analysis

To make sense of the following analysis, a general understanding of statistics is essential. With that, please see Appendix 1.A for a brief overview of correlation and regression as outlined by Richard Lowry, PhD, Professor of Psychology Emeritus at Vassar College, if necessary. A few brief notes:

- Correlation and regression refer to the relationship that exists between two variables, X and Y, in the case where each particular value of X_i is paired with one particular value of Y_i. .
- In examining the relationship between two causally related variables, the independent variable is the one that is capable of influencing the other, and the dependent variable is the one that is capable of being influenced by the other.
- The primary measure of linear correlation is the Pearson product-moment correlation coefficient. The measure was developed by Karl Pearson, former English mathematician, biometrician, and colleague of Albert Einstein. It is symbolized by the lower-case Roman letter r, which ranges in value from r=+1.0 for a perfect positive correlation to r=—1.0 for a perfect negative correlation.
- The midpoint of its range, r=0.0, corresponds to a complete absence of correlation.
- Values falling between r=0.0 and r=+1.0 represent varying degrees of positive correlation, while those falling between r=0.0 and r=—1.0 represent varying degrees of negative correlation. (Lowry)

Chapter VII: Correlation & Regression Analysis

The data used for the correlation and regression analysis to evaluate the effects of Japanese quantitative easing from 2001 to 2010 has been converted to reflect its value in USD and is as follows:

Japanese Annual Bond Purchases		
Year	BOJ Bond Purchases in Yen	in USD
2010	27,000,000,000,000	$ 307,587,149,692
2009	26,200,000,000,000	$ 279,974,353,494
2008	18,200,000,000,000	$ 175,981,434,926
2007	16,800,000,000,000	$ 142,650,929,778
2006	16,800,000,000,000	$ 144,466,420,157
2005	18,000,000,000,000	$ 163,502,588,791
2004	19,200,000,000,000	$ 177,564,043,281
2003	19,200,000,000,000	$ 165,631,469,979
2002	16,200,000,000,000	$ 129,413,644,352
2001	7,200,000,000,000	$ 59,269,015,476

Source: Bloomberg

Historical FX Rates		
Year	(USD/JPY)	(JPY/USD)
2010	87.78	0.0114
2009	93.58	0.0107
2008	103.42	0.0097
2007	117.77	0.0085
2006	116.29	0.0086
2005	110.09	0.0091
2004	108.13	0.0093
2003	115.92	0.0086
2002	125.18	0.008
2001	121.48	0.0082

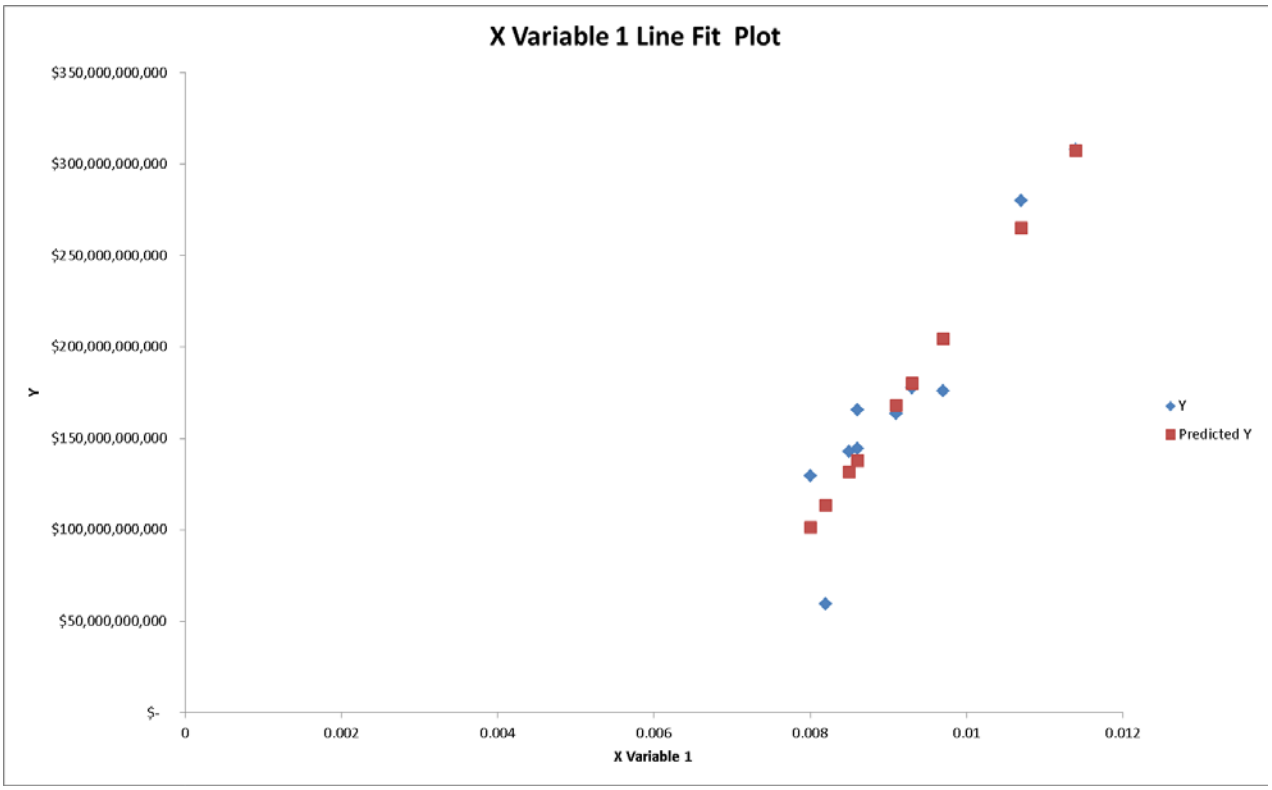
Source: Oanda Currency Converter

Japanese Goods Exported to the United States	
Year	$ of Exports in USD
2010	$ 120,552,145,178
2009	$ 95,803,683,368
2008	$ 139,262,197,032
2007	$ 145,463,342,556
2006	$ 148,180,775,579
2005	$ 138,003,696,155
2004	$ 129,805,198,658
2003	$ 118,036,645,528
2002	$ 121,428,705,198
2001	$ 126,473,307,145

Source: Presented by the Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce

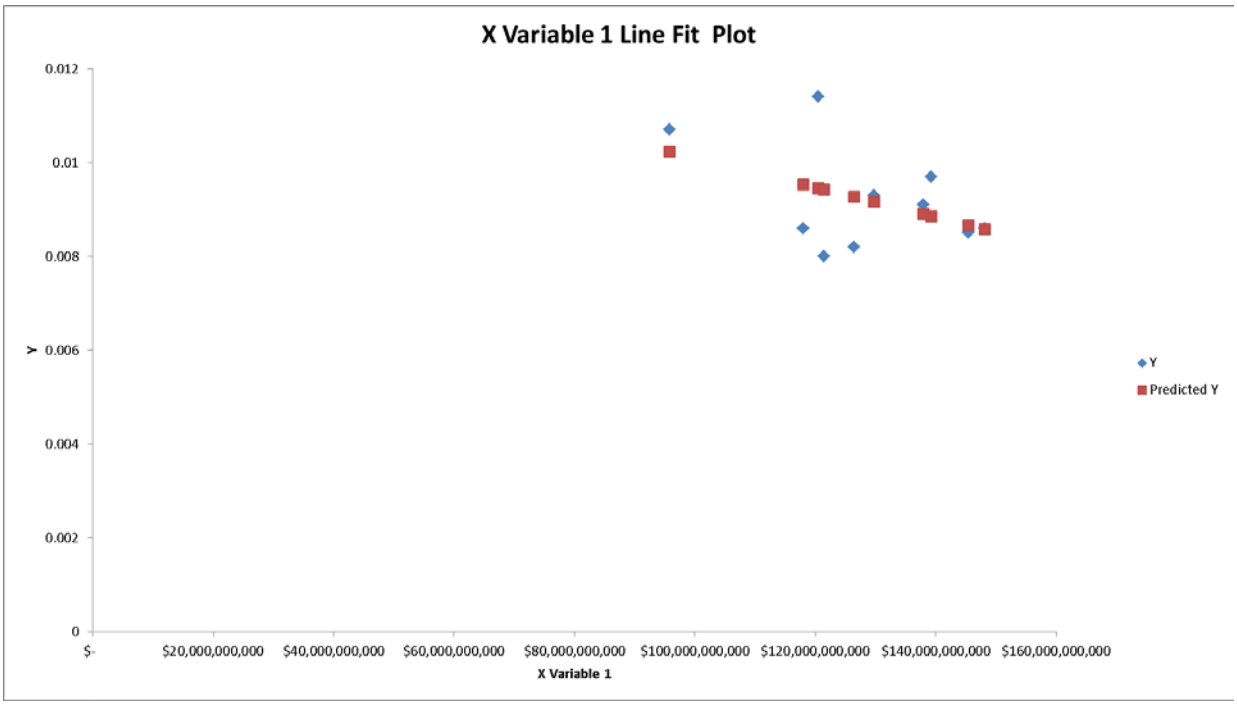
The correlation analysis and regression charts are as follows:

Chart 1: Y Variable= Annual Japanese Bond Purchases; X Variable= Annual JPY/USD FX Rate



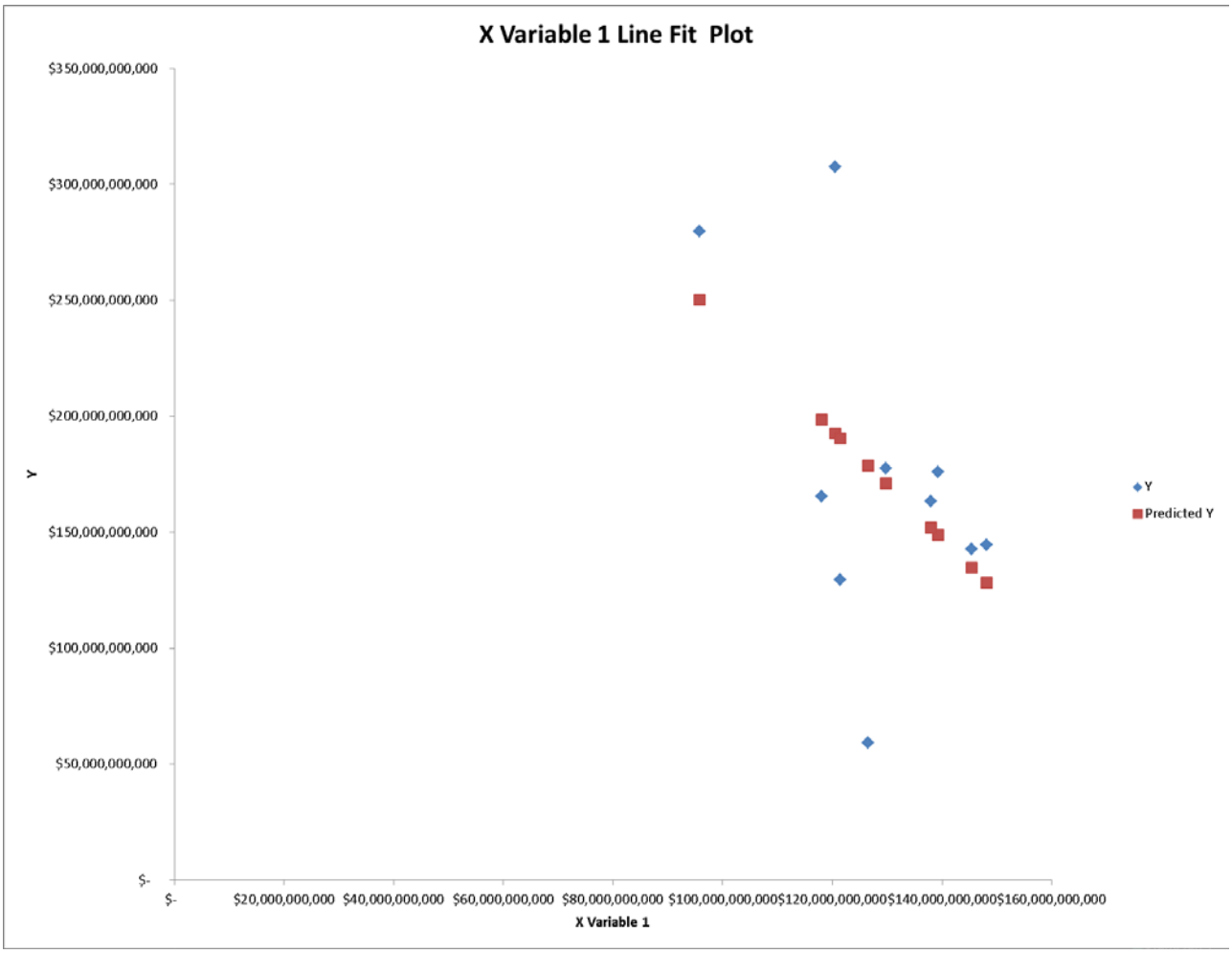
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.936049333							
R Square	0.876188355							
Adjusted R Square	0.860711899							
Standard Error	26761534489							
Observations	10							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	4.0546E+22	4.05E+22	56.61428	6.77071E-05			
Residual	8	5.72944E+21	7.16E+20					
Total	9	4.62754E+22						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-3.84329E+11	74764743298	-5.14051	0.000885	-5.56737E+11	-2.11921E+11	-5.56737E+11	-2.11921E+11
X Variable 1	6.06876E+13	8.06561E+12	7.524246	6.77E-05	4.20883E+13	7.92869E+13	4.20883E+13	7.92869E+13

Chart 2: Y Variable= Annual JPY/USD FX Rate; X Variable= # of Japanese Goods Exported to the United States in USD



SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.444539445							
R Square	0.197615318							
Adjusted R Square	0.097317233							
Standard Error	0.0010508							
Observations	10							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	2.17555E-06	2.18E-06	1.97028	0.19802401			
Residual	8	8.83345E-06	1.1E-06					
Total	9	0.000011009						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.013264621	0.002907643	4.561985	0.001845	0.00655959	0.01996966	0.006559585	0.019969658
X Variable 1	-3.16024E-14	2.25142E-14	-1.40367	0.198024	-8.352E-14	2.0315E-14	-8.352E-14	2.03154E-14

Chart 3: Y Variable= Annual Japanese Bond Purchases; X Variable= # of Japanese Goods Exported to the United States



SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.505665592							
R Square	0.255697691							
Adjusted R Square	0.162659903							
Standard Error	65615274109							
Observations	10							
ANOVA								
	df	*SS*	*MS*	*F*	*ignificance F*			
Regression	1	1.18325E+22	1.18E+22	2.748321	0.1359439			
Residual	8	3.44429E+22	4.31E+21					
Total	9	4.62754E+22						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.73627E+11	1.81562E+11	2.60862	0.031197	5.494E+10	8.923E+11	54943721798	8.92311E+11
X Variable 1	-2.3306378	1.405856755	-1.65781	0.135944	-5.572549	0.9112737	-5.572549291	0.911273691

Chapter VIII: Analysis Findings & Conclusion

Chart 1: Bank of Japan Annual Bond Purchases (converted to USD) Vs. JPY/USD Exchange Rate

This analysis presents the most compelling evidence of the three analyses. With a Pearson product-moment correlation coefficient of .94 one can conclude that there is an extremely strong relationship between these two variables. With a perfect correlation coefficient being 1, it can be concluded that the correlation of .94 is not by chance. It appears that the independent variable, the Bank of Japan's annual bond purchases, has a strong influence over the dependent variable, the JPY/USD Exchange Rate. While it cannot be proven solely by a regression analysis, it appears that Japan may have been trying to mitigate its exposure to exchange rate risk. From this, one can conclude that Japan was not necessarily attempting to devalue its currency over this time period to make its exports more attractive, it may simply have been trying to stabilize its exchange rate versus the USD. This may explain Japan's recent overly aggressive quantitative easing efforts since the appointing of Shinzo Abe as Prime Minister in 2012. The recent increase in asset purchases may be an attempt to actually try and push through this exchange rate barrier and devalue the Japanese yen in the name of increasing foreign demand. As one can tell by the graph in Chart 1, the regression line in red shows a very strong positive correlation, reflecting the tendency for high values of X to be associated with high values of Y, and vice versa; hence, the data points line up along an upward slanting diagonal.

Chart 2: JPY/USD Exchange Vs. $ of Japanese Goods Exported to the United States in USD

This analysis presents a very weak correlation, as displayed by the randomness of the data points in Chart 2. With a Pearson product-moment correlation coefficient of .44 one can conclude that there is little to no statistical significance between these two variables. It appears that the independent variable, the JPY/USD Exchange Rate, has a little to no influence over the dependent variable, the number of goods exported out of Japan to the United States in USD. From this one may be able to conclude that the exchange rate has little significance or impact on demand for Japanese goods in the United States. As one can tell by the graph in Chart 2, the regression line in red shows a very weak negative correlation, reflecting the tendency for high values of X to be associated with slightly lower values of Y, and vice versa; hence, the data points line up along a slightly downward slanting diagonal.

Chart 3: Bank of Japan Annual Bond Purchases (Converted to USD) Vs. $ of Japanese Goods Exported to the United States in USD

This analysis presents a very weak correlation, as displayed by the randomness of the data points in Chart 3. With a Pearson product-moment correlation coefficient of .50 one can conclude that there is little to no statistical significance between these two variables. It appears that the independent variable, the Bank of Japan's Annual Bond Purchases, has little to no influence over the dependent variable, the amount of goods exported out of Japan to the United States in USD. In fact it appears to have a negative effect, with exports increasing as bond purchases decrease. From this one may be able to conclude that Japan's quantitative easing efforts have little to no impact on the demand for Japanese goods in the United States, ultimately refuting my thesis that artificial inflation would cause an increase in demand for Japanese goods in the Unites States. As one can tell by the graph in Chart 3, the regression line in red shows a weak negative correlation, reflecting the tendency for high values of X to be associated with slightly lower values of Y, and vice versa; hence, the data points line up along a slightly downward slanting diagonal.

In conclusion, these analyses show that Japanese quantitative easing measures from 2001-2010 did not have a significant impact on U.S. demand for Japanese goods. Statistically, there was some significance as to what Japan was trying to accomplish. One can only infer though as correlation and regression alone analysis does not give a clear, definitive answer. One may suspect that Japanese leadership may have been attempting to stabilize the yen, mitigate the yen's exchange rate risk exposure, or peg its exchange rate to the dollar. This would mean that the Bank of Japan was trying to choose a target level for the yen's exchange rate with the USD. Although Japan has never stated that this was their desired plan of action, and no economist has determined their exact motive other than attempting to stimulate a stagnant economy, the strong

correlation between Japan's liquidity injections and the exchange rate may suggest that the Bank of Japan was attempting to peg the yen's exchange rate to the USD.

The recent liquidity injected into Japan's economy over the past year by Japanese Prime Minister Shinzo Abe, has created a great debate within the economic community as to whether or not Japan is a currency manipulator. While quantitative easing has been recognized as a useful step in the recovery of a devastated global economy, many feel that intentional currency manipulation for the sake of increasing export demand is unjust, as was recently noted by Ford CEO Alan Mulally, "Japan is absolutely manipulating its currency. With the currency manipulation, we just have to get back to the place where the currencies are set by the markets and the free trade agreements really are free trade agreements." (Engle) Time will only tell if Japan's current monetary policy will prove to be fruitful for the third largest economy in the world. A follow up to this paper may be something of interest in the future as new economic data is made available. With some of the largest economies in the world participating in unprecedented quantitative easing, it is in the best interest of those who take interest in the global economy to pay attention to what unfolds.

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Appendix 1.A

Correlation and regression refer to the relationship that exists between two variables, X and Y, in the case where each particular value of X_i is paired with one particular value of Y_i. For example: the measures of height for individual human subjects, paired with their corresponding measures of weight; the number of hours that individual students in a statistics course spend studying prior to an exam, paired with their corresponding measures of performance on the exam; the amount of class time that individual students in a statistics course spend snoozing and daydreaming prior to an exam, paired with their corresponding measures of performance on the exam; and so on.

Fundamentally, it is a variation on the theme of *quantitative functional relationship.* The *more* you have of this variable, the *more* you have of that one. Or conversely, the *more* you have of this variable, the *less* you have of that one. Thus: the more you have of height, the more you will tend to have of weight; the more that students study prior to a statistics exam, the more they will tend to do well on the exam. Or conversely, the greater the amount of class time prior to the exam that students spend snoozing and daydreaming, the less they will tend to do well on the exam. In the first kind of case (the *more* of this, the *more* of that), you are speaking of a *positive* correlation between the two variables; and in the second kind (the *more* of this, the *less* of that), you are speaking of a *negative* correlation between the two variables.

Correlation and regression are two sides of the same coin. In the underlying logic, you can begin with either one and end up with the other. In examining the relationship between two causally related variables, the independent variable is the one that is capable of influencing the other, and the dependent variable is the one that is capable of being influenced by the other.

The primary measure of linear correlation is the Pearson product-moment correlation coefficient, symbolized by the lower-case Roman letter r, which ranges in value from r=+1.0 for

a perfect positive correlation to r=—1.0 for a perfect negative correlation. The midpoint of its range, r=0.0, corresponds to a complete absence of correlation. Values falling between r=0.0 and r=+1.0 represent varying degrees of positive correlation, while those falling between r=0.0 and r=—1.0 represent varying degrees of negative correlation.

A closely related companion measure of linear correlation is the coefficient of determination, symbolized as r^2, which is simply the square of the correlation coefficient. The coefficient of determination can have only positive values ranging from r^2=+1.0 for a perfect correlation (positive or negative) down to r^2=0.0 for a complete absence of correlation. The advantage of the correlation coefficient, r, is that it can have either a positive or a negative sign and thus provide an indication of the positive or negative *direction* of the correlation. The advantage of the coefficient of determination, r^2, is that it provides an equal interval and ratio scale measure of the *strength* of the correlation. In effect, the correlation coefficient, r, gives you the true direction of the correlation (+ or —) but only the square root of the strength of the correlation; while the coefficient of determination, r^2, gives you the true strength of the correlation but without an indication its direction. Both of them together give you the whole works.

When you perform the computational procedures for linear correlation and regression, what you are essentially doing is defining the straight line that best fits the bivariate distribution of data points. The interpretation of an observed instance of correlation can take place at two quite distinct levels. The first of these involves a fairly conservative approach that emphasizes the observed fact of co-variation and does not go very far beyond this fact. The second level of interpretation builds on the first, but then goes beyond it to consider whether the relationship

between the two correlated variables is one of cause and effect. The latter is a potentially more fruitful approach to interpretation.