IJEP International Journal of Economics and Politics

The Impact of Inflation Targeting on Direct Taxes in Selected Countries: A Propensity Score Matching (PSM) Approach

Hasan Kazemi Zaroomi*[1], Ahmad Jafari Samimi, Saeed Karimi Potanlar
Faculty of Economics and Administrative Sciences, University of Mazandaran, Babolsar, Iran

ARTICLE INFO

Article history:
Date of submission: 27-11-2019
Date of acceptance: 28-12-2019

JEL Classification:
E5
H2
C21

Keywords:
Inflation Targeting
Direct Tax
Propensity Score Matching
Monetary Policy
Policy Evaluation

ABSTRACT

Inflation targeting is a prevalent economic policy that is applied increasingly by countries. In addition, the effect of inflation targeting on macroeconomic variables is also been considered recently which mostly uses econometric models. One of the most important issues in this regard is that evaluating the effectiveness of inflation targeting usually confronted with bias in econometric models. In order to solve this problem, it is suggested the Propensity Score Matching Method (PSM) which has been used recently by economists. In this paper, it is tried to investigate the impact of inflation targeting on direct taxes and its components in a selected collection of two groups of oil importer and exporter countries by Propensity Score Matching Method (PSM) during 1990- 2016 years. The results show that adopting inflation targeting framework has a positive and significant effect on tax revenue in oil importer countries; whereas the impact of this policy in oil exporter countries is statistically insignificant and its direction is also ambiguous.

1. Introduction

Inflation targeting is one of the operational frameworks for monetary policy aimed at achieving price stability. Compared to alternative strategies - specifically money supply or exchange rate targeting, which seek to achieve low and sustained inflation through targeting intermediate variables such as the growth rate of money aggregates or exchange rate as a monetary anchor - the inflation targeting directly involves target inflation. Inflation targeting

[1] . *E-mail address: kazemi.hasan87@gmail.com*

has two main characteristics that distinguish it from other monetary policy strategies. First, the central bank commits to a unique and quantitative target in the form of a level or range for annual inflation. Determining a specific number for target inflation emphasizes the fact that the main focus of this strategy is price stability. Second, the inflation forecast over several horizons is the real intermediate target of policy making. For this reason, inflation targeting is sometimes referred to as "inflation forecasting targeting" (Svensson, 1997). Since inflation is somewhat predetermined by current prices and wage contracts or indexation to past inflation, monetary policy can only affect expected future inflation. As monetary conditions change, central banks will influence expected inflation in response to new information and target inflation over time, ultimately leading real inflation to anchor better to target.

Inflation targeting can help build credibility and contain inflation expectations faster and more durably. It is clear that low inflation is the main goal of monetary policy and will provide greater transparency in exchange for the loss of operational freedom. Inflation targets are inherently more transparent and easier to see and understand than other targets, as they are usually unchanged over time and controlled by monetary means. Inflation targeting can therefore help economic agents better understand and evaluate the performance of the central bank and also make inflation expectations faster and more stable than the strategies in which the central bank's role is less clearly defined and harder to monitor (Truman, 2003).

Since the 1990s, extensive literature has examined the interactions between monetary and fiscal policies, focusing mainly on the relationship between the public deficit and inflation. Fischer et al. (2002), Vu (2004), Catao & Terrones (2005), and Wimanda et al. (2011) argue that high inflation rates, especially in many developing countries, are associated with severe budget deficits, which is mainly financed by seigniorage revenue. Alesina & Tabellini (1987), Obstfeld (1991) and Jensen (1994) believe that if the central bank gives significant weight to the objective of price stability in its loss function, it will reduce the revenue generated by seigniorage and force the government to raisetaxation revenue through efforts to equip taxes. However, this monetary strategy entails a process of economic and

institutional reform that has a relatively large disciplining effect on fiscal policy management in avoiding seigniorage revenue and thus reduces public deficits by increasing tax revenue and reducing government expenditure. Nevertheless, developed inflation targeting countries have become more fiscally disciplined.

In the years since 2000, numerous empirical studies have been conducted to confirm the relationship between inflation targeting and the performance of fiscal policy indicators in developed and developing countries. Indeed, studies such as Miles (2007) and Tapsoba (2010) sought to answer the question of whether inflation targeting policy, as a monetary policy framework for stabilizing inflation, could have a positive effect on fiscal discipline. Lucotte (2012) found in an empirical analysis that adopting inflation targeting, which requires strengthening the central bank's independence and maintaining a low level of inflation, has a significant impact on the effort to collect tax revenue. Several empirical studies have sought to investigate the effect of inflation targeting on budgetary discipline in terms of budget deficit performance. Abo-Zaid & Tuzemen (2012), inspired by econometric findings of Ball & Sheridan (2004), concluded that fiscal policies in developed inflation targeting countries have become more disciplined. In addition, improvements in budget imbalances in some developing inflation targeting countries may be partly due to efforts to achieve target inflation. They also conclude that this imbalance is significantly improved when countries, especially developed countries, explicitly target the inflation. Therefore, non-inflation targeting countries will greatly benefit from adopting inflation targeting policies. Kadria & Ben Aissa (2014) examined the question of whether the implementation of inflation targeting monetary policy and its discipline function would reduce the budget deficit in emerging countries. To do this, they used the Propensity Score Matching method to evaluate the effect of inflation targeting program on fiscal policy in terms of budget deficit performance in emerging countries that have adopted this monetary policy framework. Their empirical analysis showed that, normally, adopting inflation targeting had a significant and remarkable effect on reducing the budget deficit. Ardakani et al. (2018) estimated the effect of inflation targeting on macroeconomic variables using

the semi-parametric Propensity Score Matching method. Their results showed that there was no significant difference in inflation rate and inflation fluctuations between inflation targeting and non-inflation targeting countries. Inflation targeting has also strengthened fiscal discipline in both developed and developing countries. These results reinforce the literature on the disciplinary effect of the inflation targeting regime on fiscal policy performance.

So far, no research has examined inflation targeting policy in oil-exporting countries. This is important because oil-exporting countries have special characteristics that can affect both the adoption of the inflation targeting and the results of implementing this policy. In oil-exporting countries, usually because of the high level of oil revenues, governments don't see any need to pursue more efficient and sustainable ways of earning revenue, especially move toward higher tax revenues that can reduce the popularity of governments and they prefer simplest ways to earning revenue. Applying inflation targeting policy, by limiting the seignorage revenues, can encourage the government to move towards improving the tax structure and increasing tax revenues, especially direct taxation.

The purpose of this paper is to empirically investigate the impact of adopting inflation targeting policy framework on tax revenues in two groups of oil importing and exporting countries during the period of 1990 to 2016. To this end, the remainder of the paper is organized as follows: Section 2 reviews the theoretical foundations and background of the research. The data are discussed in Section 3. The research methodology is described in Section 4. The empirical results are presented in Section 5 and finally Section 6 is devoted to conclusions and recommendations.

2. Theoretical Foundations and Literature Review

There is a broad theoretical literature on the relationship between monetary and fiscal policies. This set of studies particularly emphasizes that the monetary policy assignment to an independent and conservative central bank should influence the design of fiscal policies (see e.g.,Masciandaro & Tabellini, 1988; Castellani & Debrun, 2001; Montiel, 2011). Indeed, the independence of monetary authority, along with their apparent commitment

to price stability, will in the future deprives the government of inflation tax revenue and thereby impose greater fiscal discipline. This is especially true in developing countries where seigniorage is animportant source of government revenues (World Economic Outlook, 2001). In this regard, Lucotte (2009), using data covering a large sample of developing countries, found relatively strong evidence for the negative relationship between central bank independence and budget deficit predicted in theory. In addition, Gerlach (1999) argues that inflation targeting can be seen as an alternative for central bank independence, given the legitimate objective of price stability for monetary authorities. Accordingly, within the framework of inflation targeting, seigniorage is restricted by a transparent law, forcing the government to implement more responsible fiscal policies.

In order to reduce the budget deficit, a budget authority has two complementary options: restrain spending or increase revenues. On the spending side, the government can take measures to reduce structural spending and improve efficiency in public spending allocation. Since the 1980s, a common measure to strengthen the state's fiscal conditions has been the privatization or reform of state-owned enterprises (Montiel, 2011). On the revenue side, the government can make reforms to improve the performance of tax administration - that is, the capability of the government to efficiently impose and collect taxes. Therefore, it seems that implementing such tax reforms would generate more revenue at a given level of economic activity and thus createa significant reduction in seigniorage revenue due to tighter monetary policy.

Following this insight, Minea and Villieu (2009) show theoretically that a stricter monetary policy should inevitably lead the government to improve the institutional quality of tax structures in order to limit the erosion of tax revenues. By extending the model presented by Huang and Wei (2006) which was modifying the principal-agentstructure and a combination of indicators for financial development and social welfare function, Minea and Villieu (2009) concluded that, based on institutional reform, followinga low-inflation target encourages the government to improve the performance of its tax collection system. Therefore, it is expected that the adoption of inflation

targeting policy in the selected countries will have a positive effect on the process of tax collection.

More precisely, Minea and Villieu (2009) consider a model in which the government has two sources of income to support public expenditures: output tax and inflation tax (i.e., seigniorage). In addition, they also included two types of sources of revenue leakage within the government budget: tax revenue leakage determined by the degree of institutional quality, and seigniorage revenue leakage determined by the degree of financial sector development. In fact, they argued, poor institutionalized countries were unable to create an efficient tax system, and that is why these countries are characterized by their continued weakness in tax collection. On the other hand, countries with a well-established tax structure exploit a larger portion of their tax capacity and have lower tax revenue leakage. Concerning seigniorage revenue leakage, Minea and Villieu (2009) applied a financial development index to take into account the fact that the banking system's share of the seigniorage revenue relative to the central bank increases in proportion to the level of financial development. In other words, the higher the degree of financial development, the lower the proportion of seigniorage revenue, earned as a source of government spending. Therefore, in line with the view of Cukierman et al. (1992), Minea and Villieu (2009) suggested that in economies characterized by poor tax management structure and less developed financial markets widespread use of the seigniorage as an alternative source of government revenue to conventional tax revenue is common.

In addition, as in the model by Huang and Wei (2006), their model assumes a two-stage game with three factors: the central bank, the fiscal authority, and a superior authority (here we mean the economic agents in society). However, the chain of activities is reversed, and the timing of the model is as follows: In the first step, the superior authority (acting as the principal) chooses a monetary regime to maximize the social welfare function. Secondly, the central bank (as the agent) selects the inflation rate, tax rate, and level of effort to improve the quality of institutions that maximize the government's objective function. More precisely, with regard

to the inflation targeting framework, the superior authority determines theinflation target that the monetary authoritymust meet.

The model presented by Minea and Villieu (2009) yielded two interesting results. First, by finding an inverse relationship between effort level and inflation target, they showed that lower inflation target would result in higher government efforts to improve the quality of their institutions. In other words, by keeping the inflation target low, the government can step up its efforts to streamline its tax collection process to compensate for the loss of seigniorage revenue due to stricter monetary policy. Thus, it combines the empirical and theoretical perspectives outlined above, which emphasize the effect of higher degrees of central bank independence on government fiscal discipline.

As a result, it is important to note that the government's incentive to improve the tax collection process may be undermined by a significant reduction in inflation. In fact, empirical literature has provided evidence of the negative effect of inflation on tax revenue, called the Olivera-Tanzi effect (Tanzi, 1992). This inverse relationship is generally explained by the fact that the real value of tax revenue is reduced by inflation, as for some tax groups there is a time lag between the date of imposition and its efficient collection. Thus, by targeting inflation at very low levels, and consequently by increasing the real amount of tax revenue, inflation targeting can undermine the government's effort to efficiently collect taxes. However, in most inflation targeting economies, inflation targeting policy was adopted after a process of inflation reduction. Therefore, the Olivera-Tanzi reverse effect is expected to be relatively marginal in these countries.

In an empirical study Fazio et al. (2018) found that while the financial stability of inflation targeting countries with high quality of institutions is not significantly improved by this policy, countries with a moderate level of institutional quality appear to benefit more. In addition, in countries with low levels of institutional quality, inflation targeting and financial stability are associated with the fact that governments must have at least some public trust in order to effectively implement economic policies. In international analysis, they found an inverted U-shaped relationship between inflation targeting and financial stability as an institutional quality function. Díaz-

Roldán et al. (2019) have analyzed the performance of fiscal policy in Brazil since the implementation of the Inflation Targeting regime in 1994 and the usefulness of fiscal rules to achieve fiscal discipline. In this regard, by defining three different fiscal rule scenarios, it is concluded that, if inflation targeting framework is in place, the use of proper fiscal rule helps to rationalize fiscal consolidation efforts by promoting afavorable environment for economic growth. Galvis Ciro & Ferreira de Mendonça(2018), by reviewing the economy of Colombia, concluded that inflation targeting by increasing reputation of the central could lead to an increased tax effort. Erfani et al. (2016) evaluated the effect of inflation targeting on tax revenue for a sample of 50 developing countries using the Generalized Method of Moments(GMM) and found that adoption of inflation targeting policy in developing countries increases tax revenue.

Countries with natural resources, especially oil, as the most important part of natural resources, make a lot of revenue through the sale of these natural resources, and the revenues from the sale of oil provide a significant portion of government expenditure in these countries. Most oil-exporting countries are developing economies, which usually have inefficient tax structures and weak fiscsl discipline.

Dependence on oil revenues leads to Dutch disease and causes the economy to be heavily dependent on oil shocks and foreign economies, which can have devastating and irreversible effects on the economy. Volatility and instability are essential features of crude commodity markets such as oil and gas. The sharp fluctuation in the price of natural resources in the market can be due to the low supply elasticity of these resources. The most important consequence of these fluctuations is the uncertainty in amount of definitive revenue from oil exports, which in turn makes government revenue unpredictable. And as a result, government expenditure is unpredictable and, therefore, this uncertainty poses serious policy making challenges.

Previous empirical studies have often examined countries with proper fiscal development and institutional quality, with no regard for the country's dependence on natural resource revenues, and whether the presence of the Dutch disease could change the effectiveness of inflation targeting policy. In

other words, does the implementation of inflation targeting in oil exporting and importing countries have similar effects, and does a country like Iran, which is an oil exporter, also have similar profit from adopting this policy?

3. Data

The independent variable of this research is Inflation Targeting which is a binary variable taking the value 1 if a country operates with an inflation targeting framework at the year t, and 0 otherwise.In this paper, we categorize inflation targeted countries according to Schmidt-Hebbel & Carrasco (2016). According to this classification, our sample consists of a set of 35 inflation targeter countries and 33 non-inflation targeter countries. Table 1 lists the sample countries of this study in the category of oil importer and oil exporter.

Table 1. List of inflation targeter and non-inflation targeted countries

Oil Importing Countries			
inflation targeted		Non-inflation targeted	
Armenia (2006)	NewZeeland (1990)	Austria	Jamaica
Australia (1993)	Paraguay (2013)	Bangladesh	Jordan
Chile (1991)	Peru (2002)	Belarus	Lithuania
Czech (1997)	Philippines (2002)	Belgium	Morocco
Dominican (2011)	Poland (1999)	Bulgaria	Netherlands
Georgia (2009)	Romania (2005)	China	Pakistan
Guatemala (2005)	Serbia (2006)	Croatia	Portugal
Hungary (2001)	SouthAfrica (2000)	Finland	Spain
Iceland (2001)	Sweden (1995)	France	Sri Lanka
India (2011)	Thailand (2000)	Germany	Switzerland
Indonesia (2005)	Turkey (2006)	Greece	Trinidad
Japan (2013)	Uganda (2012)	Ireland	Ukraine
Korea (1998)	UnitedKingdom (1992)	Italy	Uruguay
Moldova (2010)			
Oil Exporting Countries			
inflation targeted		Non-inflation targeted	
Albania (2009)	Ghana (2007)	Algeria	Kazakhstan
Brazil (1999)	Mexico (2001)	Azerbaijan	Vietnam
Canada (1991)	Norway (2001)	Congo	EquatorialGuinea
Colombia (1999)	Russia (2014)	IR Iran	

Note: inflation targeting adoption year for inflation targeter countries has reported in parentheses.

The endogenous variable of this study is the components of direct tax revenue as a share of GDP which its components are include total income tax revenue, individual income tax revenue, corporate income tax revenue, and property tax revenue.

Finally, other variables of the model are ones that determine the probability that a country will adopt the inflation targeting policy. Following the empirical literature focusing on the determinants of moving towards inflation targeting policy, five variables were selected: inflation rate, central bank governors turnover rate, GDP per capita growth, the domestic credit to private sector to GDP, the trade openness.

The research dataset consists of 68 countries, including 15 oil exporting countries and 53 oil importing countries, during the period of 1990 to 2016. The data were collected from various sources, especially the World Bank and the IMF.

4. Econometric methodology

The main challenge of econometric analysis in the present study is the nature of the independent variable, which is binary.If the country pursues a policy of inflation targeting at period t, it takes the value1, and otherwise it becomes zero. The difficulty of assessing the effect of inflation targeting on tax revenue stems from the fact that we cannot observe how this revenue would have occurred if an inflation targeted country had decided not to adopt this policy. In contrast, it is impossible to see how tax revenue could have been achieved if a country that had not pursued inflation targeting decided to implement it.

A simple way to assess this causal effect is to compare the average tax revenue for two groups that have implemented and have not implemented inflation targeting. This model was proposed by Rubin (1974). To do so, it is assumed that the two groups of countries are very similar, such that countries which adopted inflation targeting would have had tax revenues similar to those in the comparison group in the absence of inflation targeting. But in reality the countries in question are a relatively heterogeneous group.

Therefore, using this statistical approach raises the issue of inflation targeting, which can overestimate the effect of inflation targeting on tax revenue.

In response to this problem of selection bias, Rosenbaum and Rubin (1983) devised the PSM model that is a non experimental method that matches treated observations and untreated observations based on observable characteristics that are not affected by the treatment. The average treatment effect is calculated as the mean difference of the outcomes (the study variable) between two groups, namely treated and untreated group. Here, the program means adopting inflation targeting and the outcome (the study variable) is tax revenue. In fact, if a country pursues an inflation targeting strategy in year t, it falls into the treated group and if it does not apply this monetary policy framework in the same period, it falls into the untreated group. Finally, the matching is made according to a set of factors that are potentially relevant to a country's choice of inflation targeting.

Therefore, the Average Treatment effect on Treated (ATT) can be written as follows:

$$\Delta_{ATT}^{PSM} = E[Y_{it}^{1}|T_{it} = 1.p(X_{it})] - E[Y_{it}^{0}|T_{it} = 0.p(X_{it})] \qquad (1)$$

In equation 1, T is the independent variable, i.e., inflation targeting, and Y is tax revenue. Thus, $Y_{it}^{1}|T_{it} = 1$is the tax revenue observed in the country that has implemented inflation targeting in year t, and $Y_{it}^{0}|T_{it} = 0$is the tax revenue observed in the counterfactual. $p(X_{it})$is thepropensity score, that is, the probability that country i will adopt the inflation targeting framework in period t, subject to the set of observable variables X. The propensity score is written as follows:

$$p(X_{it}) = pr(T_{it} = 1|X_{it}) \qquad (2)$$

The propensity score is estimated using a model with binary results (probit or logit). In Equation 2, X_{it} is a vector of variables corresponding to the observed characteristics of a country, which are theoretically related to the adoption of inflation targeting.

The propensity score matching method is increasingly being used in microeconomics to evaluate the effectiveness of development programs,

including educational or health programs. However, it has been used to a lesser extent in macroeconomic studies.

5. Model estimation and analysis of Results

Participation in a program or treatment, such as adopting inflation targeting policy, can have an effect on participants' response to the program. The resulting effect is the result of executing the program in question. Inflation targeting policy can be aimed at improving government performance, including improving tax performance, the realization of which is the result of this specific program that It happens for countries that adopt this policy. However, improvement in tax performance can be achieved for other countries as well. What are the effects in inflation targeting countries and how much is the response of other countries to tax performance, can be examined in the propensity score matching method.

In this section of the paper, the results of the propensity score matching method are analyzed to assess the impact of inflation targeting policy on the tax performance of oil exporting and importing countries. Based on this approach, the reaction of the government's tax performance to adopting inflation targeting policy can be assessed.

Table 2 reports the results of the probit estimation to obtain the probability values of participating in the treatment group (propensity scores) for each of the observations, which are used to match units. The dependent variable is the inflation targeting.

Table 2. Probit estimates of propensity scores

	all countries	oil importing countries	oil exporting countries
trade openness	-0.0039154**	0.001552	-0.043447***
	(0.0016874)	(0.001876)	(0.007518)
domestic credit to private sector	0.0081953***	0.006605***	0.033140***
	(0.0012595)	(0.001484)	(0.005851)
Inflation	-0.0747742***	-0.070769***	-0.142416***
	(0.0117238)	(0.013939)	(0.027420)

GDP per capita growth	0.0005579	0.030933*	-0.068729*
	(0.0133433)	(0.017892)	(0.037674)
central bank governors	3.3522492***	3.687105***	0.044308
turnover	(0.5780724)	(0.692145)	(1.293885)
Constant	-1.4672596***	-2.027040***	1.887127**
	(0.2549928)	(0.299604)	(0.763409)

Note: standard errors are reported in parentheses. *, **, *** refer to statistical significance at the 10%, 5% and 1% respectively.

The results of estimating the propensity score matching model for direct tax components are reported in Table 3.

Table 3. Matching estimates of treatment effect on the level of direct tax revenue components

Average Treatment on Treated (ATT)	all countries	oil importing countries	oil exporting countries
income tax	1.8295***	1.9683***	-1.4422
	(0.34752)	(0.4233)	(1.9103)
individual income tax	1.2376***	1.2201***	-1.0392
	(0.28879)	(0.37412)	(1.4535)
corporate income tax	0.56609***	0.5707***	0.17075
	(0.15807)	(0.17307)	(1.5278)
property tax	0.26114***	0.14634	-0.063035
	(0.072142)	(0.090102)	(0.32326)

Note: standard errorsarereported in parentheses. *, **, *** refer to statistical significance at the 10%, 5% and 1% respectively.

As shown in Table 3, the average treatment effect on treated(ATT) for the variable of income tax, individual income tax, corporate income tax, and property tax forall countries is positive and statistically significant.

In the group of oil importing countries, the estimated ATTs for the variables of income tax, individual income tax and corporate income tax are positive and significant, while the ATT for property tax is statistically insignificant.

Finally, in the group of oil exporting countries, all ATTs are not significant. The results for income tax, individual income tax and property tax are negative and the corporate income tax coefficient is positive.

Inflation tax and institutional quality are alternatives to government financing, because stronger institutional quality increase tax collection. In this way, low inflation frameworks, leading to low income from seigniorage, encourage the government to improve the quality of tax administration and tax efforts and causes an increase in tax resources.

A low inflation target is an effective tool that encourages governments to strengthen their tax structures. According to empirical observations of inflation targeting, countries that adopt inflation targeting have on average better tax structures than other countries.

Inflation targeting requires two basic preconditions: fiscal discipline and central bank independence. In oil-exporting countries, because of their drastic dependence on oil revenues and the budgetary needs that is main characteristic of these countries, there isn't sufficient ability and resolute impetus to exact implementation and with the full discipline of this policy, that makes the results of the inflation targeting in these countries not exactly consistent with other countries.

Generally due to high oil revenues in oil-exporting countries they do not see the need to reform their tax structure. As a result, even adopting an inflation targeting policy has not had a positive impact on the fiscal policy performance and tax structure of these countries. Therefore, in addition to adopting monetary policy frameworks such as inflation targeting, special attention should be paid to the dependence of the fiscal structure of these countries on oil revenues and the need for fiscal discipline. The structural problems and poor institutional quality in these countries, which are caused by the defective structure of these economies, are a major obstacle to improving the fiscal situation and increasing the efficiency of tax performance. Finally, we must accept the fact that modernizing the tax structure requires profound reforms that take time to achieve income benefits. Also, because oil-exporting countries are often developing countries, as a result, usually in these countries, fiscal development and

institutional quality are not sufficiently developed, and after adopting inflation targeting, they need time to gradually improve institutional quality.

6. Conclusion and Suggestions

The present study, using the propensity score matching method, examines the impact of the adoption of inflation targeting policy on tax revenue in two groups of oil-importing and exporting countries from 1990 to 2016.

The results for all countries and oil-importing countries are that adopting this monetary policy framework while keeping inflation at a low level, can encourage the government to improve tax revenue collection so that it can to recoup the substantial loss of seigniorage revenue due to a tighter monetary policy. Indeed, empirical results show that, on average, adopting inflation targeting policy has led to increased tax collection in these countries.

The empirical findings suggest that inappropriate fiscal policy should not prevent countries from adopting inflation targeting, because this monetary policy framework can help constrict and disciplining fiscal policy. In the medium term, the success and sustainability of inflation targeting will depend on the ability of the authorities to plan and implement institutional reforms following the adoption of inflation targeting, in particular reforms to modernize the tax structure.

In oil-exporting countries, the results indicate that adopting inflation targeting policy has not had a significant impact on their tax revenues. This result illustrates the effects of these countries' heavy dependence on huge oil revenues. The oil-exporting countries are essentially developing countries because of their inherent characteristics and institutional quality in these countries is usually lower than international averages. For oil-exporting countries, in addition to adopting inflation targeting policy, tighter policies should be implemented to manage, control and strictly monitor fiscal discipline so governments can't offset the loss of inflation tax revenue by injecting oil revenues leading to Dutch disease. The simultaneous implementation of inflation targeting policy and the removal of dependence on oil revenues could lead these oil exporter countries also can benefit from the positive and constructive effects of this monetary policy framework on improving the quality of economic and fiscal structures.

References

Abo-Zaid, S., & Tuzemen, D. (2012). Inflation Targeting: A three-decade perspective. *Journal of Policy Modeling*, *34*(5): 621-645.

Alesina, A., & Tabellini, G. (1987). Rules and discretion with noncoordinated monetary and fiscal policies. *Economic Inquiry*, *25*(4): 619-630.

Ambaw, D. T., & Sim, N. (2018). Is inflation targeting or the fixed exchange rate more effective for attracting FDI into developing countries?. *Applied Economics Letters*, *25*(7): 499-503.

Ardakani, O. M., Kishor, N. K., & Song, S. (2018). Re-evaluating the effectiveness of inflation targeting. *Journal of Economic Dynamics and Control*, *90*, 76-97.

Ball, L. M., & Sheridan, N. (2004). Does inflation targeting matter?. In *The inflation-targeting debate* (pp. 249-282). University of Chicago Press.

Castellani, M. F., & Debrun, M. X. (2001). *Central bank independence and the design of fiscal institutions* (No. 1-205). International Monetary Fund.

Catao, L. A., & Terrones, M. E. (2005). Fiscal deficits and inflation. *Journal of Monetary Economics*, *52*(3): 529-554.

Cukierman, A., Edwards, S., & Tabellini, G. E. (1992). Seigniorage and political instability. *The American Economic Review*, *82*: 537-555.

Díaz-Roldán, C., Ferrari-Filho, F., & da Silva Bichara, J. (2019). The performance of fiscal policy under an inflation targeting regime: What can be learned by the Brazilian fiscal rules?. *Metroeconomica*, *70*(1): 98-118.

Erfani, A., Rezaee, M., &Eskandari, M. (2016). The Impact of Inflation Targeting on Tax Revenues: A Cross-country Analysis. *Taxjournal*, *24* (30): 213-241.

Fazio, D. M., Silva, T. C., Tabak, B. M., & Cajueiro, D. O. (2018). Inflation targeting and financial stability: Does the quality of institutionsmatter?. *Economic Modelling*, *71*: 1-15.

Fischer, S., Sahay, R., & Végh, C. A. (2002). Modern hyper-and high inflations. *Journal of Economic literature*, *40*(3): 837-880.

Galvis Ciro, J. C., & Ferreira de Mendonça, H. (2018). *Inflation targeting and tax effort: Evidence from Colombia* (No. 90544). University Library of Munich, Germany.

Gerlach, S. (1999). Who targets inflation explicitly?. *European Economic Review*, *43*(7): 1257-1277.

Huang, H., & Wei, S. J. (2006). Monetary policies for developing countries: The role of institutional quality. *Journal of International Economics*, *70*(1): 239-252.

Jensen, H. (1994). Loss of monetary discretion in a simple dynamic policy game. *Journal of Economic Dynamics and control*, *18*(3-4): 763-779.

Kadria, M., & Aissa, M. S. B. (2014). Implementation of inflation targeting and budget deficit performance in emerging countries: a treatment effect evaluation. *Journal of Applied Business Research*, *30*(4): 1077.

Lucotte, Y. (2009). Central bank independence and budget deficits in developing countries: New evidence from panel data analysis, 1-24.

Lucotte, Y. (2012). Adoption of inflation targeting and tax revenue performance in emerging market economies: An empirical investigation. *Economic Systems*, *36*(4): 609-628.

Masciandaro, D., & Tabellini, G. (1988). *Monetary regimes and fiscal deficits: A comparative analysis*. Springer Netherlands.

Miles, W. (2007). Do inflation targeting handcuffs restrain leviathan? Hard pegs vs. inflation targets for fiscal discipline in emerging markets. *Applied Economics Letters*, *14*(9): 647-651.

Minea, A., & Villieu, P. (2009). Can inflation targeting promote institutional quality in developing countries. In *The 26th Symposium on Money, Banking and Finance, University of Orléans*, 25-26June.

Montiel, P. J. (2011). *Macroeconomics in emerging markets*. Cambridge University Press.

Obstfeld, M., 1991. Dynamic seigniorage theory: an exploration. Discussion Paper 519. Center for Economic Policy Research, London.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*(1): 41-55.

Rubin, D. B. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of educational Psychology*, *66*(5): 688-701.

Schmidt-Hebbel, K., & Carrasco, M. (2016). The Past and Future of Inflation Targeting: Implications for Emerging-Market and Developing Economies. In *Monetary Policy in India* (pp. 583-622). Springer, New Delhi.

Svensson, L. E. (1997). Inflation targeting in an open economy: strict or flexible inflation targeting?. *Reserve Bank of New Zealand Working Paper*, (G97/8).

Tanzi, V. (1992). 12 Structural factors and tax revenue in developing countries: a decade of evidence. *Open Economies: Structural Adjustment and Agriculture*, 267-289.

Tapsoba, R. (2010). Does inflation targeting improve fiscal discipline. *An empirical investigation. Clermont Université, Université dâAuvergne (CERDI, 3*: 380-408.

Truman, E. M. (2003). *Inflation targeting in the world economy*. Columbia University Press.

Valera, H. G. A., Holmes, M. J., & Hassan, G. M. (2018). Is inflation targeting credible in Asia? A panel GARCH approach. *Empirical Economics*, *54*(2): 523-546.

Vu, U. (2004). Inflation dynamics and monetary policy strategy: some prospects for the Turkish economy. *Journal of Policy Modeling*, *26*(8-9): 1003-1013.

Wimanda, R. E., Turner, P. M., & Hall, M. J. (2011). Expectations and the inertia of inflation: The case of Indonesia. *Journal of Policy Modeling*, *33*(3): 426-438.

World Economic Outlook. (2001). International Monetary Fund.

Appendix: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.
oil importing countries				
trade openness	75.5629	300	9.8762	35.6795
domestic credit to private sector	64.2311	312.1179	0.12	48.5817
Inflation	31.5963	7481.664	9.8762	280.2053
GDP per capita growth	1.4635	23.9569	-967.702	26.4051
central bank governors turnover	0.2166	0.43	0.06	0.0966
income tax	7.954957	23.3	0.00012	4.919844
individual income tax	4.973259	19.2	-0.06746	4.233879
corporate income tax	2.819034	34.93427	0.00012	2.495211
property tax	1.05E+00	7.30E+00	0.00E+00	1.031864
oil exporting countries				
trade openness	79.8527	531.7374	15.1617	60.4136
domestic credit to private sector	39.4611	291.7516	0.8173	46.8588
Inflation	67.3763	2947.733	-10.6301	300.892
GDP per capita growth	2.8923	140.5011	-29.1633	10.0929
central bank governors turnover	0.234	0.6	0.06	0.1259
income tax	7.64118	30.4	0.112066	6.099864
individual income tax	2.666437	14.6	0.02749	3.478972
corporate income tax	4.219947	28.3839	0.005796	4.335075
property tax	0.726307	3.9	-6.94E-18	1.012595