

Sanctioning the Iranian regime, perhaps not?

Do international sanctions affect the citizens of Iran, through the Phillips-curve factors Inflation and Unemployment?



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Preface

Without ever thinking about it, this might actually be a subject that influences you. Not everyone is aware of the deep extent to which the sanctions on Iran have their influence. A country far away from the Netherlands, you can't be bothered. But is it possible that we somehow do interact with these problems that arise?

During my thesis I experienced that there are many sides to one story, even more than the 2 that are usually mentioned. It was a really exciting and somewhat difficult job writing this thesis. The difficulty mainly came from staying objective in this story. It was however very interesting examining the path sanctions take. Even though they have a specific target, ending up there is easier said than done.

Everyone has their own opinion and everyone is entitled to one. This thesis has not been written to provide an opinion for the reader; it is merely there to examine the facts and figures. This is an economical thesis; therefore I have tried to refrain from any political statements. It has been written in such a way that it allows the math to do the talking.

Finally, special thanks go out to Dr. Vladimir Karamychev, for being a very helpful and well-organized thesis supervisor. He improved my efficiency and contributed to my positive opinion about the accessibility of professors/teachers.

Abstract

Iran has been targeted by EU and US sanctions for many years now. In this thesis, the effectiveness of these sanctions is assessed. Is it a full package for the government, or can a part of these sanctions be transferred to the working class people?

Sanctions have been imposed on Iran over the years for behaving in a way that is not considered acceptable. The US allows practically no trade with Iran, only in very limited amounts and on an individual basis. I analyze the effect on the people of Iran through inflation and unemployment. This relation is better known as the Phillips curve.

I estimate that there is a significant effect of the sanctions on the two aforementioned variables. The sanctions explain some of the highs and lows in the Iranian inflation. Without taking the sanctions into account, the results are a lot less influential. I find that the R-squared in the end-model has improved from 0.144 to 0.444.

Even though there are possible ways in Iran to evade the sanctions or at least partially, it still is hard to cope with them. Underground banking has always been a popular way of transferring money in the Middle-East and beyond. Now is the time that it can prove itself as an alternative method for individuals and even companies. Even though there are many sanctions in place, there are people who consider it to be a process they have to go through. They believe that they will eventually come out of it stronger. As sanctions have not produced the desired effect yet, they wonder why this should start now.

Keywords: Iran, Sanctions, Targeting, Inflation, Unemployment, Solutions, Adaptability.

Section 1. Introduction

On November 4th 1979, a revolutionary group from Iranian took hostages in the American Embassy in Tehran. This was during the Iranian revolution, where the Shah was taken from power and replaced by Ayatollah Ruhollah Khomeini. Over sixty Americans were taken hostage and this situation lasted for more than a year. With the signing of the Algiers Accords on January 19th, 1981 the release of the hostages was arranged. They were released the following day. After this situation, and the Iranian revolution as a whole, the Americans discontinued their diplomatic ties with Iran. This caused a major shift in the US-Iran relations starting in 1979, when the revolution was completed. A lot of things would never be the same.

During the hostage situation, the first sanctions against Iran were imposed: the freezing of assets worth billions of dollars. These sanctions were put in place to put pressure on Iran. The new regime didn't behave as the US wanted and the sanctions were to get them back on the 'right path.' The more recent sanctions have a somewhat different purpose. They focus mainly on isolating Iran, and preventing them to process uranium of which the US/EU/Israel believe it is used to produce a nuclear weapon, whereas Iran says it is merely to create nuclear energy as a power source.

A lot of sanctions have been imposed on Iran over the years. Of course there is a dispute on whether it is for the right reasons and who is right and who is not. To keep this on an economical level, one could say that there are winners or losers, based on the effectiveness of these sanctions.

The goal of this thesis will be to analyze some effects of the economic sanctions imposed on Iran. Through economic analysis as key indicator, but an interview with one of Tehran's biggest traders (import/export) will also be included. Figures and numbers may give clear indications, yet a story from inside Iran may just shed a different light on the whole situation. With the use of mathematical and economical analysis the goal is to reach an answer which covers to some extent the effect of the sanctions. One way to look at the effects is the relationship between Inflation and Unemployment, also known as the Phillips Curve. This relation states that when one of these is at a high level, the other factor should be significantly lower. If this relation is disturbed, then we can look at the reasons behind it.

The research question that belongs to all this is: ‘Do international sanctions affect the citizens of Iran, through the Phillips-curve factors Inflation and Unemployment?’

To answer this question I sequentially analyze:

- What do the sanctions look like, and how have they developed over time?
- What does the economic analysis tell us? Based on economic factor analysis.
- How does underground banking (hawala) play a role in all this?
- A story from Tehran, an interview with an Iranian trader.

I find that there actually is a significant effect when we look at imposing the sanctions. They contribute to the accuracy of predictions. An indication is that when spikes are recorded in actual data, the dummy of sanctioning causes the prediction power to increase, especially around these years. The normal Phillips curve does not hold with Iranian data, but with the help of a dummy I get close to the actual data, without saying that these are all the factors that contribute to the prediction.

The rest of the paper is structured as follows. At first, Section 2 provides an analysis of the current relevant literature concerning the sanctioning of Iran. This provides a general overview of what already has been said and assumed. Secondly, data sources will be presented as well as the way they are used to research the proposed questions.

Section 3 gives an overview of the data I used for the analysis. This includes sources and possible problems that can arise while using this data. Section 4 then covers the sanctioning of Iran over time. This concerns the history of sanctioning as well as a list of the most important sanctions that I use to conduct the analysis.

This is followed by Section 5, which contains the actual analysis, in which the Phillips curve plays a central role. Through analysis I assess if the sanctions imposed on Iran also affect the people of Iran and through which possible ways that happens. If the unemployment rate is at a high level at the same time as the inflation rate, then there is a reason to be found why.

After the analysis, Section 6 elaborates on the concept of 'Hawala' and how it is used in the Middle East. This is a way of underground banking which is quite commonly used in the region. I believe that this might be a way to evade some of the sanctions for the normal people. The analytical part will be concluded by Section 7 which contains an interview with Mr. Roozdar. He is an Iranian trader who has, according to himself, to deal with the sanctions on a daily basis.

I then provide a conclusion. The conclusions are drawn on the basis of Section 5 (Analysis.) As it is almost impossible to check the interview for possible bias or incorrectness I do not elaborate on it too much. As there is always room for improvement and further research, the thesis ends with a discussion.

Section 2. Literature Review

The first real sanctions in 1979, freezing the assets, had some sort of effect in releasing the hostages. It is disputed what the effect is. In general the effect is hard to measure, Lindsay (1986) argues it can only be done when the definition of a successful sanction is changed to: 'having an effect on the policy' (initiating a change.). He assesses the effectiveness based on four criteria: deterrence, subversion and domestic or international symbolism. Lindsay concludes that the freezing of Iranian assets did not meet any of these criteria, but has contributed in some way to the release of the hostages. The main reason was the funds and support they needed for their war against Iraq.

There seem to be a lot of different views on this specific issue, because Pape (1997) states that Iran successfully blocked the sanctions on asset freezing by using blackmail as a tool. Iran allegedly tried to get the sanctions removed and replace them with sanctions on the assets of the just expelled Shah. Furthermore, the new Iranian leaders also wanted the guarantee that US firms wouldn't separately impose any new sanctions. Only after the US complied with Iranian demands the hostages would be released. Pape does state that there was a drop of 3.8 percent in Iranian GNP after the sanctions were imposed. He mainly analyzes a previous paper by Hufbauer et al. (1990), but adds that the 1979 Iran-US case was a successful act of coercion by Iran.

Maloney (2009) states that it is difficult to assess what the goal of the economic sanctions was in the first place, and secondly, how we should measure the way in which they impacted the situation. It is however stated that the use of this kind of sanctions has prevented the US, or for that matter Iran, to use military force upon the other. A backup of this claim can possibly be derived from the fact that the Bush administration rejected an offer by Iran. A deal was constructed where Iran would give up its nuclear ambitions, but the US had to lift all of its economic sanctions against Iran, added to some other demands specified by Tehran.¹ Maloney also states that the Clinton administration as well as the first few years under Bush Jr. has been of great importance in order to judge the potential of the sanctions. Assessing the cost generates varying results according to her, but there are a few clear statements that can be

¹ Select Committee, 2007, The impact of economic sanctions Volume 1: Report, London, The Stationery Office Ltd. (Authorized by the House of Lords.)

made about the sanctions. This includes the direct effect calculated by Iranian economists on the costs of import. According to their study the costs increased between 10 and 30 percent after sanctions imposed by the Bush administration. The higher costs were not only caused by import tariffs or similar measures. There is also the exchange rate which had a significant impact on the purchasing power of Iranians. Even on the black market, which is likely to prevail or at least have a significant role in everyday trading as Copeland (2008) argues, a huge spike was registered in the nineties.

Furthermore, the current crisis also plays a role in all this. Since the price of oil dropped incredibly in 2008 and 2009, the revenue sources of the Iranian regime deteriorated quickly. This phenomenon was actually quite useful for the US, because it strengthened their sanctions of restricting oil-imports from Iran and other financial measures taken. Since the oil price has recovered a bit, the Iranians are trying to find other markets for their oil. Maloney argues that countries who do not necessarily obey American rules and legislation, such as China and Venezuela, are considered potential new partners for the Iranians.

Chaitkin (2010) states that the sanctions haven't become significantly worse as they have been imposed over the years. From a US point of view, the new Obama administration has also focused on dialogue. This should not be interpreted as a complete shift of approach but merely as an addition to the 'tough' line of threatening Iran with sanctions.

In general it can be said that Iranian countermeasures aren't always taken because of their expected impact. There is a high amount of pride involved. The Regime in Tehran wants to show their superiority to the people and that no sanctions, especially from the US, will get them down. The effects seem to be mixed, judging by these first few results. Especially a study which provides the evidence for certain statements made in the introduction. This study provides the effectiveness of sanctions in numbers but also in responses. One of the results is the drop in Iranian GDP after the first sanctions were imposed during 1979. The decrease is actually almost 4%, which is an indication that the sanctions paid off. On the other hand, as I mentioned earlier and what this study reconfirms, is that Iran also had a lot of (negotiating) power. This resulted in talks with the US, in which the latter agreed to ease the sanctions and freeze the assets of the expelled Shah instead as Pape (1997) states.

Looking at sanctioning in general, Dashti-Gibson et al. (1997) offers a good perspective. They assess the effectiveness of different types of sanctions. They argue that financial sanctions may well be one of the most effective ones. Without specifically referring to the case of Iran, they mention ‘the freezing of assets.’ Gibson argues that this might be an effective measure, because it restricts the accessibility of funds which are highly needed by a regime. They conclude after analysis, that financial sanctions are also the most effective in another case: If one perceives a political change in the country the sanction are imposed on.

When analyzing the unemployment in Iran, Valadkhani (2003) argues that quick reforms have to be taken. Valadkhani does not explicitly link the problems with high unemployment to the sanctioning of Iran. He does however argue that the Iranian economy might have been underperforming since as early as 1979. This means after the revolution, and when the era of sanctioning began. Valadkhani also states that unemployment has not dropped below 10% since 1979. Combined with a high level of inflation, the possibility of a deteriorating economy gets more likely. He adds to this that more than 30% of the population is under the age of 15. If no measures to counteract these problems are taken, it might prove to be a severe and persistent issue. His theoretical model underwrites the effects of 1979. With his model he produces 2 unemployment curves in which the one of before 1979 is significantly better than the one that depicts the situation after 1979.

Section 3. Data / Methodology

Data should always be collected and analyzed carefully. Even in these cases some crooked data may show up, as recently shown with possible tampering of growth-percentages from China. The data I used also has a potential threat in it. It is partially provided by the Statistical Centre of Iran, which has strong ties to the current regime. This might affect the data presented in a way that the real figures are actually worse than the ones provided. It is of great importance for the regime to show the outside world that they are running a stable and well-organized country. High rates of inflation and unemployment do not contribute to this image. Even if it might be easy to prove otherwise, the case of pride yet again plays a big role in all this in my opinion.

The main economic factors I use are Inflation and Unemployment. Whereas the official unemployment rate stands at 12.30% for 2011, the opposition states, backed by several Iranian experts, that it might be as high as 20%.² This is probably done with most of the variables. Despite that, the data is eventually provided by the IMF which convinced me to use it. Inflation numbers will be used first, because it is highly likely that restrictions on trade and/or financial transactions have an impact on the actual inflation rate. For instance 1979, the lack of skilled workers in the oil industry required outsourcing and thus an increase in price in this case.

Inflation figures come from www.tradingeconomics.com which is a well known place that collects economic data from practically every country if available. The data is not expected to cause any problems as they match with data provided by the IMF. Unemployment figures are partially found on www.tradingeconomics.com as well, but also extracted from Valadkhani (2003).

Figure 1 (next page) shows the data of Iranian inflation and unemployment since the Iranian revolution, 1979. By just looking at the data, we see that the inflation fluctuates a lot more than unemployment. Another thing we immediately see, is that both factors are almost always well above 10%. This would not be the case if the Phillips-curve was perfectly accurate in the case of Iran.

² <http://www.radiozamaneh.com/english/content/conflicting-reports-irans-unemployment-rate> (downloaded 25th of June)

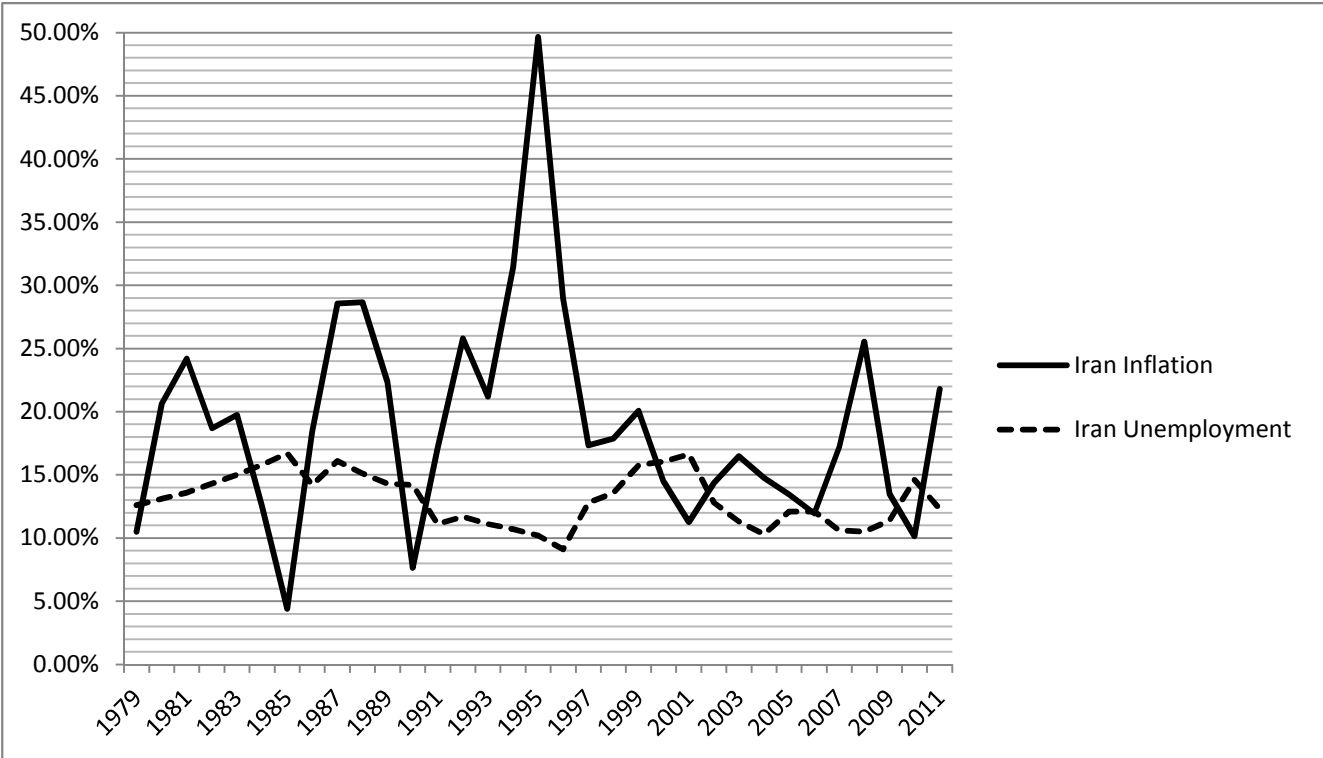


Figure 1. Data on Iranian Inflation and Unemployment

Section 4. History of Sanctioning

What do the sanctions look like, and how have they developed over time?

The inability of Iran coping with the situation after the revolution was mostly because of the fact that the new measures in place weren't well thought out. It is also partly because of the sanctions that were imposed on Iran, during and right after the hostage crisis of 1979. Iranian assets up to 12 billion dollars were frozen. Also a US oil-embargo against Iranian oil was put in place. Some researchers consider this to be a successful move, since the oil production of

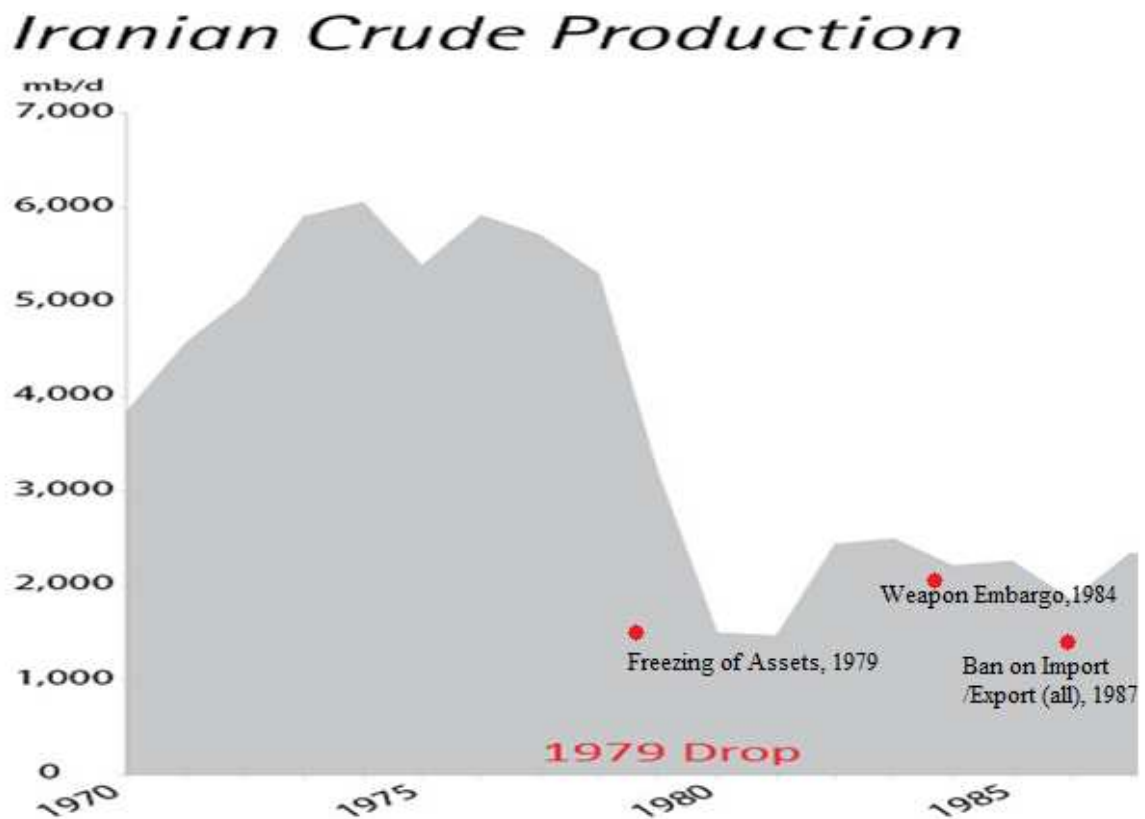


Figure 2, Iranian oil production with sanctions in place (downloaded from iranprimer.usip.org (May 26th))

Iran dropped significantly (as can be seen in figure 2.) Further sanctions also show, minor, drops in the oil production. Later studies showed that the economic impact -through oil- was rather restricted and that the reasons for the oil-crisis in Iran were to be found in the unstable situation right after the Iranian Revolution, Lindsay (1986.) Not only because of the crisis that was already in place, but also because of the fact that Iran actually found ways to keep distributing its oil to the rest of the world. In 1979, after Khomeini was instated as the leader

of Iran, one of his first moves was to nationalize the oil-industry. All the big firms which had contracts with the old government were suddenly replaced. This also meant that their skilled workers were no longer welcome.³ This caused the near-collapse of the Iranian oil-market. And prices sky-rocketed from 15 dollars up to 40 dollars a barrel, which was quite a lot at that time.

There is one example of possible success of the economic sanctions in 1979. The hostage situation is believed to have ended a bit earlier, by some, compared to a situation where no sanctions would have been in place whatsoever. Even though the hostages were probably to be released at some point, it could have been that the 'asset freezing' contributed to the ending of the situation as Lindsay (1986) argues.

The US decided to impose sanctions on Iran to show their discontent with the new situation. Before the aforementioned crisis, the USA and Iran were quite large business partners. As mentioned before, the US started with freezing assets in order to restrict Iranian (funding) possibilities. In 1984, the Iran-Iraq war was partly fought out in the Strait of Hormuz, which is a very important passage between Iran and the UAE to get to open waters (the Indian Ocean.) The US wasn't really fond of the developments, so it decided to impose extra sanctions on Iran. By now, all financial loans were opposed by the US and any financial assistance to Iran should be prohibited according to the new guidelines.⁴

1987 saw a bigger hit for Iran, when all imports from the country to the US were prohibited by President Reagan.⁵ Especially considering the situation before 1979, this crippled Iran. During the Clinton-years the sanctions were tightened even further. In 1995 bills were passed that prohibited all US involvement in the Iranian petrol industry, and later on in '95 virtually all trade with Iran was banned.⁶

Later on, mid-2000, the focus of the sanctions shifted towards more direct financial and banking measures. In 2007, Iranian banks were banned from directly transferring money to

³ <http://www.arabianoilandgas.com/article-5817-10-events-in-oils-history-that-shook-the-world/6/> (downloaded 5th of June)

⁴ <http://www.irvl.net/iran-sanctions/> (downloaded 12th of June)

⁵ <http://www.archives.gov/federal-register/codification/executive-order/12613.html> (downloaded 12th of June)

⁶ US Department of the Treasury, 2012, *What you need to know about US Economic Sanctions, Memo.*

the US. Even though it is allowed indirectly, foreign banks are persuaded by the US not to do so. The effect of these sanctions on individuals is more limited than other sanctions I believe, but more on that later. President Obama has recently renewed the bills issued under the Clinton administration, while the financial sanctions were also tightened. Most important is the rule preventing major banks from handling oil payments with the Iranian Central Bank and declaring that Iran's banking sector is -as a whole- supporting terrorist activities and launders money.

The new millennium was a signal for EU sanctions to gain momentum. A whole list has accumulated over the years. Key feature is the boycott of Iranian oil, signed in January 2012 and placed into effect July 2012. Further financial sanctions include the forced withdrawal of a big part of Iranian banks from the SWIFT system. This system conducts a large share of the international financial transactions. Trading and Banking has become a lot more difficult for Iran as of now.

To summarize, the most important sanctions I use are:

- 1979: Freezing of Iranian foreign assets,
- 1984: Prohibition of weapon sales to Iran as well as all US assistance to the country.
- 1987: Prohibiting the import and export of any goods from the country.
- 1995 saw two rounds of sanctioning, one in March and one in May. The first one prohibited the investment in Iran's oil industry by the US and US companies. In May basically all trade was banned between the US and Iran.
- 2005 saw the Bush administration freezing all assets of individuals who were suspected to have ties to the Iranian nuclear program. With sanctions in place starting 2006.
- In September 2010 and 2011 president Obama signed executive orders which restricted financial trade with Iran as well as financial possibilities from Iran.

The aforementioned sanctions are all US imposed sanctions⁷, as they have been around for quite some time now. Other UN and EU sanctions include:

- UN Resolution 1737 signed in 2006 also freezes assets of people involved in Iranian nuclear activities.
- Resolution 1747 tightened the sanctions even further. The freezing of assets was now a priority as well as prohibiting the sale of any weapons to the regime. This Security Council Resolution was passed in March 2007.⁸
- The EU decided to cut off Iran from the international banking system SWIFT on March 15th 2012. This caused problems for people and companies trying to do business with or from Iran.

⁷ <http://www.archives.gov/federal-register/codification/chapter.html> (downloaded June 26th)

⁸ UN Security Council Resolution 1747, Non-Proliferation, 24 March 2007. (downloaded July 1st)

Section 5. Analysis

Note: numbers in brackets represent significance levels, unless stated otherwise.

Note2: a significance level of 10% will be maintained, unless stated otherwise.

Note3: QQ-plots, Residual analysis and other relevant factors are to be found in the appendix, if used and mentioned.

When analyzing the Phillips curve, the general version looks like this:

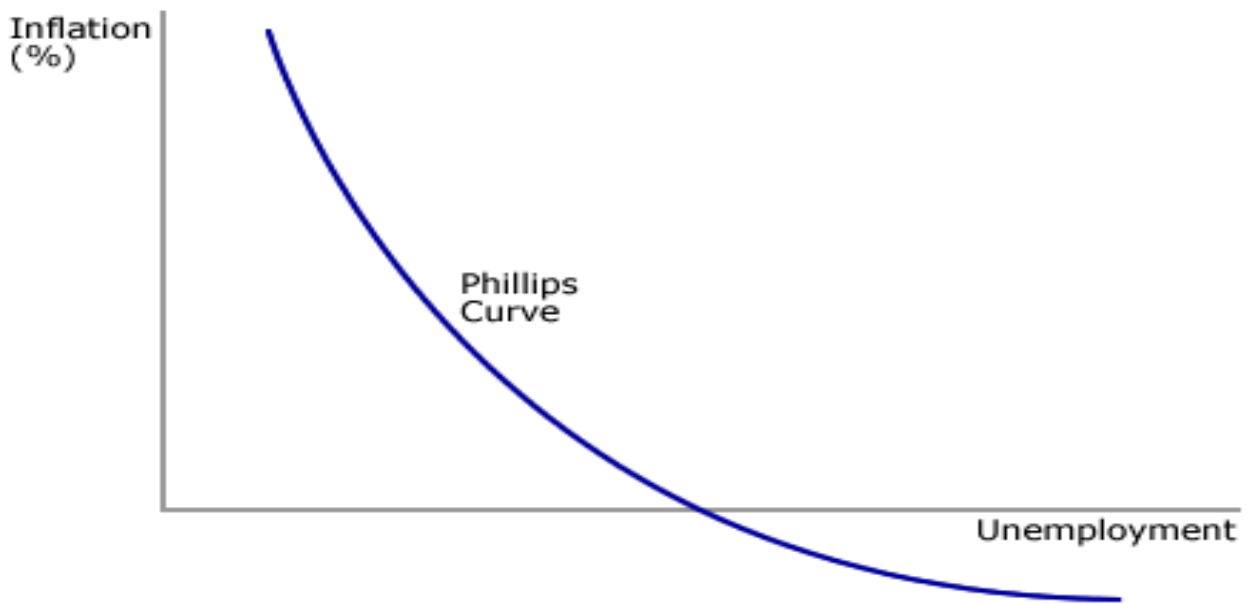


Figure 3. A standard Phillips Curve⁹

There is a (non-linear) inverse relation between the rate of unemployment and the rate of inflation. It is argued that it is only a short-run equilibrium while at the long-run, after inflation occurs, unemployment steadily returns to its old level, only with higher rates of inflation.

A short SPSS regression with and without a dummy for the years sanctions were imposed suggest that. The inflation rate in 1995 is a real peak in the graph, with 49.66%. Correlation analysis suggests a negative relation of -0.379 (0.03) between inflation and unemployment, in line with the Phillips curve. First of all, it is key to establish a basic regression:

$$\pi = \alpha + \beta U_t + \varepsilon_t,$$

⁹ www.bized.co.uk (downloaded 1st of July)

Where π = the inflation rate in Iran and U is the unemployment rate.

Table 1. Basic SPSS regression on inflation.

Output	Coefficient	P-value
α	39.002	0.000
U	-1.520	0.030

The residuals show no real pattern or extreme values and even the QQ-plot of this regression shows a nice path along the desired 45-degree line. However, the R-squared only has a value of 0.144. Figure 4 gives a prediction, where we see that the line is a bit too flat to explain every value in the real data. Taking the log of the y-variable: inflation results in the following equation.

Table 2. Basic SPSS regression of the log.

Output	Coefficient	P-value
α	3.977	0.000
U	-0.081	0.020

This results in an improvement of the R-squared to 0.163, and an even nice distribution of the residuals and the QQ-plot. Unemployment is now significant at (0.02.) Figure 5 shows the prediction of this regression. It shows that there is barely any explanation for several highs and lows in the actual data.

There isn't enough explanation for some of the peaks in the actual inflation figures. Especially after the years: 1979, 1987, 1995 and 2007 there is a big discrepancy. A dummy variable can be introduced now to see if sanctioning is the reason behind these peaks. The dummy is based on the following: after sanctions are imposed, they sort an effect, both immediate and long term. Therefore the dummy is coded take value 1 in years that big (new) sanctions were imposed as well as the two years following the new sanctions.

There have been a lot of, minor, revisions in certain sanctions. These are not taken into account since the original sanction is still in place.

The dummy will be coded as follows:

The whole period from 1979-1984 is coded 1 as it took long to get the sanctions lifted. Soon after that, new sanctions were already imposed again.

To clarify, years with dummy code 1 are:

1979-1984, 1987-1989, 1995-1997, 2006-2008, 2011

To see these what main sanctions consist of I refer to the final part of section 4.

After introducing the aforementioned dummy D we get:

Table 3. A basic SPSS regression including a dummy for sanctions.

Output	Coefficient	P-value
α	35.061	0.000
U	-1.443	0.028
D	6.065	0.027

The R-squared improves to 0.274. As can be seen in figure 4, the highs and lows in the actual data are somewhat better covered than in the previous regressions.

Whereas the log of inflation shows an even better R-squared of 0.301.

Table 4. A basic SPSS regression on the log of π including a dummy for sanctions.

Output	Coefficient	P-value
α	3.775	0.000
U	-0.077	0.018
D	0.311	0.021

Figures 4 and 5 respectively, clearly show that the prediction has improved. The 2 predictions without the dummy are also added to the figures to allow a comparison between the two. It is not perfect, but as I discuss later, sanctions are not the only source of (extra) inflation.

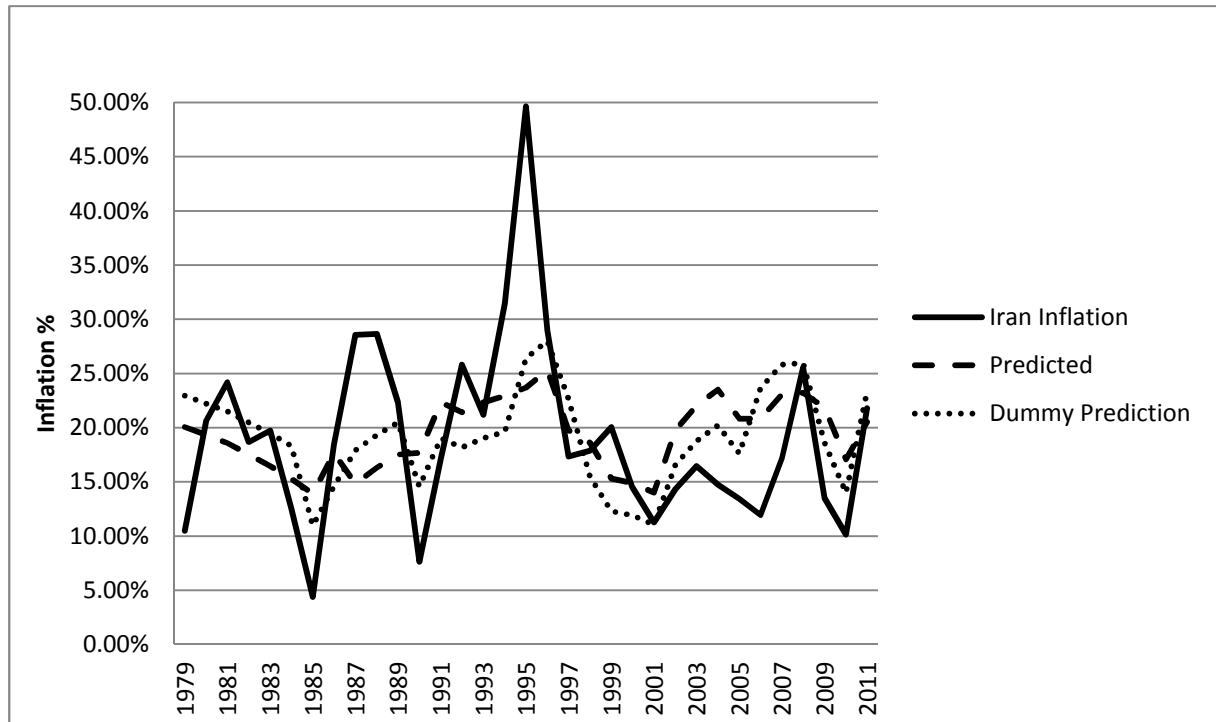


Figure 4. Prediction of Iranian Inflation with Unemployment and a Sanction-Dummy.

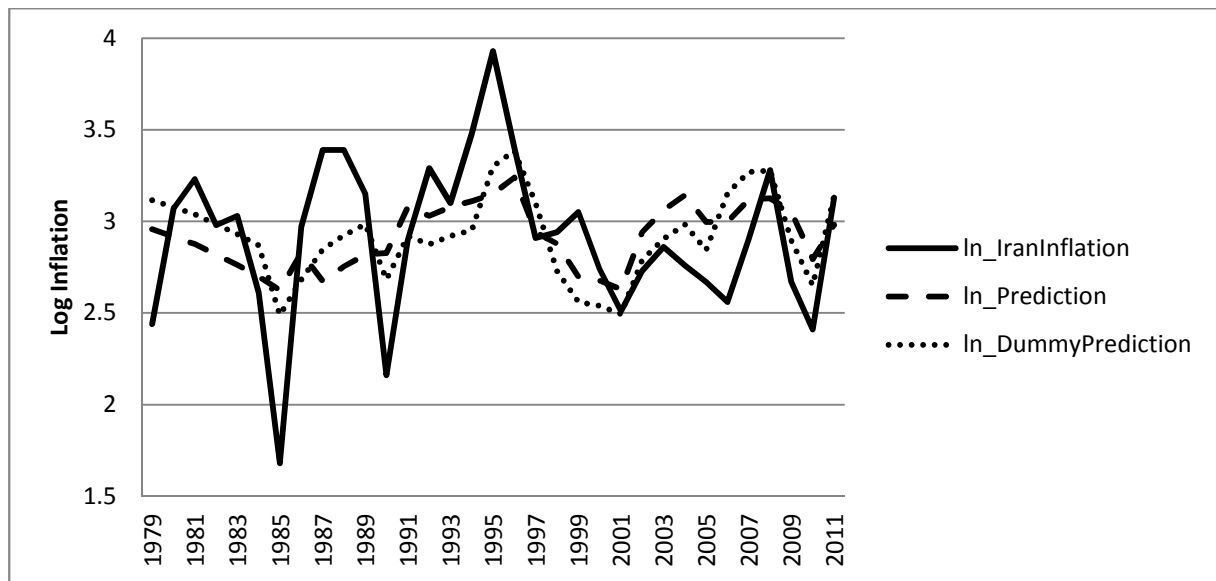


Figure 5. Prediction of the log of Iranian inflation with Unemployment and a Sanction-Dummy.

A more in-depth look at the data follows. First of all, I take the basic regression

$$\pi = \alpha + \beta U_t + \varepsilon_t$$

Where π = the inflation rate in Iran and U is the unemployment rate.

Autocorrelation is found in the inflation rate and to an even further extent in the unemployment rate. Subsequent values may influence each other, in a way that errors could occur in the model. When I take the first lag of inflation almost all autocorrelation is eliminated. Only at position 2, there is some autocorrelation, with a p-value of 0.076. After including a second lag to inflation, all autocorrelation is no longer significant.

A Unit Root is not found in the inflation p-value of 0.0167. Taking the first difference is necessary for unemployment, only then a unit root is not found p-value is 0.0001.

The basics equations yield the same output as in SPSS. Analysis tells us that the equation containing the dummy, has a lot of autocorrelation in it. The R-squared of this regression is 0.274. This is the same regression as can be found in table 4:

Table 5. A basic SPSS regression on the log of π including a dummy for sanctions.

Output	Coefficient	P-value
α	3.775	0.000
U	-0.077	0.018
D	0.311	0.021

$$\pi_t = \alpha + \beta\pi_{t-1} + \beta U_t + \beta D + \varepsilon_t,$$

This model should result in a decrease of autocorrelation and the fit should improve.

Table 6. E-views regression including previous value of π

Output	Coefficient	P-value
α	28.07	0.0044
π_{t-1}	0.269	0.1031
U	-1.245	0.0477
D	5.344	0.0528

This regression shows no autocorrelation at the 95% significance level, and an improved R-squared of 0.386. Figure 6 provides the prediction of this model, which shows a good pattern

along the actual data. The highs and lows are not entirely covered, but the prediction-line nicely follows the actual line.

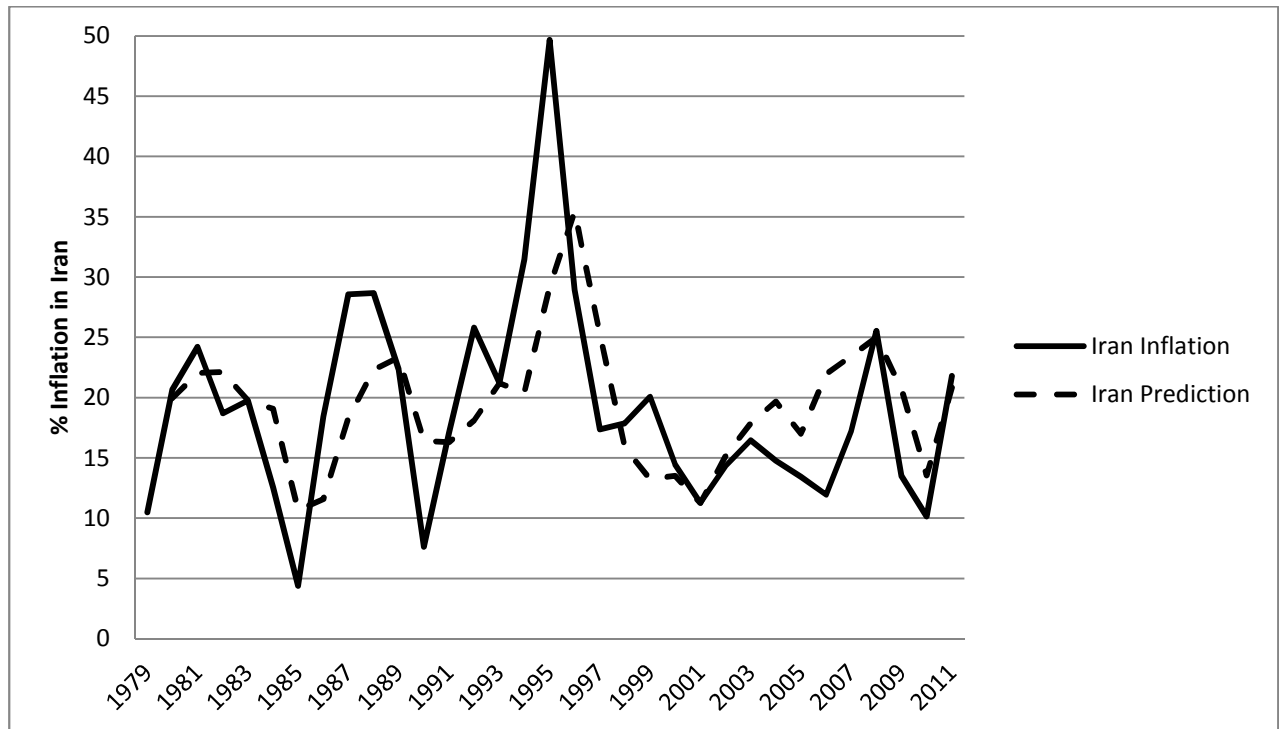


Figure 6. Prediction with model $\pi_t = \alpha + \beta\pi_{t-1} + \beta U_t + \beta D + \varepsilon_t$

Figure 7 allows us to compare the different models that have been used to predict the Iranian inflation. It clearly shows that the last model:

$$\pi_t = \alpha + \beta\pi_{t-1} + \beta U_t + \beta D + \varepsilon_t,$$

provides the best prediction. The figure shows that the introduction of the dummy already causes a big improvement in the prediction power of the model. When introducing the model with π_{t-1} however (dash-dot line) the prediction improves even further. Especially around two important peaks, we see that the last model gives a good explanation. The years 1987 and 1995, the two peaks, are important because these are the years that the heaviest sanctions were imposed. To recall, 1987 saw all import and export to Iran banned by the US. 1995 was the year in which investment in Iranian oil was prohibited as well as the ban on basically all trade with Iran.

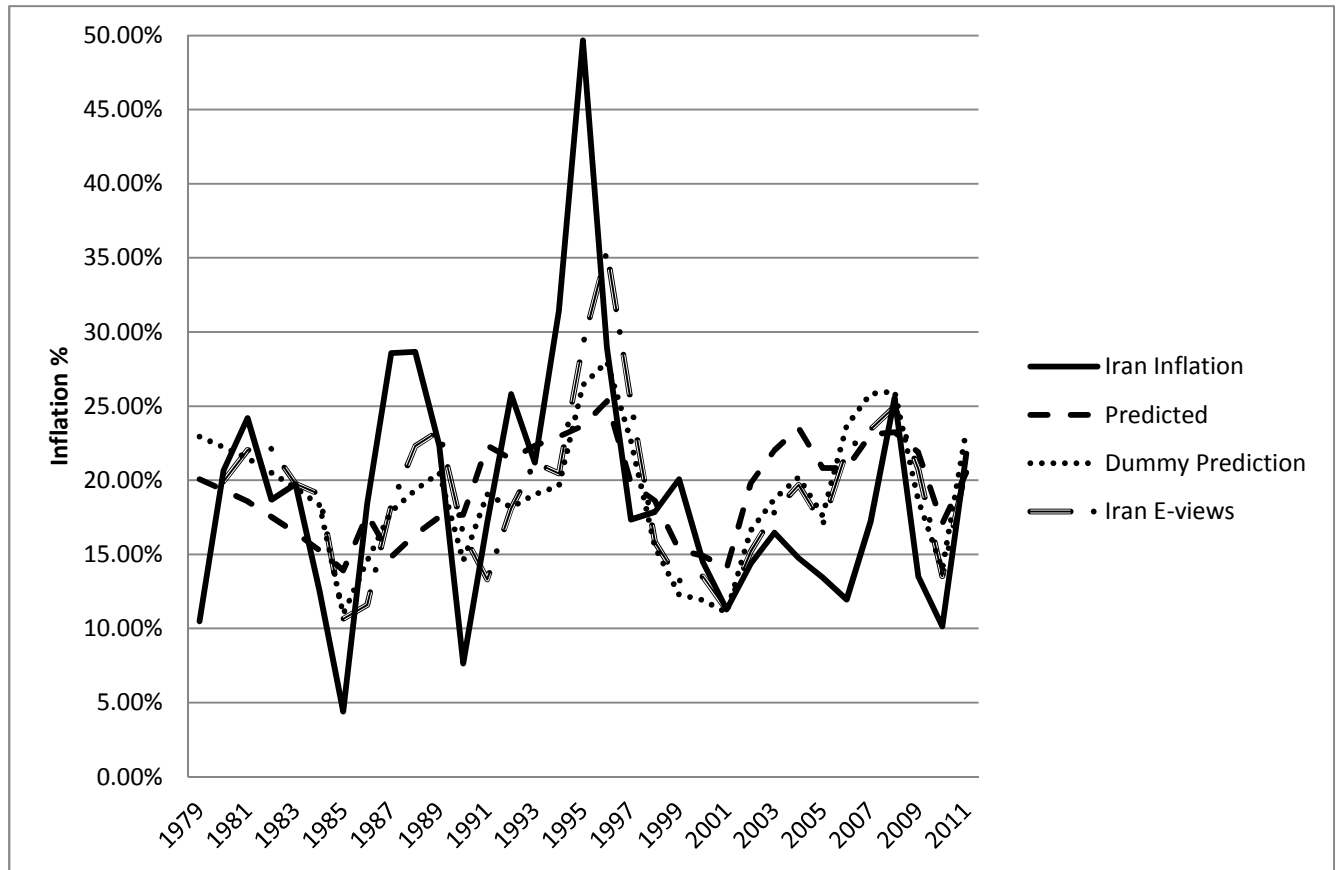


Figure 7. Comparison of models

To make another -better- prediction, we regress on the first difference of inflation. This Partial Adjustment Model (PAM), allows us to increase the significance of π_{t-1} when using $\delta\pi_t$. The significance increases from 0.1031 to 0.0001. All other factors keep the same output and p-values.

Table 7. Regression on $\delta\pi_t$

Output	Coefficient	P-value
α	28.07	0.0044
π_{t-1}	-0.731	0.0001
U	1.245	0.0477
D	5.344	0.0528

$$\delta\pi_t = \alpha - \pi_{t-1} - U_t + D + \varepsilon_t.$$

This model results in an even further improved R-squared of 0.444. Despite the fact that the autocorrelation remains the same compared to the last model, the prediction is quite good. This last model is the closest I get with the used data. Mostly based on the R-squared, but also the prediction over the years is a good indicator. The model is somewhat over-fluctuating at certain points.

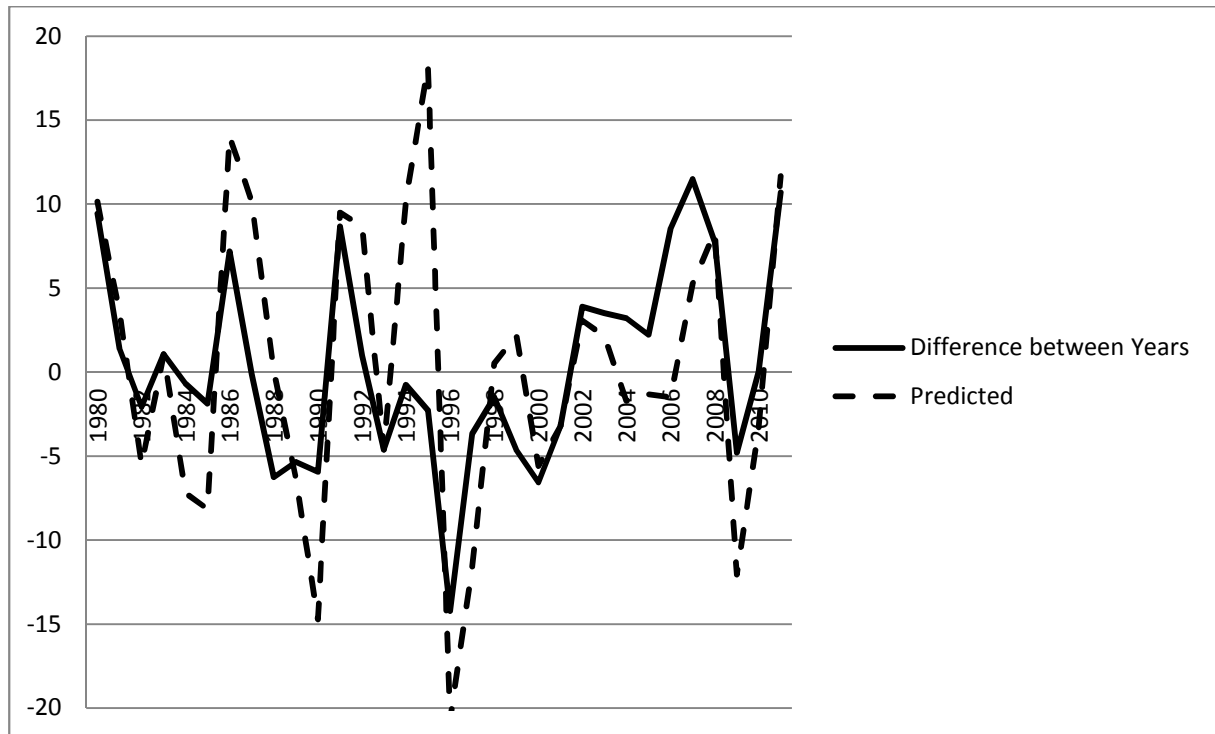


Figure 8. Prediction on difference in inflation: $\delta\pi_t = 28.07 - 0.731\pi_{t-1} - 1.245U_t + 5.344D + \varepsilon_t$.

Section 6. Underground banking

To illustrate section 6, a quick introduction to EU sanctions on SWIFT is needed. The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is an international banking system which is active in over 200 countries. It is some sort of an intermediary, which provides the platform and the services for banks. This helps for transactions costs to be significantly lowered.¹⁰

On March 15th, 2012, the EU approved of a resolution that expelled Iran from the SWIFT system. Subsequently, all 'suspicious' Iranian banks were disconnected from the system a couple of days later. This caused a problem for Iran, since the size of SWIFT and the amount of transactions conducted.

This might be one of the sanctions which will not directly hit the Iranian people. They use banks to conduct transactions, even from foreign countries when receiving/sending money from/to Diaspora. As Khosravani (2008) mentions, Iran has been using a different system for domestic banking transactions since 2006. This system, called MQ, operates in a similar way but is not connected to SWIFT.

For international and long distance transactions however, the Middle East has developed a system over the centuries, which might help to evade a possible new problem. 'Hawala', or underground banking, is a process in which people living abroad send and receive (mostly send) money to people in their home country. This process usually involves family-ties and hawala-dealers/brokers. It is based on trust for the great part. As Jost (2000) explains, this system is preferred because of a few factors. First of all, it does not involve banks and contracts. Sometimes people work or stay illegally in a country so restricting interaction with the government is important. Secondly, the exchange rate for the conversion is often much better. And finally, this process can be done without even moving the money.

For example: an Iranian immigrant in the US calls a hawala-broker in New York to transfer \$1000.-. This broker takes a small commission and calls his friend in Tehran, who is also a broker. He then takes the (1000-C) dollars, converted in Iranian Reals and delivers them to the person in Iran. So the actual money does not have to be transferred from one place to the

¹⁰ www.swift.com (downloaded 27th of July)

other. It is however clear that this process involves a lot of trust. The brokers need to have obtained some respect.

This system does not only work for individuals who cannot or can no longer use the banking system, it also works for companies. It is estimated that Iranian exporting firms use hawala in some cases to settle payments. Since there are many financial restrictions, they consider it to be a proper alternative. Besides hawala, Iranian-Chinese trade has shown signs of the old trading principle. When Iran exports fruit to China, it gets other products such as cans in return.¹¹

To summarize, the key positive sides to hawala are that it is efficient, cost-effective and reliable, according to Jost (2000.) Since Iranian banks can no longer use SWIFT to conduct international transactions it has possibly increased its importance. Its importance is reconfirmed when we see that companies have started to use it as a legitimate pay method as well.

¹¹ Unknown Author. 2012. "Iran firms beat sanctions by barter and new steps", Tehran Times, March 03, <http://tehrantimes.com/economy-and-business/95981-iran-firms-beat-sanctions-by-barter-and-new-steps-> (downloaded 30th July 2012)

Chapter 4. A story from Tehran

Through this interview, I try to assess the effects of the sanctions on the trader and his business, as well as how the regime transfers the effects onwards onto the working class.

Q: Could you please state your full name and profession?

A: My name is M. Roozdar, importer and entrepreneur in Tehran. I am one of the few that has import rights for Italian cosmetics. I used to import Italian textile until Chinese textile became more popular. I have a turnover of roughly 3 million Euros a year.

Q: Based on your job, do you come into contact with the sanctions or effects of it a lot?

A: Firstly, I notice it through monetary changes. The Iranian Real has lost a lot of its value over the years. This leads to higher prices for me when I buy goods abroad. I am obliged to directly recharge these costs to my customers, which leads to inflation. A bottle of deodorant may now cost as much as 40000 Real which is roughly 2% of what a normal month's rent is in Tehran. Besides that, the government has imposed a 100% import tariff a long time ago. We have managed to live with it though.

Q: Do you get in touch with the sanctions on a personal level?

A: To compensate, the government does try to offer primary goods as cheap as possible. There are many subsidies on basic products such as bread. Moreover, the healthcare system has seen great improvements over the last few years as well. On the other hand, I do have to pay more for petrol nowadays. I think this is only partly because of the sanctions, since the government also thinks it is used too much and spilt a lot in our country.

Q: Do you think (know) that the Iranian government tries to redirect the sanctions onto the population?

A: I believe that some sanctions have an effect on us as Iranian population, but I do not instantly blame the government. They now trade with countries such as Russia and China so they try their hardest. I think that the sanctions that are imposed are not meant for the regime but directly target us, the working class and the entrepreneurs.

Even when I look at the refusal to refuel Iranian planes in Europe. I don't see this as a 'sanction' to the regime. I consider it to be a direct threat to the safety of Iranian people, and something which might even be illegal under aviation (ICAO) rules.

Q: Do you believe Iran can cope with this for a longer period of time?

A: Iran has a lot of natural resources and I believe we can function as a sole nation, without the help of others. Banking transactions can sometimes be done via other countries in the Middle East and otherwise we still have our underground banking system.

During and after the first Persian Gulf War with Iraq we have shown that we are a strong nation and that sanctions can't hurt us in the way that they want to hurt us. So why would the sanctions get us down now?

Conclusion

Looking at the results from the analysis there are things that instantly become clear. From the start it is obvious that the normal Phillips curve is not applicable on Iran in its standard form.

My analysis did generate a good predictor model, although some spikes still are not accounted for. I discuss the possible reasons for this in the discussion. The data did show autocorrelation, but through model building this was slowly eliminated. A normal analysis of the Phillips curve results in a prediction which is far off the normal data. In order to explore this situation, I added a dummy which accounts for the 'sanctioning years.' Immediately the results improved.

In the period up to 2000, the model fails to account for some serious highs and lows in the inflation, especially the peaks in 1987/88 and 1995. When adding the dummy, the predictions do come closer to reality. This indicates that the sanctions do have a significant impact on Iranian inflation, but other factors are present as well.

Since 2000, the government of Iran has been trying to bring down inflation. This did result in a smoothed inflation, but not so much for the lowering of it. In the graphs, the predictions improve around the same period, so I conclude that the government is succeeding in its approach. It might not have lowered the inflation, but apart from 2008 and 2011 there are no real jumps in inflation when sanctions were imposed. It is of great importance that they continue with this and not fall back into old habits. This is however indicated a bit by the new spikes.

Furthermore, the models run smoothly towards a high or a low point in the inflation index. The actual data shows that it happens more drastically. This might indicate that sudden events, such as sanctions, play a big role in the development of the inflation.

In general, I believe that a significant effect of the sanctions is shown. The R-squared gets up to 0.444 which is pretty good considering I only took the Phillips curve variables and added a sanction dummy. This is proved by the high (close to 6) and significant value the dummy takes when a sanctioning year is in place. Together they do come to a good prediction, even though the Phillips relation does not hold when looking at Iranian data.

Discussion

The models used for predictions all have the flaw that they do not register the highs and lows good enough. In order to further improve the prediction power of the regressions that I made, I created another dummy. This dummy counted for the years that the Iran-Iraq war lasted. A war sometimes has the effect of severely limiting the inflow of certain products. This causes serious inflation if it concerns primary goods. During analysis I found that the autocorrelation improved somewhat when adding this dummy, as well as the R-squared. Both the dummy for sanctioning as the aforementioned one became insignificant. The increase in prediction power was very small (0.444 to 0.454) so I decided not to elaborate any further on it. It might however be an interesting thing to see how these dummies relate to each other. Furthermore, the years in which they coincide could be given extra attention in further research. This might help to explain the sudden increase in inflation during the final years of the war (1987-1988.) The regression of this PAM-model can be found in the appendix as table 9.

1995 showed a huge spike in inflation and in that year the US imposed the heaviest sanctions on Iran, almost banning all trade. Especially the important oil-sector was hit, so this could possibly be solved by adding an 'oil-dummy' or 'heaviest-sanction-dummy.' In order to get the result that is needed.

Another interesting option which I have not examined is the actual influence of hawala. I personally believe it might not have just a positive influence on business. When hawala is conducted too often, it could occur that a lot of Iranian families have big funds to their disposal all of a sudden. In case they are all interested in the same basket of goods, some sort of bidding war might start. Based on this idea, it could be that hawala has a negative effect on inflation figures.

And finally, the quick drop after 2008 is possibly not just because of Iranian adaptation to the sanctions. We must bear in mind that the crisis severely hit the Western world at that time. This could mean that they had to adjust their focus to coping with their own problems first, so that Iran had a bit more time to sort their problems out.

References

- Blenkinsop Philip, 2012. "Payments system SWIFT to expel Iranian banks Saturday," *Reuters*, March 15th <http://www.reuters.com/article/2012/03/15/us-nuclear-iran-idUSBRE82E15M20120315> (downloaded June 12th.)
- Chaitkin, Michael. 2010. *Negotiation and Strategy: Understanding Sanction Effectiveness*. Working Paper, New York University Center of International Cooperation.
- Copeland, Laurence. 2008, *Exchange Rates and International Finance 5th Edition*, Essex: Pearson Education
- Dashti-Gibson, Jaleh. Patricia Davis and Benjamin Radcliff. 1997. On the Determinants of the Success of Economic Sanctions: An Empirical Analysis, *American Journal of Political Science* 41 (2): 608-618.
- Johnson, Toni. Greg Bruno. 2012, *The Lengthening List of Iran Sanctions*, Working Paper, Council on Foreign Relations.
- Jost, Patrick M. 2000. The hawala alternative remittance system and its role in money laundering. Working Paper, Interpol General Secretariat.
- Khosravani, Amir. 2008. The modern integrated payment system: The Iran experience to date, *Journal of internet banking and commerce* 13 (1).
- Lindsay, J. 1986. Trade Sanctions as policy instruments: a re-examination, *International studies quarterly* 30 (2): 153-173.
- Maloney, Susan. 2009. Sanctioning Iran: If only it were so simple. *The Washington Quarterly* 33 (1): 131-147.
- Pape, Robert. 1997. Why Economic Sanctions Do Not Work, *International Security* 22 (2): 90-136.
- Valadkhani, A. 2003. The Causes of Unemployment in Iran, *International Journal of Applied Business and Economic Research* 1 (1): 21-33.

Appendix

Table 8. Data used in tabular form

Year	Iran Inflation	Iran Unemployment
1979	10,49%	12,60%
1980	20,64%	13,10%
1981	24,20%	13,60%
1982	18,69%	14,30%
1983	19,74%	15,00%
1984	12,54%	15,80%
1985	4,39%	16,70%
1986	18,43%	14,20%
1987	28,57%	16,10%
1988	28,67%	15,10%
1989	22,35%	14,30%
1990	7,63%	14,20%
1991	17,13%	11,10%
1992	25,81%	11,70%
1993	21,20%	11,10%
1994	31,45%	10,70%
1995	49,66%	10,20%
1996	28,94%	9,10%
1997	17,35%	12,80%
1998	17,87%	13,57%
1999	20,07%	15,78%
2000	14,48%	16,04%
2001	11,27%	16,63%
2002	14,34%	12,80%
2003	16,47%	11,30%
2004	14,76%	10,30%
2005	13,43%	12,10%
2006	11,94%	12,10%
2007	17,21%	10,60%
2008	25,55%	10,50%
2009	13,50%	11,40%
2010	10,14%	14,60%
2011	21,80%	12,30%

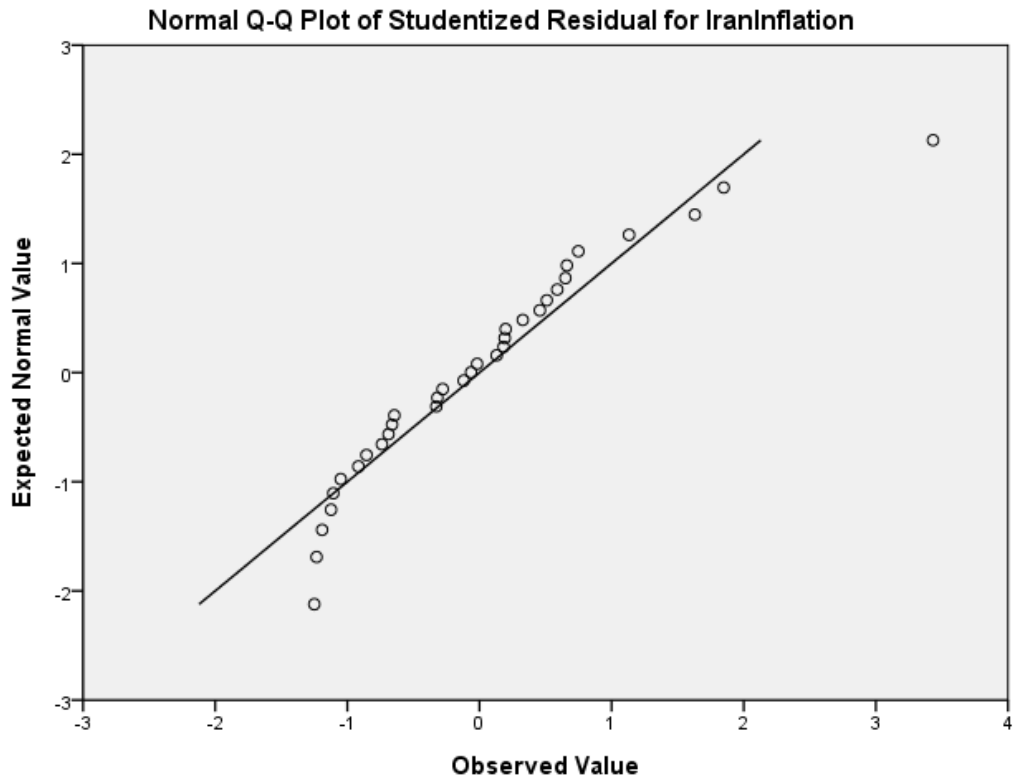


Figure 9. QQ-plot of basic SPSS regression (page 17)

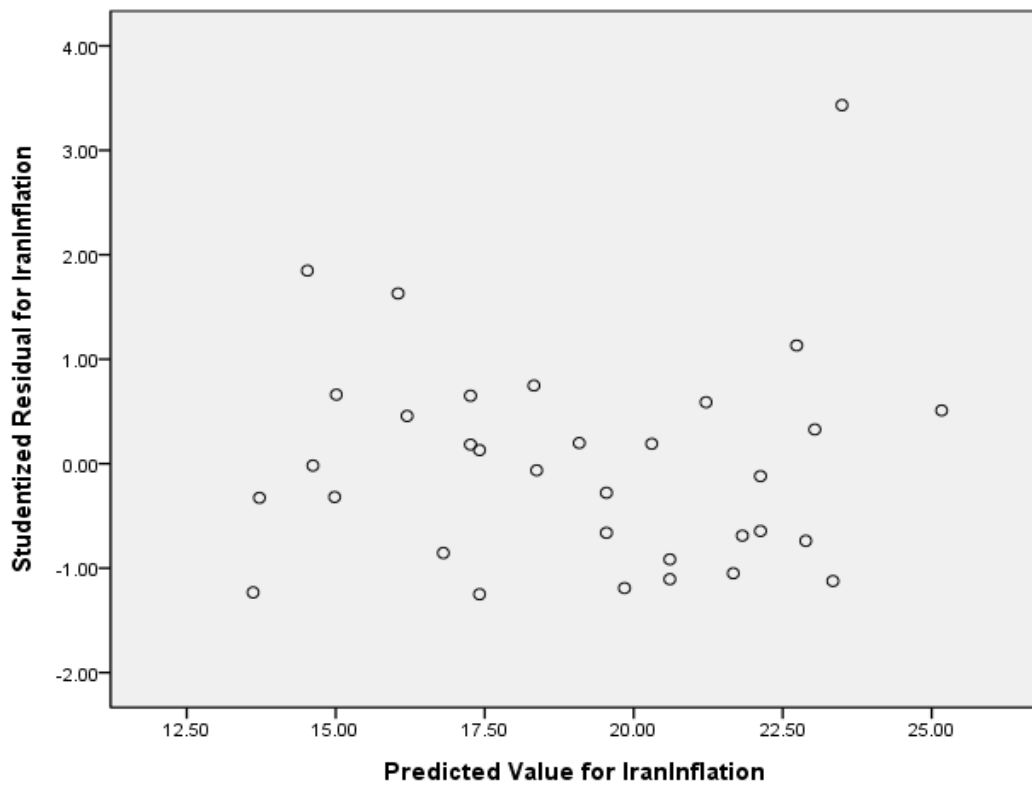


Figure 10. Residual plot of basic SPSS regression (page 17)

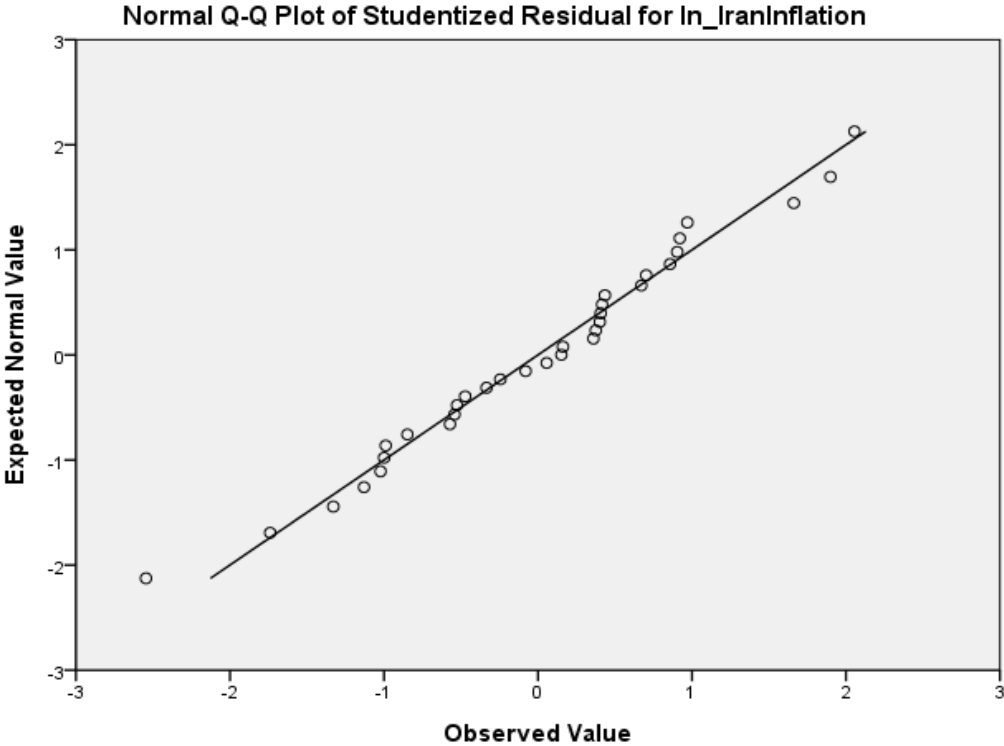


Figure 11. QQ-plot of basic SPSS regression on the log of inflation. (page 17)

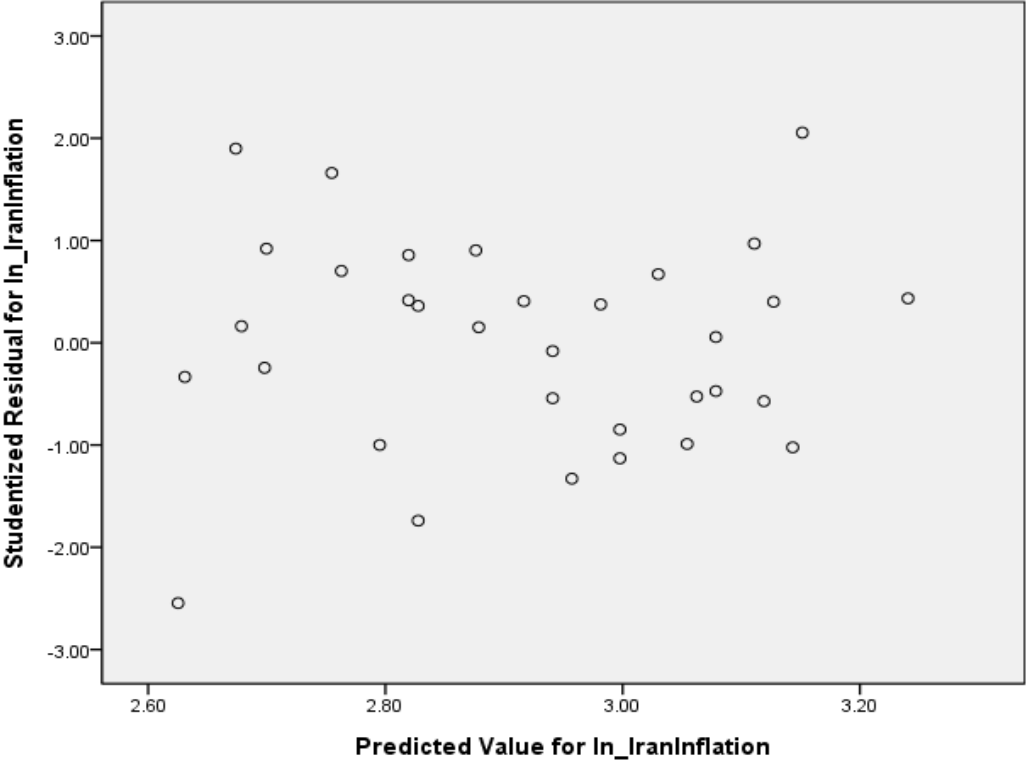


Figure 12. Residual plot of basic regression on the log of inflation. (page 17)

Table 9. Regression on $\delta\pi_t$ with Iran/Iraq-war dummy.

Output	Coefficient	P-value
α	31.74546	0.0053
π_{t-1}	-0.725155	0.0001
U	-1.555717	0.0460
D1 (Sanctions)	4.478018	0.1373
D2 (Iran/Iraq-war)	2.733972	0.4774