Prospects for Inflation Targeting and the Taylor Rule in Jordan

By

Raed Alkhasawneh

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Date	Chair of Examining Committee
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Date	Executive Officer

Professor Thom Thurston

Professor Michael Grossman

Professor John Devereux
Supervision Committee

The City University of New York

Abstract:

Prospects for Inflation Targeting and the Taylor Rule in Jordan

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Raed Alkhasawneh

Advisor: Professor Thom Thurston

This paper estimates the Taylor rule as one specification of monetary policy reaction function for Jordan. It uses the estimated parameters to establish an implicit form of inflation targeting. It measures how much interest rates react to deviations of inflation and real activity from their target levels, however the data indicates that these estimated movements in interest rate are statistically insignificant to the deviation of inflation and output gap. The paper uses expanded forms of the reaction function by the means of adding different variables to the function to test if the interest rate policy is affected by those variables. The source of the data is the Central Bank of Jordan (CBJ), the International Monetary Fund Data base and New York Federal Reserve Bank.

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Introduction:

Inflation targeting is the announcement by the government, the central bank, or some combination of the two that in the future the central bank will strive to hold inflation at or near some numerically specified level. More often inflation targets are more often than not specified as ranges i.e. 1-3 percent rather than single numbers. Bernanke B. and Mishkin F. (1997). Over the last ten years, inflation targeting became an exciting in the approach of central banks to conduct monetary policy. Since 1990 inflation targeting has been the choice of a growing number of central banks in industrial and emerging economies and many more considering future adoption of this new monetary framework. After more than a hundred years and with public announcements of inflation targets in New Zealand and Chile, 19 inflation targeting country cases have been recorded as of November 2000. (Mishkin F. and Schmidt-Hebbel K.(2001). Inflation targeting offers a number of the basic elements of a successful monetary policy framework, including a clearly-defined nominal anchor, or coherent approach to decision-making, the flexibility to respond to unanticipated shocks, and a strategy for communicating with the public and financial markets. Making good policy requires sensitivity to the specific economic and institutional environment in which the policy maker finds him/her self, as well as the technical capability to modify and adapt the framework as needed. Inflation targeting considered as one of the strategies that was developed to conduct monetary policy that will keep the gains of recent years and contribute to continued stability and growth in the future.

Many economists looked at inflation target as a framework for the monetary policy rather than as a rule for monetary policy. Bernanke B., Mishkin F. (1997). Another approach used in monetary policy is based on discretion that is a central bank follows a purely discretionary approach to policy makers. Following this approach gives the policy makers more flexibility and enables the central bank to respond to new information or unexpected developments. "There is no such thing in practice as an absolute rule for monetary policy". Bernanke B, Mishkin F. (1997*).*

Considering that inflation targeting may be an effective mean of providing a nominal anchor for monetary policy is sufficient reason in itself to consider this approach seriously. Inflation targeting would remain a useful framework for policy even if the inflation targets were set to moderate inflation rate rather than low level; perhaps because it may be determined that very low inflation is not beneficial to the economy.

One of the most issues that are related to inflation targeting is transparency and flexibility, they are considered as the two major advantages of inflation targeting.

Transparency means, clear and timely communication of policy objectives, plans and tactics to the public. Flexibility means, the ability of central banks to react effectively to short run macroeconomic development within the board constraints imposed by the inflation targeting frame work. In the design of an inflation targeting strategy, a key issue is the proper balancing of transparency and flexibility. Bernanke B, Mishkin F. (1997). Different studies would suggest inflation target should be set above zero, around 1% to 3% per annum. There is an argument and a debate over whether targeting should be of the inflation rate percentage or of the price level. Of course, a targeted price level need not imply a constant price level; the target level could be

allowed to drift upward over time. The disadvantage of targeting the inflation rate is that unanticipated shocks to the price level may be treated as bygones and never offset. As a result, long –term forecasts of the price level might show a large variance that could delay private sector planning. In practice, central banks set inflation rather than price level targets but tend to compensate partially for target misses, particularly at shorter horizons. Inflation targeting can be set for one or more horizons. In practice, targets of less that one year or more than four years are unlikely to be meaningful, in one year horizon; inflation is not controllable by monetary policy at such a short horizon. In the four years horizon, such distant targets would have little credibility. Within the 1-4 years range, the central banks choice of target influences the trade off between transparency and flexibility; the more tightly the target is specified over the shorter time, the less ambiguity there is in the central bank's communication with public, but the greater the constraints on the central bank's freedom of action in the short run. In the case of the central bank chooses to announce a range for its target, a narrower range communicates greater commitments by the central bank to nearing its inflation goal than does a broader range, but at the same time it reduces the bank's ability to respond to unforeseen events. Unavoidable errors in controlling inflation may drive inflation outside of its range, despite the best efforts made by the central bank.(Haldane and Salamon (1995), Steven and Debelle (1995).

Section 1: Literature review:

In their paper Svensson and Woodford (2003) present a theoretical case for the view that inflation forecast targeting is an optimal monetary policy. In their paper they concerned more about the implementation of optimal policy that can be expected to bring about the desired equilibrium. They argue that an inflation-forecast targeting procedure can be designed that is not only consistent with an optimal equilibrium but also represents the desirable approach to implementation. Under such a procedure the central bank consider in each design cycle how its instrument must be set in order for the central bank's current projections regarding the future evolution of inflation and other variables.

They judge alternative approaches to implementation according to several criteria including the transparency of the connection between the public description of the policy rule and ultimate policy goals, the robustness of the policy rule model perturbation, and the degree to which a given policy rule excludes the possibilities of alternative, much less desirable equilibrium that arise as a result of self fulfilling expectations. They argue that forecast targeting procedure is especially desirable approaches to implementation of optimal policy on the first two grounds. They also argue that it is possible to design a "hybrid procedure" that retains the transparency and robustness of targeting procedure, while ensuring determinacy of equilibrium as well. Giannoni and Woodford (2003) discussed the optimal target criterion in a range of more complicated models that introduce features found in many estimated models of monetary transmission mechanism with optimizing foundations. They show what determines the appropriate relative weights that should be placed on various variables. The main point of

their paper is to show how the nature of the optimal target criterion varies depending on one's beliefs about correct structural model of monetary transmission mechanism, and on the numerical values assigned to the parameters of one's model. They illustrate their model by estimating a small quantitative model of the U.S. monetary transmission mechanism and computing an optimal targeting procedure for the estimated model. The optimal policy rule is found to correspond to a multi-stage inflation-forecast targeting procedure. The degree to which actual U.S. policy over the past two decades would have conformed to the optimal target criteria is considered on the assumption that projections at each point in time would have corresponded to the forecasts implied by a small unrestricted VAR model.

Cecchetti and Kim (2003) considered the degree to overshoots of the long run target inflation rate in the design of an optimal targeting regime. They argue that the degree to overshoots of the long run inflation target inflation rate should be followed by intentional undershoots, in order to undo part or all of the undesired increase in prices. They argue that under a purely forward-looking inflation target, the central bank sets an inflation target that is independent of past success or failures in hitting the target. Under a price path target, the central bank would seek to keep the price level near some preannounce target path that rises deterministically at the long run target inflation rate, which require that the success inflation eventually be completely reversed, in order for the price level not to remain permanently away from the target path. In the same paper they assume that the central bank is assigned a quadratic loss function which is expected to seek to minimize in a discretionary fashion. They consider which objective would be the best to assign to a central bank from the point of view of minimizing a true social

welfare function which panelizes both inflation and output gap variability but assigns no intrinsic significance to the stationary of the absolute price level. They use 23 countries to estimate the optimal hybrid central bank objective and they conclude that a hybrid rule that is fairly close to price path targeting would be optimal for most of the countries in their sample. The numerical analysis indicates that price path targeting is a more robust choice against variation in the values of the estimated parameters.

Orphanides and Williams (2003) consider the extent to which performance under given policy rule may deteriorate if people don't have rational expectations, but must base their forecasts on extrapolation from statistical patterns that they have already observed. They argue how a concern for robustness against this kind of imperfect knowledge should modify the recommendations that are made for the conduct of monetary policy. They found that the degree to which it is possible for central bank to stabilize inflation and the output gap is reduced in the case of imperfect knowledge on the part of the private sector. Also they found that these policies are no longer optimal. They find that the optimal policy allows less response of inflation to cost- push shocks that would be optimal in the case of rational expectations. When private sector form its inflation expectations, allowing inflation to rise temporarily in response to cost-push shock runs the risk of being interpreted by private agent as an indication of a higher long run average rate of inflation. It is therefore necessary for the central bank to target inflation more tightly than would be optimal under rational expectations, in order to prevent the losses that would result from allowing inflation expectations to drift. They also conclude that stricter inflation targeting is more appropriate in the case of economies where central bank credibility has not yet been established. They show that when private

agents are assumed to know the long run average inflation rate associated with central bank policy rather than estimate it, a more favorable tradeoff between inflation and output gap variability becomes attainable. Ball and Sheridan (2003) compare the macroeconomic performance of inflation targeting and non-inflation targeting countries. They compare seven OECD countries that adopted inflation targeting in the early 1990s with thirteen that did not, with respect to the behavior of inflation, output and interest rates. They find that macroeconomics performance improved along similar dimensions for both targets and non targets over this period of time. They conclude that once the control for initial macroeconomics conditions, they find little evidence of greater improvement due to the adoption of inflation targeting. They find greater absolute improvements in performance in inflation targeting countries which typically had worse initial conditions, and thus were likely to improve more than countries that were in better shape at the beginning of the sample, independent of choice of policy regime.

Goodfriend (2003) considers the case for adoption of inflation targeting in the United States. He argues that in several important senses, the Federal Reserve already practices implicit inflation targeting. The Fed assigns priority to maintain a low and stable inflation rate, and it has achieved considerable credibility in this regard, and as a result of this credibility the Fed has gained flexibility in stabilizing the real economy without losing control of inflation. He argues that it would be desirable for the Fed to make its commitment to maintaining a low inflation rate more explicit. He considers practical aspects of the way in which inflation targeting could be adopted in the U.S. given the current legislative mandate of the Fed. Jonas and Mishkin (2003) examine the experience of three transition economies that have recently adopted inflation targets in

Czech Republic, Poland and Hungary. Such these transition economies have a number of unusual features that post special problems for conduct of inflation targeting.

They are new democracies, and relation between the government and the central bank in particular are not clear defined. Also they have recently joined the European Union, and are thus prospective future members of the European Monetary Union; the requirements for entry to EMU thus pose additional constraints on the conduct of monetary policy. While these special circumstances make inflation targeting more difficult in these countries, Jonas and Mishkin (2003) find that the strategy has been relatively successful in bringing about disinflation. They argue that other possible strategies for inflation control would also be at least as problematic under these circumstances. They argue that it is more than usually important in these economies that the central bank avoid undershooting its inflation target. It is also important for these economies that the inflation target can be defined as a medium- term objective, allowing room for substantial short run departures from the medium-term target in response to unforeseen shocks, and that the central bank is able to communicate effectively with public about the goals of inflation targeting.

Caballero and Krishnamurthy (2003) are concerned with special problems resulting from the vulnerability of emerging market economies to volatile international capital flows, specifically, the occurrence of "sudden stops", in which foreign lenders are suddenly unwilling to lend to the country at any interest rate. They present a model of a small open economy in which a central bank that is unable to commit itself in advance, will choose to use monetary policy to defend the value of its currency too aggressively when a "sudden stop" occurs. They argue that this policy is distinctly sub-optimal

relative to the best policy under commitment. They show that central bank operating under discretion can be induced to behave in a more desirable way if it is assigned a state-contingent inflation target, or if the inflation target is defined in terms of a measure of inflation that assigns greater weight to the prices of non tradable goods. The paper also contributes to theoretical discussion of the appropriate price index to target in the case of an open economy, an important issue in the theory of inflation targeting for advanced economies as well.

Campbell Leith and Simon Wren-Lewis (2002) argued that in the open economy, whether using consumer price inflation will be better target than output price inflation. There are many reasons to explain by adopting a rule based on consumer price inflation may behave in a different way than using output price inflation, i.e. the effect of monetary policy may be passed on exchange rate through into the consumer prices will be faster than the monetary policy. Also the impact of foreign shocks may take longer to be revealed in domestic output and inflation data relatively to the effect they have on consumer price inflation through the exchange rate. They argue that monetary policy should seek to minimize the distortions caused by nominal inertia in an attempt to recreate the equilibrium that would emerge under flexible prices and since this nominal inertia is assumed to only apply to output prices, then the monetary policy should target the output price inflation rather than consumer price inflation. They used a two country model where PPP holds for consumer prices but not output prices and if both countries implement Taylor rules defining the excess inflation rate based on consumer prices, the results will not be a unique rational expectations path for prices. This implies that Taylor rule based on consumer prices will not be sub-optimal and constantly destabilizing. They

find in their paper that the Taylor rule analysis that is applies to close economy could be applied to open economy when the excess inflation rate is in terms of output prices. The paper argues that in open economies where the monetary authorities have an explicit inflation objective, this objective involves some measure of consumer price inflation. The authors argue that this is the wrong inflation measure to target because the policy rules based on consumer prices may lead to instability because of the influence of interest rates on the exchange rate and its feedback to consumer price inflation.

Woodford (2001) argues that the Taylor rule incorporate several features of an optimal monetary theory, that is the respond to fluctuations in inflation or output gap tends to stabilize those variables, and stabilization of both variables is an appropriate goal. This response to these variables guarantees determinant rational expectations equilibrium and prevents instability due to self fulfilling expectations.

The author argues that the output gap that the central bank should seek to stabilize is the gap between actual output and the natural rate of output, while Taylor compares between the respond rule and actual U.S. policy where the output gap is assumed to be measured by output relative to deterministic trend. This measure of the output gap suggested in Taylor's analysis of the rule's empirical fit may be quit different from the theoretically correct measure. The rule assumes a constant intercept, but a desirable rule is likely to require that the intercept be adjusted in response to fluctuations in the natural rate of interest, and this too should vary in response to a variety of real disturbances. He added that the classic formulation assumes that interest rates should be set on the basis of current measure of the target variables alone, but an optimal rule will generally involve a commitment to history dependent variables.

Section 2: Estimating the implicit inflation target: An application to Jordan Monetary Policy:

2.1 Toward inflation targeting in Jordan:

The first requirement for any country considering the adoption of inflation targeting is that the central bank should have a considerable degree of independence. Although it is not necessary to have full legal independence but the central bank can have enough level of freedom to manage the monetary policy instruments toward some nominal objects.

To meet this condition, the monetary policy should not be constrained by purely fiscal policy considerations. This implies that the public sector borrowing from the central bank and the banking system must be low or nonexistent. This means that the government should not rely on the revenues from the seigniorage generated by excessive currency issuance. It is generally agreed that if a country experience a high inflation rates of 15%-25% for a number of years, it will be unable to rely on monetary policy alone to target any lasting reduction in the rate of inflation. At high rates of inflation, fiscal and monetary policies tend to become almost undividable. Paul R Masson, Miguel A. Savastano , Sunil Sharma, (1998). The other important requirement to adopt inflation targeting framework is that the monetary authority should have a degree of exchange rate flexibility. It could affect the monetary authority's credibility since the public would have to conclude the authorities' priorities from their actual responses whenever the exchange rate came under pressure. A country that satisfies these two important conditions could in practice conduct its monetary policy in a way that is consistent with inflation targeting.

After achieving these two requirements, a country needs four elements to conduct the inflation targeting in its monetary framework: first, explicit inflation targeting for some period or periods ahead. Second, clear indications that attaining those inflation targets is the overriding objective of monetary policy. Third, a model for forecasting inflation that uses relevant variables and information indicators. Fourth, a forward looking operating procedure in which the setting of policy instruments depend on assessing inflationary pressure and where inflation forecast are used as the main intermediate target of monetary policy. Paul R Masson, Miguel A. Savastano , Sunil Sharma, (1998).

To set up such a framework, the monetary authorities must have the technical and institutional ability to model and forecast domestic inflation, and to consider the effects of instrument changes on future inflation, they must have also a view on the way in which monetary impulses affect the main macroeconomic variables.

This part describes the challenges that might face the Jordanian economy during implementation of implicit inflation targeting regime[1]. The strategy of starting inflation targeting with an implicit version and gradually converting to an explicit targeting can be a viable option when certain set of conditions is satisfied.

Inflation targeting has emerged in recent years as a leading and increasingly advocated framework for conducting monetary policy in order to achieve and maintain price stability. Like many other developing countries, the Central Bank of Jordan (CBJ) implicitly indicates its intention to maintain the price level under control and at reasonable levels. Using inflation target regime is one of the suggested systems that the

[1] Implicit inflation targeting can be defined as a period under which inflation targets are announced to the public, but not the regime and its details as such. It involves country acting as if inflation targeting were in place without a formal adoption of the regime. Typically, the central bank would also have other intermediate targets like monetary targets.

central bank can use as a monetary framework. There is now a wide consensus on the necessity of meeting a set of economic, institutional and technical preconditions before being able to successfully adopt an inflation targeting regime. I will review the prerequisites of inflation targeting, analyses the extent to which they are met in Jordan and examine whether the Jordanian economy, under its current status, is ready to formally adopt an inflation targeting regime. This part will discuss why developing strong fiscal, financial and monetary institutions is so critical to the success of inflation targeting and explains how, even if the prerequisites are not stringently fulfilled in the beginning of its adoption, the move towards them is believed to contribute to the macroeconomic stability of the country. More particularly, the focus is being put on fiscal balance, the financial sector and central bank independence. I believe that the latter is the most important condition in the inflation targeting implementation process; this section discusses the CBJ independence and underlines the importance of issues related to transparency, credibility, technical capabilities and accountability. Inflation targeting can be described as a choice by the monetary authorities to target the inflation rate in the short-to-medium term, giving a clear indication that hitting the inflation target takes precedence over all other objectives of monetary policy such as the exchange rate, economic growth or the level of employment. Some preliminary steps include the setting of explicit quantitative targets for inflation for several periods ahead, as well as setting up a model or methodology for inflation forecasting that uses a number of indicators containing information on future inflation. In order to do that, the monetary authorities must have the technical and institutional capacity to model and forecast domestic inflation and have a well-informed view of the relative effectiveness of the various

instruments of monetary policy at their disposal. Inflation targeting is incompatible with a fixed exchange rate regime in a context of free capital movements. Giving priority to exchange rate stability means completely sacrificing monetary policy, which can no longer be used for any domestic economic purposes. Therefore, countries wishing to move to inflation targeting are required to abandon their fixed exchange rate regimes and adopt a floating exchange rate policy. However, a pure float of the nominal exchange rate and its consequent fluctuations can be very costly for emerging markets: real appreciations might hinder the competitive power of the tradable goods industry, while local currency depreciation can lead to destruction of the balance sheet of domestic firms because their debt is often denominated in foreign currency. The strength of the exchange rate pass-through has resulted in many developing countries adopting a floating exchange rate regime while keeping their exchange rate policy managed. This is a source of concern for developing countries which consider adopting an inflation targeting regime, as there is a risk of seeing the exchange rate becoming the main focus and objective of the central bank. One suggested way to limit the over-vulnerability of the economy to exchange rate fluctuations is to increase the openness of the economy. The increased openness can lessen the exposure of businesses in the tradable sector to the negative consequences of a depreciation of the currency because, even when their debts are denominated in the foreign currencies, the goods they produce are more likely to be traded internationally and priced in foreign currency. In addition to the abovementioned preliminary requirements, there are three initial conditions that are essential to support an inflation targeting monetary policy. First, the central bank independence and accountability, the importance of central bank independence for the adoption of inflation

targeting has been extensively discussed in the economic literature. The theoretical argument that explains the negative relationship between central bank independence and inflation is based on the well accepted rule which states that the achievement of price stability requires the imposition of constraints on monetary expansion. Since policy makers are often tempted to use monetary policy to achieve quick but temporary objectives, such as financing of the budget deficit, high employment or low interest rates to reduce the government's financing costs, they are likely to induce increases in inflation expectations and in actual inflation that persist after the desirable effects of monetary expansion have disappeared. Giving sufficient independence to central banks allows the monetary authorities to focus on the price stability objective, even at the expense of other objectives that may seem more appealing in the short term.

The essential features of an independent central bank can be summarized under five broad headings: (i) a very well defined primary objective that takes priority over all other objectives; (ii) political independence for the design of monetary policy; (iii) economic independence for the execution of monetary policy; (iv) financial autonomy; and (v) clearly defined accountability procedures.

Second, accountability can be seen as a natural counterpart of central bank independence. The existence of mechanisms to ensure public accountability increases the credibility and the effectiveness of monetary policy. Moreover, they provide a channel for the central bank to explain and justify its policy decisions. In addition, the design of the board and management should guarantee that the decision making process is protected against any political influences.

In sum, it seems that good governance is a key element for any central bank to achieve its objectives. This implies that central banks should have clearly defined and prioritized objectives, be given sufficient authority and autonomy to achieve their objectives and functions, and be held accountable to increase the credibility and the effectiveness of monetary policy. Second, fiscal consolidation, a strong fiscal position is essential in order to engage in an inflation targeting regime. Large budget deficits and large government debts can lead to a failure to control inflation and the abandonment of the inflation targeting policy. Indeed, fiscal policy can affect monetary policy and inflation in a variety of ways. In the case of large budget deficits, central banks are required to finance public sector deficits through monetization, which generates higher inflation. Second, in case of large public debt, monetary authorities might be hesitant to raise interest rates if such a move is necessary to fight inflation pressures, because an increase in interest rates raises the cost of debt service and the debt level. Higher debt also increases the default probability and the country premium, generating capital outflows and leading to a depreciation of the exchange rate. Again, if debt is largely denominated in foreign currency, a depreciation of the domestic currency versus the denominated foreign currency causes a further increase in the value of debt. Moreover, depreciation of local currency also introduces higher prices through imported inflation. Aggregate demand is another way through which fiscal policy can affect inflation, i.e. a tax cut does not only decrease the government revenues, and it also increases real household wealth, and boosts both aggregate demand and the price level.

The multiplicity of channels through which fiscal policy affects monetary policy underlines the importance of limiting the fiscal deficit to a level that can be

financed through the operation of the capital market, especially in economies where there is limited access to financial markets to finance government deficits. In countries suffering from structural fiscal imbalances, substantial fiscal reforms which increase transparency of the government budget and budget rules, rebalance the government budget and reduce public debt and default probability are needed as a fundamental condition for adopting inflation targeting. Third, in implementing its monetary policy, the central bank needs to assess the impact of its decisions as well as the necessary time span before they affect the economy. This is particularly important for the adoption of the inflation targeting regime, which is a forward-looking monetary policy. More precisely, it is important to have a good knowledge of how changes in the central bank policy rate are transmitted through the economy, affecting aggregate demand, inflation expectations and consumer prices.

Channels through which decisions about the official interest rate affect economic activity and inflation are known as the ‘transmission mechanisms’ of monetary policy. Poddar T. Sab R. and Khachatryan H (2006). Adopting inflation targeting requires a sound definition and understanding of these mechanisms and their way of functioning within the economy. For example, the authorities need to know to what extent the central bank rate movements are passed through to banks' borrowing and lending rates, and whether the response of the economy to official rate changes is symmetric. Monetary policy can only be effective where transmission channels are properly understood by the policy makers, and are working effectively. In addition to this, the credibility of the monetary policy is crucial for managing inflation expectations. In developing countries, financial systems are often characterized by the dominance of

the state over financial activity, especially the banking sector, which leads to inefficiencies in running banking operations and the absence of market competition. Therefore, strengthening the soundness of the financial system might require to close insolvent financial institutions and to adopt sound supervisory practices, because financial weakness can undermine any attempts to control inflation. If the banking system is weak, and this weakness is recognized by the markets, there is a risk of a reversal of capital flows out of the country which can cause a sharp depreciation of the exchange rate, leading to upward pressures on the inflation rate. Therefore, it is important for a country – before it adopts a new monetary policy - to undergo a financial reform program, in order to be able to attain the goals of the new policy. Strengthening the financial system requires several types of institutional reforms. For instance, prudential regulation of the banking and financial system must be strengthened to ensure that currency mismatches are limited, in order to prevent currency devaluations from destroying balance sheets. Financial markets should also be sufficiently developed to enable inflation targeting to be implemented using market-based instruments.

2.2 Is Jordan ready for inflation targeting?

2.2.1 Macroeconomic overview

The Jordanian economy has been subject to exogenous shocks such especially during and after the first and the second Gulf war, and the politically unstable area. The major economic indicators started to deteriorate and the growth rate was insufficient to ensure growth in per capita GDP. After a significant devaluation of the Jordanian Dinar in 1987-1988, the Jordanian Dinar depreciated and lost 50% of its value. As a result, inflation rates rose to 25.7% in 1988. This pass-through effect of the local currency

depreciation had a negative impact on corporations and businesses, which usually have their liabilities denominated in dollars, while their assets and earnings are in Jordanian Dinar. Besides, the high share of intermediate inputs and investment goods in Jordan's imports increases price sensitivity to developments in the exchange rate. For these reasons, it is believed that the Jordanian monetary authorities are not allowing a free floating currency.

Chart I, shows that the CPI inflation has reached to 25.7% which was the highest level during the last 30 years and then starts to come down to 5.6% in 2007 and starts to go up again to reach to 15.8% in the first quarter of 2008.

Table (1) shows the trend in the budget deficit since 2003 and it clearly shows the fall of fiscal conditions in 2003. The budget deficit rose to 3% of GDP in 2003 and increased slightly around 5.7% of GDP in 2006. Public debt has increased between 2006 -2007, and currently stands at around 110% of GDP. As shown, Jordan's budget deficit and public debt are relatively high, and cannot be sustained at current levels without compromising its economic potential. Besides, fiscal conditions play a central role in helping a country to achieve its inflation targets. Given the increasing interdependence between fiscal and monetary policies, fiscal performance cannot be treated in isolation from other economic policies; it must be adjusted as an integral part of the policy framework. Table 1 presents the components of the government budget during the recent years.

On the positive side, a sustained high real GDP growth rate and a slight improvement in the budget deficit can be noted. Indeed, the high growth rate, in addition to the revenues coming from the privatization process, have both contributed to a lower

deficit. However, these improvements are not sufficient to adjust the structural disequilibrium in public finances. Even with a cut in fuel and other goods subsidies, public expenditure rose to 50% of GDP in 2006. The public debt is also growing and putting an extra burden on the state budget through debt interest payments.

2.2.2 Construction of CPI:

The adoption of inflation targeting requires the construction of an appropriate price index on which the inflation target is to be based. As in all developing countries, choosing such an index is problematic. The first reason is that foodstuffs, which make up a large part of the basket and have highly variable prices because of their sensitivity to many conditions. This high variability translates into more volatile CPI inflation. Second, goods and services with subsidized prices have a large share in the basket. Large movements in regulated prices, which have a direct impact on the overall price level, may lead to poor control of inflation and damage the central bank's credibility. A common practice between inflation targeting central banks consists of targeting an inflation index that excludes items which are especially prone to supply shocks, and items over which they have no control (such as food and energy). Using a core inflation measure, should thus limit the risks of missing the target and any resulting loss of credibility for the central bank. However, an important criticism usually addressed to the so-called "core inflation" is that such an index would not accurately reflect the trend in the cost of living because of the important weight of these items within the basket of goods and services.

Table (2) shows the weight of the basket components and the trend in prices for each component between 2003 and 2007. As expected, the food category has seen the highest inflation rate over the period (52.3%). On the other hand, inflation in the Housing

category (includes Rent, Fuel and electricity) was the lowest, with a rate of 11.9% over the same time period.

To summarize, a timely and accurate measurement of inflation is needed for policymakers to conduct Jordan's monetary policy. However, a measure of core inflation that reduces the importance of food and regulated prices may not adequately reflect the trend in households' cost of living. Given that the index is used by the public to monitor price developments, it definitely contributes to forming inflation expectations, which are a cornerstone of inflation targeting. In a country where independent measures of inflation are unavailable, it is recommended to choose an index that helps enhancing the central bank's credibility and transparency. A sound strategy would suggest keeping a watch on core inflation – even if it is not used as a target – in order to evaluate the economic conditions and set the appropriate policies. An independent statistical office is required for a public and, as stressed before, a regular and timely provision of detailed price statistics.

2.2.3 transmission mechanisms and forecasting models:

It follows from the previous point that well developed technical capabilities of the central bank are a major factor in implementing a framework to target inflation. Building a convenient and reliable index is just one aspect of this requirement. In fact, the implementation of inflation targeting requires a very good knowledge of all the aspects of the monetary transmission mechanism in the country, which underlines the importance of improving the operational and analytical capabilities of the central bank. For this purpose, the central bank needs to invest in human capital to put together a qualified team of staff who are capable of understanding the functioning of the economy and are familiar with

the requirements of an inflation targeting regime. Forecasting techniques are also crucial and need to be improved. Producing forecasts on the trends in the main macroeconomic indicators and making projections on inflation dynamics requires the development of macroeconomic modeling capabilities, as well as the data needed to implement them. Quantitative projections of the economy expected future course form the basis of the central bank's decisions about the appropriate level of short-term interest rates and other appropriate instruments.

The public discussion of those projections should also be part of the process whereby the central bank explains and justifies the conduct of monetary policy to the public.

2.2.4 Transparency, credibility & accountability:

Inflation targeting can only function if monetary policy and its full decision-making process are conducted in a transparent and credible manner. The principal argument in favor of more transparent objectives and actions is that, by making it easier for markets to interpret central bank policy, inflation expectations are anchored more firmly, which in turn helps to lower the costs of meeting the target.

A transparent framework is also essential to establishing and maintaining the credibility of the monetary authorities and their policy. Indeed, the Central Bank has to build its credibility as a monetary authority committed to price stability, which requires actions consistent with the inflation-targeting framework combined with high levels of transparency and communication with the public. Ideally, a transparent inflation targeting framework involves communicating the central bank's objectives, deliberations, and policy decisions to the public. This is usually done by publishing a regular monetary

policy report, which includes not only information about the current state of the economy but also the bank's forecast on inflation and other variables and its own analysis, which are based on these forecasts.

All these elements provide the rationale for the central bank's policy decisions. The Central Bank of Jordan is making an effort to strengthen communication with the public through the regular publication of monthly, quarterly and annually reports. Press releases on the main considerations underlying monetary policy decisions are also available on the CBJ website. A major step to enhance CBJ transparency would be to issue an *Inflation Report* that includes an assessment of current and future economic developments for the public and analyses the major risk factors that are identified during each round of forecasts. Producing such a report, which explains the conduct of policy in more qualitative terms, would definitely reinforce credibility and confidence building. There is a concern about the quality of available data (coverage, periodicity, timeliness, integrity and access by the public). The existence of the Department of Statistics which is an independent department that provide other departments with available data will help to enhance the quality of data provided, but should endowed with sufficient financial and human resources to ensure the credibility of the data available. With credibility being a key factor in the success of inflation targeting, close and regular communication with the public appears to be the most important way to enhance the authorities' credibility. Explaining what inflation targeting is all about will influence how inflation is perceived. Since consumers' overestimation of inflation can have a negative impact on inflation expectations and on the credibility of the CPI index and its capacity to measure price

developments, insufficient communication can lead to a loss of credibility that may hamper the proper conduct of monetary policy.

Section 3: Behind the Monetary Policy Rule:

In this section, I review a number of useful principles about monetary policy that are reasonably general in applicability. This approach is based on the idea that temporary nominal price rigidities provide the key friction that gives rise to non neutral effects of monetary policy. Clarida R., Gali J. and Gertler M. (1999) adopt the Keynesian approach of stressing nominal price rigidities, but at the same time based the analysis on frameworks that incorporate the recent methodological advances in macroeconomic modeling. The instrument of monetary policy is a short run interest rate. The policy design problem is to characterize how the interest rate should adjust to the current state of the economy. The private sector behavior depends on the expected course of monetary policy, as well as on current policy and that's why the credibility of monetary policy becomes relevant and whether there may be gains from enhancing credibility either by formal commitment to a policy rule or by introducing some kind of institutional arrangement that achieve roughly the same goal. Clarida R., Gali J. and Gertler M. (1999) address the issue by examining optimal policy for both cases: i.e. with and without commitment. Clarida R., Gali J. and Gertler M. (1999) show a baseline framework model with a dynamic general equilibrium model with money and temporary nominal price rigidities. The monetary policy affects the real economy in the short run similar to the traditional Keynesian IS/LM model. The difference in this model is that the aggregate behavioral equations evolve explicitly from optimization by households and firms which

implies that current economic behavior depends on expectations of the future course of monetary policy as well as on current policy. Clarida R., Gali J. and Gertler M. (1999).

The baseline is presented in terms of two equations: an IS curve that relates the output gap inversely to the real interest rate and a Phillips curve that relates inflation positively to the output gap.

$$y_t = -\varphi[\, i_t - E_t\, \pi_{t+1}] + E_t\, y_{t+1} + e_t \qquad \textbf{(1)}$$

$$\pi_t = \gamma\, y_t + \beta\, E_t\, \pi_{t+1} + u_t \qquad \textbf{(2)}$$

Where, y_t is the output gap , i_t is the short run nominal interest rate, π_t is the inflation rate and e_t ,u_t are disturbances terms. Equation (1) shows that the current output depends on expected future output as well as the interest rate. Higher expected future output will increase consumption in the future and this will lead to increase current consumption which raises current output demand because consumers prefer to smooth consumption. Clarida R., Gali J. and Gertler M. (1999), at the same time, the negative effect of the real interest rate on current output, reflects inter temporal substitution of consumption. Clarida R., Gali J. and Gertler M. (1999) :

$$y_t = E_t \Sigma_{i=0}^{\infty} \{-\varphi[\, i_{t+i} - E_t\, \pi_{t++i1}] + e_{t+i}\} \qquad \textbf{(3)}$$

Equation(3) makes transparent the degree to which beliefs about the future affect current aggregate activity within this framework. Clarida R., Gali J. and Gertler M. (1999). It suggests that expected as well as current policy actions affect aggregate demand.

Equation (2) is simply a log linear approximation about the steady state of aggregation of the individual firm pricing decisions and it relates the inflation rate to the output gap and expected future inflation. Now integrate equation (2) forward to obtain:

$$\pi_t = E_t \Sigma_{i=0} \beta^i [\gamma y_{t+i} + u_{t+i}] \quad \textbf{(4)}$$

Equation (4) shows that inflation depends entirely on current and expected future economic conditions. Clarida R., Gali J. and Gertler M. (1999), where firms can set nominal price based on the expectations of future marginal costs, where, y_{t+i} captures movement in marginal costs associated with variation in excess demand. The shock, u_{t+i} which is a cost push captures any thing else that might affect expected marginal cost, Clarida R., Gali J. and Gertler M. (1999). The central bank objective function translates the behavior of the target variables into a welfare measure to guide the policy choice. It is assumed that the objective function is over the target variables y_t and π_t and takes the form: Clarida R., Gali J. and Gertler M. (1999).

$$Max\ -1/2\ \{E_t \Sigma_{i=0} \beta^i [\gamma y_{t+i}^2 + \pi_{t+i}^2]\} \quad \textbf{(5)}$$

Where, γ is the relative weight on output deviations.

This objective function may be obtained as quadratic approximation of utility function.

The policy problem is to choose a time path for the instrument i_t to engineer time paths of the target variables y_t and π_t that maximize the objective function (5) subject to the constrains on behavior implied by the IS curve (1) and Phillips curve (2). In this model, the target variables depend not only on the current policy but also on the expected future policy: i.e. the output gap depends on the future path of the interest rate as in equation (3) and inflation depends on the current and expected future behavior of the output gap as in equation (4). The central bank that chooses operating under discretion, will chose the current interest rate which implies that any promises made in the past do not constraint current policy. But under a rule, the central bank chooses a plan for the

path of the interest rate that it sticks to forever Clarida R., Gali J. and Gertler M. (1999). the key distinction between discretion and rules is whether current commitments constrain the future course of policy in any credible way. In both cases, the optimal outcome is a feedback policy that relates the policy instrument to the current state of the economy in a very specific way, but the two approaches differ in their implications for the link between policy intentions and private sector beliefs. Under discretion, a perceptive private sector forms its expectations taking into account how the central bank adjusts policy. The rational expectations equilibrium thus has no incentive to change its plans in an unexpected way, even though it has the discretion to do so. Clarida R., Gali J. and Gertler M. (1999). Under a rule, it is simply the binding commitment that makes the policy believable in equilibrium.

Now to derive the model for optimal monetary policy under discretion, in each period the central bank chooses (y_t, π_t ,i_t) consisting of two target variables and the policy instrument to maximize the objective function (5) subject to the aggregate supply curve (2) and the IS curve (1).

Clarida R., Gali J. and Gertler M. (1999), have solved the model into two stages, first, the central bank chooses y_t and π_t to maximize the objective function (5) given the inflation equation (2), then conditional on the optimal values of y_t and π_t, it determines the value of i_t implied by the IS curve in equation (1). The central bank takes private sector expectations as given in solving the optimization problem.[2]

Since it cannot credibly manipulate beliefs in the absence of commitment, the central bank takes the private sector as given in solving the optimization problem. Following Clarida R., Gali J. and Gertler M. (1999) approach, we see that the solution of

[2] For full mathematical derivatives, see Clarida R., Gali J. and Gertler M. (1999).

the optimization problem implies that the central bank pursues a “lean against the wide policy”: i.e. whenever inflation is above target, central bank raises the interest rate to contract demand below capacity. Clarida R., Gali J. and Gertler M. (1999).

It is concluded that the more knowledge of the way the macro-economy works, the highly performance the monetary policy works. The output – inflation trade-off is highly sensitive to both the degree and nature of the persistence in inflation. So it is suggested that the short run aggregate supply curve used in the model may provide a reasonable approximation reality. This analysis was restricted to a close economy models and extension to an open economy frameworks are likely to provide new insights on the alternative monetary policy rules including the choice of the exchange rate system. The optimal policy implied by most of the existing macroeconomic frameworks generate paths for the interest rate that are much more volatile than what is observed in reality which arises the probability that these models will fail to characterize the constraints that policy makers face in practice.

Economists have agreed that the monetary authorities increase the interest rates when inflation exceeds its target and decrease interest rates when inflation is below the target. The relationship between interest rate and other macroeconomics variables are known in monetary theory as reaction function. A particular specification of reaction function is known as Taylor rule, which was proposed by Taylor (1993) and linked the interest rate with the gap between actual inflation and its target, and the gap between the actual and potential output.

Taylor (1993) suggests a very simple rule for monetary policy that captures the dependence of the nominal interest rate from the developments of output and inflation.

His rule sets the level of the nominal federal funds rate equal to the rate of inflation plus an equilibrium real fund rate plus an equally weighted average of two gaps: Judd J. and Rudebusch G. (1998)

$$i_t = \pi_t + r^* + 0.5(\pi_t - \pi^*) + 0.5\, y_t \quad \textbf{(6)}$$

Where, i_t is the nominal interest rate, r* is the real interest rate, π_t is the actual average inflation rate, π^* is the target inflation rate and, y_t is the output gap (percentage change difference between real GDP and potential GDP). Taylor did not econometrically estimate this equation. He assumed that the weights the Fed gave to deviations of inflation and output were both equal to 0.5. He also assumed that the equilibrium real interest rate and the inflation target were both equal to 2 percent. The greatest strength of the Taylor rule is its simplicity. Besides its simplicity the Taylor rule include its focus on variables that most policy makers consider important and it explicitly incorporate concern for a measure of excess demand (the output gap), inflation, and movements of the interest rate away from its perceived equilibrium level, and because the output gap, inflation and interest rate are key drives in most models examined. We assume that the Taylor rule is a reasonable approximation of inflation control problem at any point in time. The Taylor rule uses current values of inflation and output gap to set the interest rate target of a central bank, but many people view it as approximation of an inflation target rule because the output gap and inflation are two primary indicators of future inflationary pressure. We use interest rate, real GDP, inflation and expected inflation one year ahead and estimate the Taylor rule. In many cases empirical studies assume that inflation target and the real interest rate are constant.

We can use this general Taylor rule expression:

$$i_t^* = r^* + \pi_t + \beta(\pi_t - \pi^*) + \gamma_1 y_t + \gamma_2 y_{t-1} \quad \textbf{(7)}$$

Where, i_t^* is the short run target nominal interest rate at time t. equation (7) includes an additional lagged gap term along with the current gap and this is a general specification that allows for the possibility that the central bank responds to a variety of variables proposed as reasonable monetary policy targets, Judd J. and Rudebusch G. (1998).

The dynamics of adjustment of the actual level of the fund rate to i_t^* are given by:

$$\Delta i_t = \delta(i_t^* - i_{t-1}) + \rho \Delta i_{t-1} \quad \textbf{(8)}$$

Equation (8) implies that the change in the funds rate at time t partially corrects the error between last period's setting and the current recommended level. As well as maintaining some of the momentum from the last period's fund rate change.

Now by substituting equation (7) into equation (8), we obtain:

$$\Delta i_t = \delta\alpha + \delta i_{t-1} + \delta(1+\beta)\pi_t + \delta\gamma_1 y_t + \delta\gamma_2 y_{t-1} + \rho \Delta i_{t-1} \quad \textbf{(9)}$$

Where $\alpha = r^* - \lambda_1 \pi^*$,

This equation provides estimates of the weights on inflation and output in this rule and we can estimate the inflation target by assuming a constant real interest rate and a constant inflation object. The key point in this model is that and according to the Taylor principle, if inflation increases above its target level, the central bank respond by raising the real interest rate above its natural level, also the central bank may respond to deviation in output from its potential, the central bank lowers the real interest rate below its natural rate if the output falls below potential. The monetary policy affects real activity in the short run by varying the nominal interest rate which is considered as the

main operating instrument of the monetary policy. The positive relationship between output and inflation implies that reducing inflation may require a period of output reduction, depending on the degree of nominal stickiness.

Section 4: The Model

Clarida R., Gali J. and Gertler M. (1998) used the Taylor rule to estimate the reaction function parameters and estimate the inflation target using a forward looking model. I followed the literature in their article, I assumed that within each target period, the central bank has a target for nominal short- run interest rate that is based on the state of the economy and used the Taylor rule to estimate how the central bank of Jordan has conducted monetary policy since 1980 by estimating monetary policy reaction function for Jordan. The framework assumes that the central bank has at least some degree of independence over its monetary policy. The empirical policy reaction function characterizes how the central bank chooses the level of the short- rum interest rate from period to period, assuming that the target rate depends on expected inflation and output. Clarida R., Gali J. and Gertler M. (1998),

I estimate a general type of rule that treats the nominal interest rate as the instrument of monetary policy. The rule calls for adjustment of the interest rate to the gaps between expected inflation and output and their respective target levels. This approach assumes forward looking behavior in the part of the central bank. Clarida R., Gali J.and Gertler M. (1998). The theoretical model is designed to flesh out how the observed changes in the policy rule count for the changes in macroeconomic performance.

$$i_t^* = i + \beta\,(\pi_t^e - \pi^*) + \gamma y_t \qquad \textbf{(10)}$$

Where i_t^* is the target of nominal short-run interest rate, i is the long run equilibrium nominal interest rate, π_t^e is the expected inflation rate, π^* is the inflation target rate, and y_t *is* the output gap.

This rule in some cases approximate forms of this rule are optimal for central bank that has quadratic loss function in deviations of inflation and output for their respective targets. Clarida R., Gali J.and Gertler M. (1999). Equation (10), provide reasonably good descriptions of the way major central banks around the world behave. Taylor (1993), proposes a rule where the funds rate responds to lagged inflation and output rather than their expected future values. The forward looking model treats Taylor rule as a special case, i.e. if their lagged inflation or linear combination of lagged inflation and output is a sufficient statistic for forecasting future inflation, then equation (10) collapses to the Taylor rule. Clarida R., Gali J. and Gertler M. (2000).

This forward looking specification allows the central bank to consider about the future condition of the economy. Clarida R., Gali J. and Gertler M. (1998). The implications of a policy rule in equation (10) for the cyclical behavior of the economy will depend on the sign of the slope coefficients β and γ. Clarida R., Gali J. and Gertler M. (2000).

It is possible that when choosing the target interest rate, the central bank may not have direct information about the current values of either output or price level. Given the real interest rate,

$$r_t = i_t - \pi_t^e \qquad \textbf{(11)}$$

where, r_t is the short run real interest rate, i_t is the short run nominal interest rate.

Rewriting equation (10), considering the implied rule for the ex ante real rate target, I obtain the following,

$$r_t^* = r + (\beta-1)(\pi_t^e - \pi^*) + \gamma y_t \qquad \textbf{(12)}$$

where, r_t^* is the long run target real interest rate, r is the long run equilibrium real interest rate, assuming that the real rate is stationary and determined by non monetary factors in the long run. Clarida R., Gali J. and Gertler M. (2000), accordingly, r_t^* is constant and is independent of monetary policy. Equation (12) makes it clear that the sign of the response of the real rate target to changes in expected inflation and output gap depends whether β is greater or less than one and on the sign of γ respectively. Roughly speaking, to the extent that lower real rates stimulate economic activity and inflation, interest rate rules characterized by $\beta>1$ will tend to be stabilizing, while those with $\beta<1$ are likely destabilizing or at best, accommodative of shocks to the economy. Similarly, the rules will be stabilizing if $\gamma>0$ and destabilizing if $\gamma<0$. Clarida R., Gali J. and Gertler M. (2000). The policy reaction function in equation (10) is too restrictive to describe actual changes in the nominal interest rate and that is because, first, it ignores the central bank's tendency to smooth changes in interest rates. Second, it does not allow for any randomness in policy action other than that associated with miss forecasts of the economy, which implies that the reaction function policy treats all changes in interest rates overtime as a result of the central bank's systematic response to economic conditions. Third, it assumes that the central bank has perfect control over interest rates by keeping them at the desired level. Clarida R., Gali J. and Gertler M. (2000).

The traditional explanation for changes in interest rates smoothing includes: fear of disrupting capital markets, loss of credibility from a sudden large policy reversals,

etc, and it will be difficult to capture these factors explicitly, Clarida R., Gali J. and Gertler M. (1998), so I relaxed the first assumption and assume that the actual interest rate partially adjusts to the target nominal interest rate as following:

$$i_t = (1-\rho)\, i_t^{*} + \rho\, i_{t-1} + v_t \qquad \textbf{(13)}$$

Where i_t is the actual interest rate at time t. specifically, each period, the central bank adjusts the nominal interest rate to eliminate a fraction of (1- ρ) of the gap between its current target level and some linear combination of its past values. ρ is an indicator of the degree of smoothing of interest rate changes. This specification also includes an exogenous random walk shock to the interest rate v_t . Assuming that v_t is i.i.d. Now, to obtain an estimable equation, first I define $\alpha=i-\beta\pi^{*}$ and then rewrite equation (10), I obtain the following:

$$i_t^{*} = \alpha + \beta\, \pi_t^{e} + \gamma y_t \qquad \textbf{(14)}$$

Now combining the target model, equation (14) and the partial adjustment mechanism, equation (13), and after eliminating the unobserved forecast variables and rewriting the policy rule in terms of realized variables, I obtain the following:

$$i_t = (1-\rho)\alpha + (1-\rho)\, \beta\, \pi_t^{e} + (1-\rho)\, \gamma y_t + \rho\, i_{t-1} + \varepsilon_t \qquad \textbf{(15)}$$

Where, $\varepsilon_t = -(1-\rho)[\, \beta(\, \pi_t^{e} - \pi_{t+1}^{e}) + \gamma(y_t + y_{t+1}\,)] + v_t$ is a linear combination of the forecast errors of inflation and output and the exogenous disturbance v_t .

Finally, let u_t be a vector of variables within the central bank's information set at the time it chooses the interest rate, i.e any lagged variables that help to forecast inflation, output and any other variables that are uncorrelated with the current interest rate shock v_t

Since that E [ε_t /u_t] = 0,this implies the following set of orthogonality conditions that I exploit for estimation :

$$E[i_t - (1-\rho)\alpha-(1-\rho)\beta\pi_t^e - (1-\rho)\gamma y_t - \rho i_{t-1}/u_t] = 0 \quad \textbf{(16)}$$

I used the Generalized Method of Moment (GMM) to estimate the parameter victor (α, β, ρ, γ) with an optimal weighting matrix that accounts for possible heteroskedasticity and serial correlation in the error terms. Hansen (1982). The instrument set of u_t includes the lagged values of output, inflation, interest rate and commodity prices, which will be useful for forecasting inflation and output. Now using the values of the estimated parameters α and β, I can obtain an estimate of the central bank's target inflation rate π^*. And since the model does not separately specify the inflation target rate π^* and the long run equilibrium nominal rate of interest i, the model do provide a relationship between the two variables as follows:

$\alpha=i-\beta\pi^*$ and $i= r + \pi^*$

Combine the two identities to obtain the following:

$$\pi^* =(r - \alpha)/ (\beta-1) \quad \textbf{(17)}$$

Using the sample average real interest rate provides an estimate for r and then it is possible construct an estimation of π^*.

I estimated the baseline model for Jordan over the time period. Also it is possible that there are other factors that influence the interest rate besides those observed in the baseline model, like the exchange rates and monetary aggregate. To account for these alternatives, I consider a number of simple alternatives to the baseline specification. Let z_t demote a variable beside inflation and output that influence the interest rate setting. So we can rewrite equation (14) as:

$$i_t^* = \alpha + \beta \pi_t^e + \gamma y_t + \zeta z_t \quad \textbf{(18)}$$

Then I estimate the alternative model the same way as I did for the baseline except that I added the parameter vector to include the coefficient ζ on the additional variable z_t and at the same time I expand the instrument list to include lagged values of that variable. By estimating equation (18), I tested the direct effect of these alternative factors on the interest rate policy and evaluate if this effect is statistically important. The alternative variables that I consider in the alternative specification include: real exchange rates, foreign interest rates, the money supply and the lagged value of inflation in order to test the forward looking model versus the backward model of the Taylor rule.

Section 5: The data:

5.1 Inflation:

I measured the inflation rate using the annual growth rate of the consumer price index (CPI) given by the central bank annual reports. I used one year ahead (π_{t+1}) to measure the expected inflation rate (π_t^e). The source of the data is the annual reports of the central bank of Jordan for the time period of 1980 -2007.

5.2 The nominal interest rate:

I used the rediscount rate to measure the nominal interest rate. The source of the data is the annual reports of the central bank of Jordan for the time period of 1980-2006.

5.3 The output gap:

I calculated the output gap by finding the percentage change between the actual GDP and the potential GDP. I estimated the potential GDP by using the nominal GDP and run it through a Hodrick – Prescott filter (HP filter). The HP filter, decompose time series data into growth and cyclical components, and interprets the growth component to be the Potential GDP. Japan Financial Report (2001)

GDP gap = (Actual GDP –Potential GDP)/ Potential GDP.

5.4 Money Supply (M2):

I used the growth rate in the level of money supply of Jordan measured by M2. The source of the data is the central bank of Jordan for the time period of 1980-2007.

5.5 Foreign Interest Rate:

I used the federal fund rate as a measure of the foreign interest rate. The source of the data is the New York Federal Reserve Bank releases for the time period of 1980-2007.

5.6 Real Exchange Rate:

I calculated the real exchange rate between the Jordanian Dinar and the U.S Dollar using the following formula: RER = NER *(P/P^*), Where RER is the real exchange rate, P is the domestic price level (CPI_{Jordan}), P^* is the foreign price level (CPI_{USA}), NER is the nominal exchange rate between the currencies of foreign country (USA) and home country (Jordan), expressed as the number of foreign currency units (USD) per home currency unit (JD). I used the central bank of Jordan data base to collect the data of nominal exchange rate of USD/JD and the IMF data base to collect the CPI_{Jordan} and CPI_{USA} using year 2000 as the base year. I used the given data to calculate the real exchange rate.

Section 6: The results:

To estimate the parameters vector (α, β, ρ, γ), we used the generalized method of moment GMM. In the baseline model, we used the instruments set U_t includes the lagged values of output gap, inflation, interest rates, and the commodity prices[3]. These variables are useful for forecasting inflation and output and are exogenous with respect to the interest rate. Clarida, R. Gali J, Gertler M. (1998).

First, we estimate the baseline specification for policy, given in equation (15) during the time period of 1980 – 2007, and the instrument set includes one year lagged values of output gap y_t, inflation π_t, commodity price index o_t and interest rate i_t. all results estimated in this model are reported in table (3). The top line of table (3) shows the results for the baseline. The key point of this estimates is to estimate the coefficient of inflation gap $\beta = 0.79$ with a standard error of 2.25. β is statistically insignificant and it is less than one which implies that if the central bank raises the nominal interest rate in response to an expected rise in inflation, it does not increase it sufficiently to keep the real rate from declining. Clarida, R. Gali J, Gertler M. (1998). I can explain this result that the central bank of Jordan continues to support the price stability through pegging the Jordanian Dinar to the U.S dollar which keep inflation in line with industrial country levels and promoting confidence in the Jordanian Dinar. The central bank of Jordan will continue to maintain a comfortable international reserve position and stands ready to protect reserves and monetary stability through active liquidity management. IMF third review under Stand by Arrangement with Jordan (2004). The estimate value of the coefficient of the output gap γ has a positive of 1.05, which is consistent with the theory,

[3] I used the value of the whole sales price index as a measure of commodity prices.

even though γ is statistically insignificant with a standard error of 1.7, which implies that the interest rate in Jordan is affected by other variables other than the changes in the output, and that is because the monetary authority using exchange rate targeting system.

From these estimates, we can estimate the long run inflation target π^*. Using the sample average of real interest rate which is equal to 2.07 and using equation (17), then the estimated value of the inflation target π^* is 7.76%.

The next step is to consider alternatives to the baseline specification. First, we add the lagged inflation variable to the reaction function, along with the expected inflation and output. The coefficient of the lagged function is also statistically insignificant, which is supports the point of view of rejecting the backward- looking specification in favor of the forward-looking model Clarida, R. Gali J, Gertler M. (1998).

Now we estimate the same model by adding the money supply into the reaction function. I used the growth rate in the level of the money supply M2. The estimated parameter of the money supply obtained from the estimates is insignificant. Finally, we tested if the Jordanian monetary policy considers the U.S monetary policy as external constraint. First, we let the U.S federal fund rates to enter the reaction function, and then we consider the level of the real JD/USD exchange rate. In both cases, we find that these variables can't explain the changes of the interest rate since the coefficient parameters are statistically insignificant.

Conclusions and recommendations

Over the past 16 years, many countries have adopted explicit inflation targeting as a framework for conducting their monetary policy. Initially adopted by industrial countries, inflation targeting has since been adopted by a large number of emerging market economies too, encouraged by its perceived success. Most of this success can be attributed not only to the progress that has been made toward meeting the -relatively low- inflation targets, but also to the improvements it has brought in the form of regular communication with the public, which means more transparency and better mechanisms by which the monetary authority is held accountable. In order to move toward inflation targeting, Jordan has to experience a set of economic, institutional and social reforms that are crucial to the success of the new monetary policy. Indeed, these conditions are necessary in order to achieve price stability and macroeconomic stability.

The analysis of the fiscal stance in Jordan shows that the country is suffering from a structural budget deficit, and as a result, the debt keeps on growing, which places a higher burden on the government budget through interest payments. Because of this "snowball effect", the rise in the debt level continues. The Jordanian fiscal strategy should focus on three main issues, first, is to rationalize and improve the efficiency of public expenditures as a way to stop the ongoing increase in the ratio of expenditure to GDP. In our view, expenditure rationalization should be performed according to the relative efficiency of the major spending categories in terms of performance outcomes, and should not rely on ad hoc cuts. As for the subsidies, as they are gradually removed, they should be replaced by better targeting mechanisms and accompanied by measures to strengthen the social safety net and introduce appropriate compensatory schemes.

Second, privatization of state owned enterprises should not be considered as a permanent source of revenue. They should be undertaken primarily for reasons of efficiency rather than for the purpose of deficit financing or debt reduction. At the same time, greater efforts should be deployed to improve public sector management. Third, rules should be laid down relating to the use of higher than expected revenues.

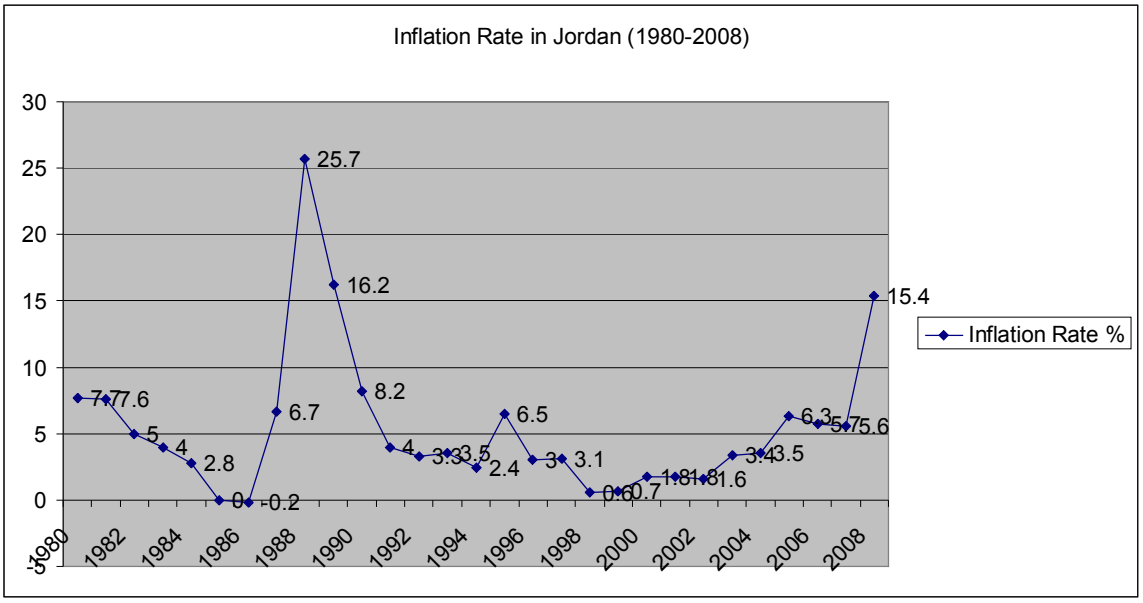
Finally, all these measures should be implemented in parallel with structural reforms, such as the necessary reform of the system of subsidies, as well as institutional reforms to ensure transparency and accountability. This paper also focused on the role of the CBJ as the authority responsible for the formulation and implementation of an inflation targeting monetary policy. Giving sufficient independence to central banks is a fundamental condition in targeting inflation, because it allows the monetary authorities to focus on the price stability objective. There are some policy recommendations regarding the measures that still need to be put into effect in order to ensure its full independence. First, the membership of the CBJ board, on which government officials are heavily represented, and the issuance of decisions according to the absolute majority of the votes of the Board members indicates that there is a certain degree of interference in the Bank's policies. Hence, it is highly recommended to review the composition of the Monetary Policy Committee and to limit the right of government members to vote. A government representative may be present to ensure coordination, but should not have voting rights on the executive board. Second, the relevant legislation needs to be amended to ensure that monetary financing of fiscal deficits is prohibited. The procedures for nominating and appointing members of the governing bodies are also especially important for establishing the autonomy of the central bank, as well as for ensuring the

integrity of central bank officials. Another key element in ensuring the CBJ autonomy is to have a provision in the CBJ law that protects against arbitrary dismissal of the Governor and board members. Finally, communication with the public should be increased via regular publications (inflation reports, annual reports, press releases…) with a full explanation of the reasons underlying the CBJ actions. Indeed, the effectiveness of monetary policy largely depends on the impact it has on expectations and confidence, underlining once again the importance of a credible and transparent monetary policy. We would even go so far as to say that the primary policy problem facing the CBJ during this period is the acquisition and maintenance of credibility for its commitment to low inflation.

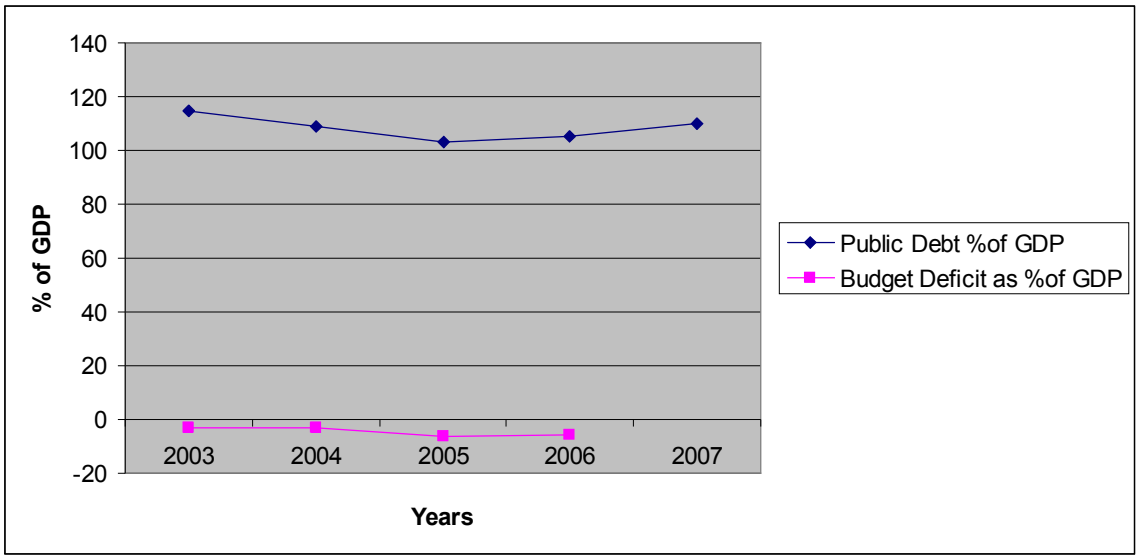
On the technical side, transmission mechanisms and channels of the monetary policy actions have to be defined, taking into considerations the characteristics of the Jordanian economy. Therefore, it is important to work on improving the CBJ technical capabilities, including its forecasting capabilities and the statistical reporting system. As for the definition of the targeted inflation rate, it should be communicated to the public. However, because of the political sensitivity of most of the measures and their consequences in the short run, successful implementation of the above reforms requires broad public consensus. Finally, all the abovementioned reforms can have a little effect without adequate political support for the changes to be implemented in practice.

Appendix

Graph I: Inflation rate in Jordan (2000-2008/Q1)[4]

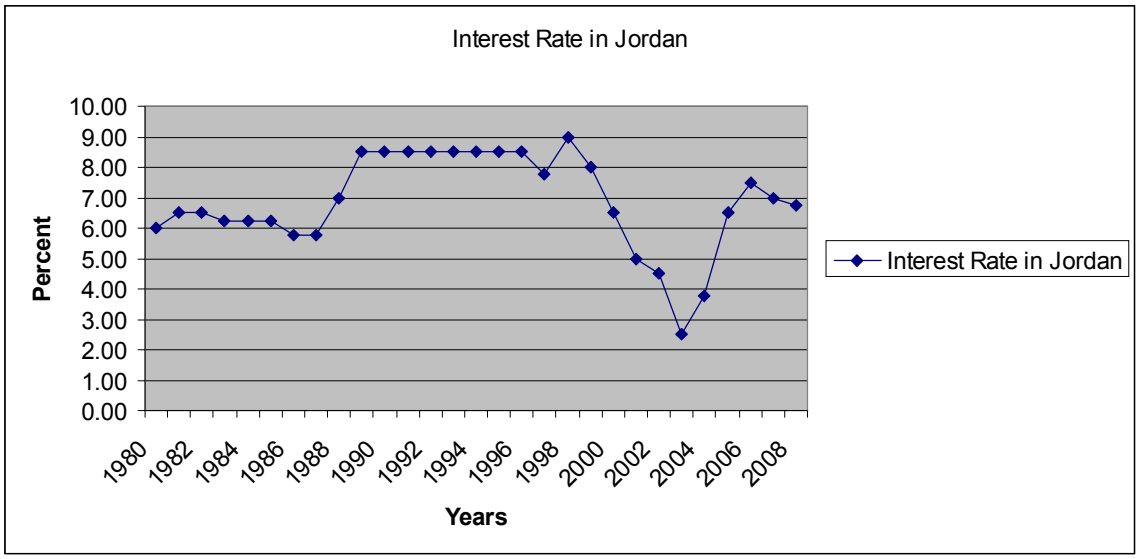


Graph II: Evolution of major fiscal indicators[5]



[4] *Central Bank of Jordan, Monthly Bulletins, Different Issues.*
[5] *Central Bank of Jordan, Monthly Bulletins, Different Issues.*

Graph III: Interest Rate in Jordan[6]



[6] *Central Bank of Jordan, Monthly Bulletins, Different Issues.*

Table 1: General Government Operations[7]

Year	RGDP Growth Rate	Rev as %of RGDP	Exp as %of RGDP	Deficit as % of RGDP	Gross Public Debt as % of RGDP
2003	8.44	41.56	44.69	-3.13	114.64
2004	7.4	43.39	46.65	-3.25	109.00
2005	6.00	41.90	48.42	-6.52	102.95
2006	4.99	44.77	50.50	-5.72	105.16
2007					110.01

Table2: Percentage Changes in CPI components prices[8] **(%)**

	Weight	***2003***	***2004***	***2005***	***2006***	***2007***	***2008/1***	***% change 2003-2007***
Food Items	39.72%	103	107	113	121	133	156.3	52.3%
Annual percentage rate		*2.6%*	*4.6%*	*5.1%*	*7.5%*	*9.3%*	*18%*	
Clothing and Footwear	4.85%	96.7	94.4	94	96.6	103	108.3	12%
Annual percentage rate		*-3.3%*	*-2.4%*	*-0.4%*	*2.8%*	*6.3%*	*5.5%*	
Housing	26.40%	102	104	106	117	114	130	11.9%
Annual percentage rate		*1.7%*	*1.7%*	*2.1%*	*5.6%*	*2%*	*14.2%*	
Other goods and services	29.03%	101	105	108	114	117	130.3	29.3%
Annual percentage rate		*0.8%*	*4.6%*	*2.8%*	*5.6%*	*2.6%*	*11%*	
Consumer Price Index	100.00%	102	105	109	116	122	139.5	37.3%
Annual percentage rate		*1.6%*	*3.4%*	*3.5%*	*6.3%*	*5.4%*	*14.6%*	

[7] *Central Bank of Jordan, Monthly Bulletin, 2007, author's calculations.*
[8] *Central Bank of Jordan, Monthly Bulletin, 2007, author's calculations.*

Table 3: Jordanian reaction function[9]

	β	γ	ρ	α	ζ
Baseline	0.79 (2.25)	1.05 (1.73)	0.84 (0.25)	3.7 (10.56)	
Adding					
Lagged inflation	0.72 (2.04)	0.97 (1.97)	0.83 (0.2)	3.8 (9.33)	0.005 (0.126)
Money Supply	0.65	1.2 (2.55)	0.88 (3.6)	2.9 (29.1)	0.07 (0.06)
Fed Fund Rates	0.06 (0.44)	0.58 (0.47)	0.73 (.22)	5.02 (4.45)	.088 (.088)
Real JD/USD	0.18 (1.28)	0.87 (1.08)	0.78 (0.28)	0.85 (13.99)	0.76 (2.09)

Standard errors are reported in parentheses. The set of instruments includes one year lags of inflation, output gap, interest rate, and the whole sales price Index.

[9] GMM estimations of the reaction function using Eviews software

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