

MONETARY POLICY IN ICELAND: **AN EVALUATION**

by

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EXECUTIVE SUMMARY

1. The purpose of this report is to *evaluate the current monetary policy regime* in Iceland, and determine if it needs to be changed, reformed, or adjusted. A restriction of the analysis is to consider only regimes with a national currency -- that is, joining an existing monetary union, or adopting another country's currency as legal tender are not considered to be options.¹
2. The report has an Introduction, three main parts and an annex: In Part One I provide some reflections on monetary and exchange rate policy options. This part does not pretend to be a primer on these subjects, but rather a brief synthesis that will help put things in perspective. Although this part is quite general, it emphasizes those aspects of monetary policy that are relevant for Iceland (the roles of capital controls and currency intervention, for example). Part Two, on the other hand, is an evaluation of the Central Bank of Iceland own assessment of its policy making during the last eight years or so. This evaluation draws on a number of reports published by the Bank, as well as on interviews in Reykjavík with a number of Bank officials, government functionaries, and experts from the private sector, including unions and business groups. It also relies on a deep analysis of the data. Part Three includes my recommendations. There is also an Annex, where I discuss models for assessing exchange rate equilibrium; this Annex is an integral part of the report, as it deals at a conceptual level with an issue that is of great importance for Iceland.
3. One of the main objectives of Part Three is to provide suggestions that will help improve monetary policy in Iceland. These recommendations have to do with the type of information that is gathered and used in the decision-making process, as well as with the type of models and processes used by the Central Bank of Iceland. This is also done in the Annex, where I argue that there is need to greatly increase the CBI's research and knowledge on the determinants of long run real exchange rate equilibrium, and on the sustainability of the external accounts. The importance of these issues stem from the fact that in small open economies and a globalized world,

¹ This restriction was included in the "terms of reference" provided to the team of outside experts analyzing this issue. This means that by ruling out one of the "corner solutions" – giving up the domestic currency – the analysis necessarily will explore "interior solutions" and the other "corner": full float.

the nominal exchange rate provides the main transmission mechanism for monetary policy.²

4. The main conclusion of my analysis is that monetary policy has contributed significantly to Iceland's recovery, and to the return of confidence. A review of monetary policy actions since 2012-2013 does not show any serious mistakes, or steps in the wrong direction. This does not mean, however, that there should be no changes/adjustment/reforms. In fact, there are a number of areas where policy could and should be improved, and a number of areas where changes should be considered. My recommendations for the future are summarized in the next numerals, and are explained in detail in the report itself.

5. The main recommendations for the future may be summarized as follows:
 - a. It is important to realize that *there is no "silver bullet" in terms of monetary regime/policy*. Central banking is an imperfect science.
 - b. Along similar lines, it is important to realize that there is a close connection between the exchange rate regime and the monetary policy regime.
 - c. After analyzing the data and the current policy procedures, my conclusion is that at the current time the best monetary regime for Iceland is *"flexible inflation targeting."*³
 - d. Although this is monetary policy framework currently pursued in Iceland, my proposal is not a defense of the status quo. In fact, there are a number of areas where the current framework for monetary policy could be improved on. In that regard, my recommendation is that Iceland moves to what may be called an *"improved inflation targeting"* monetary policy regime.
 - e. The most important suggested reforms/changes/alterations to the current policy framework are the following:

² It is important to explain at the outset that this is not a criticism of the CBI's research department. In fact, as noted in the body of this report, the research department is extremely efficient and produces high quality work. This is particularly impressive given its small size – a staff of 20 people. The purpose of these comments is to point out those areas where additional research would be beneficial.

³ As noted below, in the body of the report, this analysis only considered options with a "currency of its own." The regimes discussed in the body of the report are: inflation targeting with floating exchange rate; inflation targeting with currency bands.

Controls on capital inflows: The remaining controls on capital inflows should be lifted gradually. It is also recommended that, at least for some period of time, the reserve requirements are set at zero, which is different from totally eliminating the policy. The medium-term objective is to have no capital controls. This is the standard for advanced countries, and Iceland should aim at it. Having said that, it is important to note that macro prudential regulations should be put in place and strengthened, in order to make sure that speculative forces/flows don't destabilize the domestic banking sector. The CBI has been making good progress in this respect. This issue is being addressed in detail by Prof. Kristin Forbes, as part of this overall evaluation exercise.

Reserve accumulation policy: It is suggested that the CBI continues to have a reserves accumulation policy that will maintain the stock of foreign assets at the central bank between 1.5 and 1.8 times IMF's RAM.

Intervention in the currency market: Currently, the CBI tries to smooth (large) changes in the ISK. However, market participants believe that the decision-making rule is not particularly clear or transparent; this adds unnecessary noise to the system. It is recommended that the CBI considers the experience of other countries with transparent intervention policies. The case of New Zealand, with its so-called "traffic lights" intervention policy, is particularly relevant for this discussion. This case is discussed in detail in the body of the report.

Policy interest rate differentials: Defining the "optimal" policy rate differential between the CBI and the major central banks, such as the Federal Reserve or the European Central Bank, is beyond the scope of this report. However, it is clear that its current level, as of December 2017 – 300 basis points with respect to the FED and 425 bps with respect to the ECB –, is not an equilibrium one. It is important for the CBI to research this issue, and define an equilibrium range for policy differentials that reflect risk premia. The Bank's views on the subject should be made clear to market participants. The equilibrium differential will depend on what is done with respect to the three previous recommendations: capital controls, reserves accumulation, and currency intervention.

6. In spite of being a small institution, the Central Bank of Iceland operates in a highly professional way. It has a high quality research department; CBI professionals are

very active in international fora, and highly respected by their peers. In addition, the Bank has developed a strong and highly professional process for dealing with *prudential regulation*. However, since the Icelandic economy has gone through important structural changes since 2007, there are some areas where the understanding of the way in which the economy works seems to be somewhat out of date.⁴ In particular, and as it is pointed out below, the knowledge about important phenomena such as the “pass-through coefficients,” and the appropriate coefficients for the Taylor Rule appear to be outdated. Also, there is limited information/knowledge on what is the most appropriate way of reacting to external monetary shocks, such as changes in the policy rate by the major central banks (Federal Reserve, ECB, and Bank of England). Thus, it is recommended that further efforts are made to understand better the following phenomena (See Parts Two and Three of this report for details):

- i. The way in which changes in the policy rate affect the yield curve, both for nominal and inflation-adjusted interest rates. This is vitally important in order to understand fully the transmission mechanism of monetary policy, and to make sure that this is as effective as possible. Surprisingly, there are no up to date estimates on this process. Existing preliminary evidence suggests that this (traditional) transmission channel has become weaker in Iceland during the last few years; this is also the case in other small open economies.⁵
- ii. The way in which changes in the policy rates affect the nominal exchange rate, both bilateral and trade weighted. There are no updated quantitative empirical estimates of the impact of policy changes affect the value of the ISK. This is equally important as the previous points, since in many small open economies the exchange rate has become the most important transmission channel from monetary policy to the rest of the economy. As noted, what makes this issue particularly complex is that Iceland went

⁴ It is acknowledged that the research department makes efforts to update these coefficients. A key question, however, and one that is not clear to this analyst, is whether the analyses available at the time this report was written, completely capture the new structure of the economy. It should be noted that a particularly important attempt at updating the analysis was released after this report was written. It is contained in *Monetary Bulletin*, 2018/2.

⁵ This point has been made by the governor of the CBI. See Gudmundsson (2017).

through a major structural change a few years ago. That is, econometric estimates would have to capture this “break point.”

- iii. A better and more precise understanding of the “pass-through” mechanism is of essence for an effective monetary policy design in a small open economy. Here, it is important to obtain precise information on the pass-through with respect to different price indexes (i.e. CPI, PPI, tradables, non tradables, housing, other services). The reason for this is the same as in the two previous numerals.

Points (i) through (iii) are fundamentally important for any small *open* economy. The reason is that, as noted in the body of the report, in these economies the yield curve usually provides a weak transmission mechanism for monetary policy. As a number of authors, central bankers, and analysts have recently pointed out, in a globalized setting the exchange rate provides the main transmission channel. This is particularly true for countries such as New Zealand, Australia, and Iceland.

- iv. It is important to understand better the way in which changes in policy rates affect the housing market, both in terms of prices and quantities. There is recent evidence suggesting that housing is one of the main drivers of the business cycle. As a consequence of the tourism boom, this seems to be particularly the case in Iceland.

A key recommendation of this report: The CBI should incorporate developments in the housing market in a more formal way into the monetary policy process; *possibly*, even into the formal policy rule.⁶ The housing sector is important both with respect to prices and quantities. In terms of prices what matters is how rents (including imputed rent for owner occupied dwellings) impact the CPI, and, thus, actual inflation. But prices are not the only pertinent variable related to housing; quantities are also very important. As noted above, and as explained in detail in the body of the report, an increasing number of scholars have recently argued that housing is one of the most important determinants of the business cycle. In addition, in many small open economies speculative activities in this

⁶ Notice that I am using the word “possibly.” This means that this is a tentative conclusion; no final recommendation can be made for results from in-depth research are available.

sector have been at the heart of the major financial and banking crises; this is particularly the case when “housing frenzy” coincides with RER overvaluation. In this regard, it is important to recall Prof. Robert Aliber’s remark about the profusion of construction cranes in Reykjavík in 2007.

- v. It is important to define more clearly the form – including the coefficient values – of the “Taylor rule” used to guide policy.⁷ More generally, there is a need for the CBI to assess whether it needs to incorporate additional terms into the policy rule. As I point out in this report, recent research by a number of scholars, including John Taylor and Richard Clarida, indicate that under some conditions it is optimal for small open economy to incorporate the policy rate of the ECB and/or the Federal Reserve when making decisions about their own policy stance. This allows for better policy coordination. At the same time, by maintaining interest rate differentials within a certain range, it avoids large exchange rate movements that may result in RER misalignment.

- vi. There is a need to have a better understanding of when the real exchange departs from its long run equilibrium value. Between 2012 and mid 2017 the *króna* went through a significant degree of appreciation. Although in its latest *Monetary Bulletin* the CBI argues that the currency is close to its long run equilibrium, other analysts are not convinced that this is indeed the case. This is the message that emerges from the two most recent *IMF Article IV* consultation reports. This is a very important issue; so much so that I devote a complete annex to address it.⁸

- vii. There is need for a more thorough understanding of external equilibrium, including the long run sustainable level of the NIIP and of the current account balance. The changes in current account observed in Iceland have been so phenomenal, that an in-depth analysis is required in order to understand fully where the economy stands, and what the long run

⁷ In this report I use “Taylor rule” in a generic form, to refer to the quantitative formulation/rule used by monetary authorities to guide (and only guide) their policy. That is, I don’t mean a restricted view of the equation developed by John Taylor in 1993. Senior officials of the CBI have expressed, in private correspondence, that at every meeting of the MPC a very large number of policy rules (up to 72) are analyzed. Most of these rules are used as cross check, and to make sure that policy actions are based on a robust analysis.

⁸ In terms of the quantitative analysis, the IMF seems to be in broad agreement with the CBI. This does not mean that new and deeper research on these issues would be redundant. It is still the view of this analyst that greater efforts should be made in this area.

sustainable equilibrium is. Having this knowledge is essential for undertaking monetary policy in an efficient way.

These two last points are intimately related. As is pointed out in the Annex to this report, determining the sustainable long-run NIIP for a country constitutes one of the most commonly used techniques for assessing whether the real exchange rate is close to its long run equilibrium value. As already noted, in small open economies with inflation targeting, the exchange rate is the key transmission mechanism for monetary policy. This means that central banks not only have to be aware of the magnitude and speed of the pass-through from exchange rates to prices, but also should have a firm understanding of the equilibrium value of the real exchange rate at any moment in time. This is not an easy thing to do, as explained in the Annex, but it is fundamentally important; the CBI should invest time and effort in improving its models on RER equilibrium.

7. The effectiveness of monetary policy depends on other institutions and policies. This means that for the “*improved inflation targeting*” regime to contribute to growth and stability, it is necessary to consider reforms in a number of other policies. Although providing a complete catalog of possible reforms is well beyond the scope of this report, the following areas have been identified as needing attention: (a) *Labor markets flexibility*: Iceland has a highly centralized wage negotiation system, which results in wage rate ratcheting, and in inflationary pressures. Reforming this process and moving to a more stable wage negotiation system, that accomplishes similar real wage results, at a much lower nominal wage levels is essential. The idea that circulates in some quarters, of adopting a “Scandinavian bargaining” regime makes eminent sense, and should be pursued seriously and systematically. (b) *Increasing pension funds overseas investments*: Pension funds have accumulated assets in excess of 150% of GDP. This has put significant pressure on the local financial market, and interest rates. Allowing for a greater percentage of investments abroad will alleviate this problem. In addition, a greater degree of portfolio diversification is very positive for the retirement system, as it reduces risks associated with local shocks. (c) *Consistent and sustainable fiscal policy*: The adoption of the “Organic Budget Law” represents an important improvement in the nation’s efforts to achieve and maintain macroeconomic stability with low inflation. This initiative, however, could be improved on, through a clearer definition of the “cyclical” component of the fiscal deficit, and the determination of a sustainable level of public debt into the future.

8. The recommendations listed above cover the immediate concerns of Iceland. However, the CBI should also think in the longer run, and consider what type of issues may arise in the future. A particularly important question is what to do in the future if the CBI faces the “zero lower bound” (ZLB) problem that has affected other central banks in advanced economies. Recently, the President of the New York Federal Reserve has pointed out that given the ZLB problem, and the increased probability that the global economy will face a slowdown there is a need to rethink inflation targets. Although Iceland is far from getting to the zero bound in its policy rate, the CBI should still reflect about the problem, and study in detail the alternative solutions being suggested by other central banks.

9. A final point to be mentioned, even though it is outside of the purview of this report, has to do with governance at the CBI. Overall the bank functions well, it has a clearly determined organizational chart, and well-defined hierarchical lines. Two aspects of the organization, however, deserve additional consideration. First, whether the members of the MPC should be full-time in their positions. Many first-rate central banks in small open economies have that system, and it seems to work well. There are a number of reasons for this, including the need to ponder extensively when undertaken monetary policy; in addition call a fully dedicated board remove providing current framework for policy. (I should make very clear that I did not get any inclination, during my visit to Iceland or during my exchanges with a number of Icelandic citizens and/or people familiar with the country, of any situation that could be construed, at the current moment, as one of conflict of interest.) The second issue that deserves some consideration relates to the external members of the MPC. Should they have greater support that would help them with their job? More specific questions include: Should the external members have a small professional staff to assist them with in depth analyses of the monetary and macroeconomic conditions? Should their remuneration be competitive enough as to allow them to devote most of their time to the CBI? Should at least one of the external members of the MPC be a foreign national, who would have a broad view of economic challenges in Iceland? All of these are important questions that deserve attention as the country moves forward to a new phase in the conduct of monetary policy.

INTRODUCTION

Introduction and background

Iceland's economic recovery has been impressive. Eight years after an almost complete meltdown, the economy is thriving. Gross Domestic Product has almost gone back to its trend, inflation is below 2% per annum, unemployment is 1.5%, and there is a sizeable current account surplus (approximately 6% of GDP). With the explosion of tourism, a new source of foreign exchange and income that is literally transforming the country has been found. In addition, income distribution has once again moved towards historical levels; the Gini Coefficient is on its way back to the low 0.20s. Many of the emergency measures undertaken in the aftermath of the 2008 crisis have been dismantled, and the government is already thinking of doing away with some of the remaining ones.⁹

The assignment

The purpose of this report is to discuss alternatives for monetary policy in Iceland. The return to “normality” has prompted the authorities to ask whether the current framework for monetary policy is adequate for a small very open economy *with a currency of its own*. At this stage the exercise is circumscribed to options that maintain the ISK as the national currency. It has been deemed that, from a political point of view, alternatives that imply joining the Eurozone, or unilaterally adopting another currency such as the Euro or the USD, are not viable.

The objective of this exercise, then, is *evaluating the current monetary policy regime* in Iceland, and determining if it needs to be changed, reformed, or adjusted. The only restriction of the analysis is that the *króna* should be maintained as the national currency. Since monetary policy does not operate in a vacuum, I have interpreted the assignment to include some comments on the supporting policies and institutions that would make monetary policy more effective.

Before proceeding, it is useful to provide a brief historical perspective; this will allow us to put the discussion that follows in the right context. Iceland obtained monetary autonomy by the end of World War I, when it achieved sovereignty from Denmark in 1918.¹⁰ In 1920 the country faced what would be the first of many currency crises. Icelanders responded to it by implementing currency controls. Two years later, in 1922 a 23% devaluation of the *króna* followed. Between 1925 and 1939 the *króna* was pegged to the British pound; from 1939 to 1949 it was pegged to the U.S. dollar. In 1931, at the time the United Kingdom abandoned the gold standard and devalued sterling, Iceland once again resorted to exchange controls; their intensity varied through the years, becoming more stringent during times of crises and during World War II. In 1970 Iceland became a member of the European Free Trade Association (EFTA), and in

⁹ For references on the crisis see Jónsson, and Sigurgeirsson, (2017). Jónsson (2009), and the various reports by the IMF, and in particular the Article IV Consultation documents.

¹⁰ This was just before the demise of the Scandinavian Monetary Union.

1994 it joined the European Economic Area (EEA). At the time, and as a condition for joining the EEA, Iceland was required to lift exchange controls. This situation would last until 2008, when the most recent crisis erupted, at which time controls were reintroduced. At the current time there are controls on capital inflows for bond-related flows of a maturity of less of one year.

In 1970, after the collapse of the Bretton Woods system, Iceland adopted an adjustable peg with respect to the USD; this policy lasted until 1974. Between that time and 1983, the degree of flexibility of the exchange rate was somewhat increased and the country followed what the CBI has described as a “managed float” policy aimed at targeting the exchange rate. At first it was targeted relative to the USD and then relative to various currency baskets. Between 1984 and 1989 the exchange rate policy became more rigid. However, since inflation didn’t subside, small devaluations – ten overall – were engineered; for all practical purposes the country was following a variation of a “crawling peg” regime. Between 1990 and 1995 a renewed effort at exchange rate stability was made, and several exchange rate bands were used. Initially, the reference point was given by a 17 currencies basket, and the band width was +/- minus 2.25% relative to the benchmark. The basket was redefined in 1992; the USD was given an 18% weight, the Japanese yen 6%, and the ECU 76%. The *króna* was devalued in 1992 and 1993. In 1996 the width of the band was increased to +/- 6%, and a new basket of 16 currencies was defined. From 1996 through 2000 the currency was allowed to move freely within the band; in February 2000 the band was once again widened, this time to +/- 9% relative to the basket target. In 2001 the exchange rate target – or target zone – was eliminated and an inflation target was adopted. This regime lasted until the 2008 crisis. This saga, then, may be summarized as follows: the ISK has only floated freely from 2001-2008, a very tumultuous period.

Initial conditions

At the time of this writing, Iceland’s monetary policy may be described by the following characteristics: (a) The CBI follows inflation targeting (a regime adopted in 2001); the target is 2.5% per year. (b) There are controls to *capital inflows* in the form of “unremunerated reserves requirements” for one year, for bonds-related transactions. (c) The CBI intervenes frequently and in a discretionary way in the currency market.¹¹ According to the monetary authorities these interventions are aimed at reducing exchange rate volatility, and not geared at defending a particular *level* of the currency. Some – including by the IMF – have called this monetary regime “inflation targeting plus.”

¹¹ In this report “discretionary” is used in a technical sense, and has no pejorative meaning. It is used in the tradition of the “rules vs discretion” debate on monetary policy in the 1960s and 1970s. Milton Friedman and James Tobin were some of the participants in this debate.

Currently – December 2017 –, the CBI’s policy rate is 4.25%. This is high; indeed significantly higher than in other commodity exporting countries. Figure 1 contains data on policy rates in monetary and real terms for Australia, Canada, Chile, New Zealand, Norway, Sweden, the U.K., and Iceland in mid-October 2017. All of these countries have a currency of their own. The real rates are calculated using year over year core inflation; these inflation rates are also presented in Figure 1.

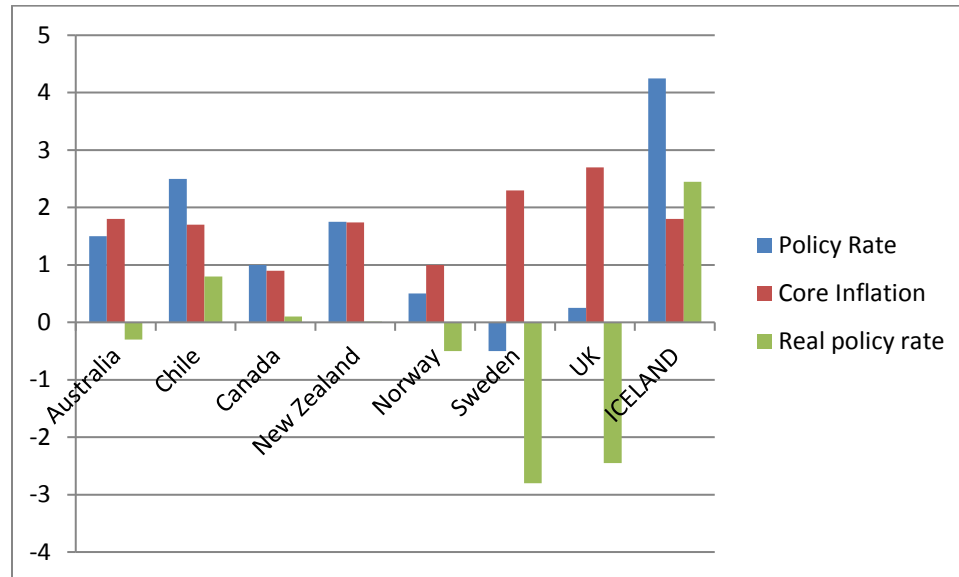


Figure 1: Policy rates in Iceland and selected OECD countries (November 2017)

Source: Trading Economics

As may be seen, Iceland is very different from the comparison group; its nominal policy rate is significantly higher. Notice that this is the case in spite of the fact that its core inflation is on the low side – below 2%.¹² In real terms, Iceland’s policy rate is also significantly higher than the policy rate in the comparison group.

Moreover, in real terms, Iceland’s policy rate is higher than in Mexico and Turkey – the two lowest income OECD members, which are not shown in Figure 1. In addition, the CBI policy rate is significantly higher than the policy rates in US and in the Eurozone – as of December 2017 the spreads were 300 and 425 basis points.

¹² This comparison group is similar to the one used by the CBI. The main difference is that I have added Chile to the list.

Iceland high policy rate may be explained by the fact that the country has only recently began to get out of a major crisis. It is still convalescent, and slowly returning to “normality.” Having said that, the fact that the initial conditions under which this report is written are characterized by (very) high policy interest rates is important, and should be kept in mind throughout the analysis. As a result of these very high policy rates there are large interest rate spreads along most of the yield curve between Iceland and other advanced countries. These spreads are important determinants of the “carry trade,” and are possible thanks to the existence of unremunerated reserve requirements. (See the report for a discussion on the effectiveness of these types of controls).

In September 2017 the CBI published a document titled “Monetary policy based on inflation targeting: Iceland’s experience since 2001 post crisis changes,” as *Special Publication No. 11*. This very useful report analyzes in great detail the evolution of macroeconomic conditions in Iceland since the adoption of inflation targeting in 2001. In many ways this is a self-evaluation of monetary policy undertaken by the CBI. It is candid, deep, and very well written. I will rely on it and cite it frequently throughout this report.¹³ The most important point made in the September 2017 CBI’s report is that there was a structural break in monetary policy and macroeconomic behavior around 2010–2012. While monetary policy was *ineffective* during the first sub period – a sub period that led to the 2008 crisis –, it has *greatly improved in terms of efficiency and effectiveness* since then.

The CBI’s report bases its conclusion of increased efficiency of monetary policy on the fact that during the last three years inflation has been at, or below, the target, and that inflation and other key macroeconomic variables have experienced reduced volatility. However, as the document points out, the reduction in inflation and volatility is, at least partially, the result of changing international conditions – very low global inflation and a major drop in commodity prices –, and of currency appreciation. An important question, then, is whether this improved performance is (mostly) the result of a more effective monetary policy, or if it is (largely) a consequence of more propitious international conditions.¹⁴

On its November 15 2017, meeting, the Monetary Policy Committee of the CBI decided to maintain the policy rate at 4.25%. The MPC’s statement declared the following:

“There are indications that the output gap may have peaked. Significant demand pressures remain, however, which calls for a tight monetary stance so as to ensure

¹³ It is useful to read this CBI document in conjunction with Governor Már Gudmundsson’s 2016 article “Global financial integration and central-bank policies in small open economies,” as well as several issues of the Bank’s Monetary Bulletin, and some of its Working Papers.

¹⁴ Clearly both types of forces have been at play. The challenge is to assess the extent to which greater effectiveness in monetary policy was behind these

medium-term price stability. Reduced demand pressures and an improved inflation outlook are consistent with the MPC's expectations in October, and the Bank's real rate is broadly as it was after the October interest rate decision. The current monetary stance appears sufficient at present to keep inflation broadly at target. Whether this turns out to be the case in the coming term will depend on economic developments, including fiscal policy and the results of wage settlements."

The report

The rest of the report is divided into four main sections:

Part One deals with monetary policy options at a conceptual level, with particular reference to the case of Iceland. This section is rather general, and deals with economic principles related to exchange rates and monetary policy. It does not pretend to be a "primer" on macroeconomics, and thus it moves at a rather rapid clip; also, it has a selective coverage, touching in greater detail on those issues that are of relevance for Iceland, while not delving onto those that are peripheral. Readers interested in a more detailed conceptual analysis should consult the literature cited in this part of the report, or many of the first rate textbooks for graduate students available in English.

Part Two, on the other hand, is an evaluation of the Central Bank of Iceland own assessment of its policy making during the last eight years or so. This evaluation draws on a score of reports published by the Bank, as well as on interviews in Reykjavík with a number of Bank officials, government functionaries, and experts from the private sector, including unions, and business groups. It also draws on a detailed analysis of Iceland's macroeconomic and monetary data.

Part Three includes the conclusions and policy recommendations. These are divided into two groups: recommendations regarding the monetary policy regime, including improvements and adjustments to the current policy stands, and recommendations on the type of models and information that the Central Bank of Iceland should incorporate into its tools kit. These latter recommendations are based on the fact that at the current time, and mostly as a consequence of the significant structural changes experienced by the Icelandic economy, some of the CBI's models and policy tools appear to be somewhat out of date. This section also deals, briefly, with supporting policies, including fiscal and the wage rate negotiation framework.

The report also includes an Annex where I discuss the different approaches used in the economics profession in efforts to calculate the long run equilibrium value for the real exchange rate. It is fundamental for central banks to have reliable models of this type in order to undertake monetary policy effectively. I argue in this Annex that this is particularly important for the case

of Iceland. This is because of the very significant structural changes that the country has gone through. In particular, the move from a current account deficit of the order of 25% of GDP, to a large current account surplus (around 6% of GDP) is very significant and unprecedented in modern economic history of advanced nations. Equally impressive and unprecedented is the change in the country's NIIP position, in just eight years, from a negative level equivalent to 125% of GDP, to a slightly positive level.

PART ONE:

MONETARY POLICY OPTIONS: REFLECTIONS BASED ON ICELAND

I. Introduction: Iceland's Recovery and the future

Iceland's recovery from the 2008 crisis has been impressive. Growth has been vigorous, inflation is under control, unemployment is below 2%, and the external accounts are in surplus. In the last year, and in an effort to normalize the situation further, capital controls have been relaxed. Controls on outflows were eliminated and, as a precautionary motive, the authorities maintained controls on inflows, in the form of unremunerated reserve requirements of 40% on inflows of less than one year.

As the crisis faded into the past, the authorities decided to engage on a review on monetary policy in the country. At a broad level the question under consideration is what type of monetary regime should Iceland have? At the current time the authorities have decided that the inquiry should be restricted to monetary systems characterized by the country having a "currency of its own." For political reasons it is deemed that options that imply giving up the *króna* should not be considered. In that regard, then, the notion of joining the Eurozone or unilaterally adopting another convertible currency will not be considered in this report.

The double issue of the optimal monetary system and optimal exchange rate regime for Iceland has been discussed many times in the past. These discussions have been prompted by recurrent historical crises, and by the fact that for many years Iceland had a rate of inflation that greatly exceeded that of most European countries and other advanced nations. The CBI published a detailed analysis in 2012, where the basic theoretical and conceptual principles behind the selection of the optimal monetary regime are explained in detail.¹⁵

More than 25 years ago, in March of 1991, Paul Krugman wrote a report titled "*Iceland exchange rate regime: policy options.*" Krugman points out that the purpose of his report is "to assess the factors bearing on Iceland's future currency regime. In particular, should Iceland maintain its traditional exchange rate flexibility, join the apparent European march towards currency union, or seek a compromise solution?" (p. 2). Krugman's report is divided into three parts. He deals with the general principles of exchange rate regimes, and discusses the benefits and cost of alternative currency arrangements. He points out that countries with unstable terms of trade would, generally, benefit from flexible exchange rates. He also points out, along the lines proposed by Mundell (1961), that the degree of labor mobility is key in determining the appropriate exchange rate regime. Krugman emphasizes the importance of two additional factors in determining the optimal exchange rate/monetary system: the extent of wage rate flexibility, and the existence (or absence) of indexation. Countries with greater degree of wage flexibility could adopt more rigid exchange rates, while countries with wage indexation would experience

¹⁵ The review presented by the CBI is very complete, and solid. Readers interested in details should read it. I will not repeat the arguments presented in that report.

situations where currency adjustments would be self-defeating. Finally, he points out that the degree of capital mobility is also important, although the direction in which it affects the selection of the optimal regime is ambiguous. In spite of the fact that Krugman's report is written in a cautious tone, his recommendation at the time was that Iceland should have maintained its currency and adopt an exchange rate regime characterized by flexibility. This early report is a good historical antecedent for the current discussion on the future of monetary policy and exchange rates in Iceland.

II. Monetary policy in a small open economy: Basic principles and the case of Iceland

In this Section I present a summary of the relation between exchange rate regimes and monetary policy. This discussion is conceptual, brief, and to the point; it does not pretend to be a primer on monetary policy. Authors interested in details should consult any of the graduates next in monetary policy, such as Obstfeld and Rogoff (1995), or the 2012 CBI report on the connection between the monetary regimes and exchange-rate systems.

a. Dilemmas, trilemmas, and all of that

One of the basic principles of macroeconomics is that monetary policy options are closely and directly linked to the exchange rate regime. The clearest manifestation of this connection is given by the so called "trilemma," sometimes also known as "the impossibility of the Holy Trinity":

"It is not possible to simultaneously have capital mobility, fixed exchange rates and an independent monetary policy."

This means that in countries with these characteristics the money supply is endogenous. Under fixed exchange rates and free capital mobility, the country will import inflation from the rest of the world. In this case, the nominal quantity of money in the country will be endogenous; it will be adjusted through the balance of payments, and changes in the country's stock of international reserves.

As noted by Krugman in his 1991 report on Iceland, and by the Central Bank of Iceland in its 2012 analysis, the discussion on the appropriate exchange rate for a particular country is related to what economists call the "optimal currency areas" discussion. This literature has emphasized a number of "conditions" required for a country/region to be part of a particular monetary union. As Robert Mundell (1961) pointed out in his original contribution to this discussion, the most important prerequisite for being part of an optimal currency area has to do with factor mobility.

It was indeed this consideration which led Mundell to state that the optimal currency area is “the region.”¹⁶

In the aftermath of the 2008 global financial crisis there was renewed interest in the topic. A number of authors asked whether the euro zone was, indeed, an optimal currency area. The main conclusion of these analyses is that one of the failures of the euro zone was the absence of a common fiscal policy, and of a broad financial safety net that covered all countries equally. As Paul Krugman pointed out almost three decades ago, it is doubtful that Iceland satisfies the fundamental requirements to become a bona fide member of the euro zone.¹⁷

b. Credibility vs. flexibility

In the late 1970s, and partially motivated by the work of Robert Barro and David Gordon, the optimal exchange rate and monetary regime literature focused on the trade-off between “credibility and flexibility.”¹⁸

According to this literature, governments that have *discretion* to adjust the value of the nominal exchange rate will tend to abuse this power, introducing an inflationary bias into the economy. At the heart of this issue is the fact that the Central Bank and the public – including the unions – play a strategic game that has a “time inconsistent” equilibrium. The central bank’s promises of maintaining a stable currency value are not “credible” and, as a result of this, the public behaves as if these assurances will be reneged on. Wages and prices are hiked and the central bank ends up validating these inflationary pressures.

Within this set up, countries that can “credibly” fix their exchange rate to a stable currency (or, in principle, to gold) will be able to escape this “time inconsistency” problem, and move to a low inflation equilibrium. In this case, the central bank will import world inflation.

The problem with this approach, however, is that under most circumstances the public will be suspicious of a simple currency peg. It will tend to see it as having an “escape clause.” This means that the public will believe that there is an unwritten contract between the authorities and the citizens that states that, if needed, the exchange rate peg will be altered through some kind of mechanism (usually at stepwise devaluation). If the contingencies under which the “escape clause” is to be used are perceived as being permissive, the commitment provided by the fixed exchange rate will be weak, and credibility will also be low. In this case inflation will tend to be higher than under a credible anchor.

¹⁶ Later, when he became an advocate for rigidly fixed rates with respect to gold, Mundell said that the optimal currency area was “the world.”

¹⁷ This is so in spite of the fact that during the recent years there has been an increase in the degree of labor between Iceland and continental Europe.

¹⁸ Of course, this type of analysis was also influenced by work by Prescott and Calvo.

The history of Iceland is replete with cases where such an “escape clause” was used, and as a result of this the country ended up with an inflationary equilibrium that exceeded that of its peers in the advanced world. As noted above, after the collapse of Bretton Woods system in the early 1970s, Iceland followed a crawling peg policy which led to a double digit inflation.¹⁹ However, in 1989 Iceland pegged the ISK to a basket of currencies (de facto the D-mark) in order to “import credibility” –inflation went down from 20-30% to about 2-3% in a three year period 1991-1992. It is possible to argue that this was one of the most of most successful exchange rate based stabilization program in the immediate post Bretton Woods period; it was supported by incomes policies, including a general wage freeze and capital controls – which were then liberalized in 1994.²⁰ The exchange rate peg, however, became unsustainable, and burst in 2001, after the economy had overheated significantly and capital flows reversed; by 2000 the trade deficit had reached 10% of GDP. An open question is whether the peg collapsed at the time because the authorities failed to provide the required fiscal support in the form of countercyclical fiscal policy.²¹

At the end of the road, and to an important extent, the issue is an empirical one: what does the evidence say with respect to fixed exchange rates as a mechanism for constraining, ex ante, fiscal and monetary policy, and thus providing a credible anchor? Is the fixed exchange rate a useful and effective tool for providing credibility?

In other words, the key empirical question is how countries with pegged exchange rates have performed relative to nations with alternative arrangements. A common mistake in this type of analyses is to compare countries that have successfully maintained a fixed exchange rate for a prolonged period of time with other nations. The problem with that approach is that it is subject to a serious “survival bias,” since only countries that sustained the peg for many years – that is, those countries that avoided crises – are incorporated into the “fixed exchange rate” sample. In that regards, the way to proceed is to classify countries according to some “initial” exchange rate regime, and include in the “peg exchange rate” category all countries that manifested the “intention” of having such a regime. This methodology, for instance, has been used recently by Alesina and Wagner (2006). In an early attempt at evaluating the performance under alternative exchange rate and monetary systems, Edwards (1992) analyzed empirically the historical behavior of over 60 countries using this procedure. His results indicate that the credibility constraint introduced by a fixed exchange rate with an “escape clause” is limited, and depends directly on the country’s inflationary history. Countries with a history of high inflation are

¹⁹ It was at the end of this period that Paul Krugman wrote his report on Iceland.

²⁰ Mar Gudmundsson, the current governor, was instrumental in designing this policy. See <https://www.sedlabanki.is/uploads/files/WP-1.pdf>

²¹ That was indeed the case in Argentina, where the experiment with a (semi) hard peg in the form of a currency board failed because the government failed to put in place the required countercyclical policies.

perceived of having abused the “escape clause,” and are less successful in using the exchange rate as a commitment device. This suggests that in the case of Iceland, or similar countries with a history of relatively high inflation, the pre-commitment technology provided by a unilateral peg is likely to be limited.

An important question – and one that is somewhat outside the realm of the current report – is whether countries with “hard pegs” are able to get around the problem generated by the implicit existence of an “escape clause.” By hard peg, this literature means countries that have either a currency board, or use another nation’s currency as their own. The empirical literature suggests that these countries indeed have had a lower inflation rate than nations with either flexible exchange rate or with “soft pegs.” However, nations with extreme rigidity have also experienced higher degree of volatility of GDP, and lower long-term economic growth. See, for example, the discussion in Edwards and Magendzo (2003) and the literature cited therein.

During the 1980s and the first half of the 1990s some authors argued that exchange rate regimes with “limited flexibility” provided an adequate solution for small open economies. These regimes were characterized by bands, crawling pegs, and other type of fixed-but-adjustable exchange rate system. It was thought that by combining fixity with flexibility it was possible to acquire the best features of each of these two policy arrangements. These types of systems were implemented in Latin America, East Asia, and in the countries of the former Soviet bloc.

Perhaps the most popular of these regimes was the “crawling peg,” where the nominal exchange rate was fixed by the monetary authority, but adjusted periodically according to some implicit or explicit rule. The most frequent variant was one where the authorities adjusted frequently (sometimes daily) the nominal exchange rate value according to inflation rate differentials between the domestic country and a predetermined group of foreign nations.

By its nature, the main purpose of this type of regime – which at some point was also adopted in Israel – was to avoid real exchange rate appreciation in countries with a domestic rate of inflation in excess of that of their trading partners. With time, however, it was found that these systems tended to de-stabilize the macroeconomy, and introduce a significant degree of persistence into the inflation-wage system. In some cases, it was found that countries that had adopted this type of intermediate regime were moving dangerously close to completely losing their nominal anchor.²² As a result, intermediate regimes have lost adepts during the last few years. They do not provide a credible anchor, nor do they allow real shocks to be efficiently accommodated. In that regard, then, they seem to be in the worst of worlds.

²² Edwards (1992).

c. *Does flexibility really means having a shock absorber?*

According to the “credibility versus flexibility” analysis, flexible exchange rates are superior in cases where real shocks coming from abroad are dominant. According to this view, flexible exchange rates act as shock absorbers, as they allow the real exchange rate to move to a new equilibrium much faster than if alternative regimes are in place. This result is quite straightforward, and is obtained in a variety of models, ranging from real business cycles to simple stylized neo-Keynesian models. See Fischer (2001).

In most models of open economies, real external shocks – including terms of trade and real interest rate shocks – will result in alterations in the equilibrium real exchange rate.²³ If the nominal exchange rate is fixed, the adjustment in the equilibrium RER will have to take place through changes in domestic nominal prices and nominal wages. As Nobel laureate James Meade (1951, p.201-02) argued early on, this adjustment will be difficult in countries with fixed exchange rate and *inflexible* money wages. According to Meade, in the presence of these wage rigidities the economy is likely to benefit from what he called a “*variable exchange rate*” regime (what is known today as a flexible/floating exchange rate). However, Meade was careful to note that flexible exchange rates are not a panacea, and that there are circumstances when they may not help to accommodate external disturbances. This would be the case, for instance, if due to indexation or other mechanisms *real* wages are inflexible. This would also be the case if fiscal policy does not accompany monetary policy, or if fiscal policy tends to work in a pro cyclical fashion.

At the end of the road, and as is often the case in monetary economics, the benefits of flexible exchange rates is an empirical issue. An early problem faced by researchers who tried to elicit an answer to this query was that the classification of countries into different exchange rate regimes was rather arbitrary, and did not correspond to reality. Indeed, the International Monetary Fund used a classification based on self-assessment; each country declared what type of regime it had, without the IMF opining on whether that classification was correct or not. In the early 2000’s, however, a number of researchers decided to create reliable indicators of countries exchange rate regimes that captured the “true” nature of the currency/monetary system. The better-known effort in this direction was undertaken by Levy-Yeyati and Sturzenegger (2002); work along similar lines was undertaken by Carmen Reinhart and Ken Rogoff.

A number of recent studies using a *de facto* and “true” exchange rates the regime classification system, have concluded that countries with more flexible exchange rates had indeed been able to accommodate better terms of trade shocks. For example, Edwards and Levy Yeyati (2005) developed a model of long-term growth that included the effects of terms of trade and other real

²³ Edwards (1989). Obstfeld and Rogoff (1995).

disturbances. They estimated their model using a two-step treatment procedure. Their results, which have been replicated and extended by other researchers, indicate that countries that face volatile international prices for their exports and imports tend to do better when they have a more flexible exchange rate regime. This research supports empirically and historically the notion that flexible exchange rates have tended to act as shock absorbers. The differences in long-term consequences are significant across regimes: the negative effect of the terms of trade shock on growth was about one half under flexible rates, as compared to hard pegs. Other studies along these lines, which have obtained similar results, include Aghion et al (2009), and Eichengreen (2007).

d. The transmission mechanisms of monetary policy under flexible exchange rates

The traditional transmission mechanism of monetary policy under flexible exchange rates and inflation targeting is the yield curve – see any model in the Mundell-Fleming tradition. The central-bank changes the policy rate – usually a very short-term interbank rate – with the expectation that that change will be transmitted along the yield curve, and will affect longer-term interest rates, which, in turn, will impact consumption decisions by households and investment decisions by firms. In the case of the United States, the expectation is that changes in the Federal Funds rate will be reflected in the 10-year Treasury note yield. It is this longer-term benchmark rate the one that affects economic agents’ expenditure decisions, including households’ expenditure in big ticket items. In discussing the transmission mechanisms of monetary policy, Leamer (2015) has recently argued that the most important effect of changes in the long interest rate is on the housing sector -- for an expansion of Leamer’s views see Part Two below.

For some time now – approximately since the first decade of the 21st century – there has been concern among experts that monetary policy in the U.S. – and in other advanced countries/monetary unions, for that matter – has lost effectiveness and power. Long-term interest rates seem to be much less responsive to changes in the policy rate. Perhaps the clearest manifestation of this phenomenon happened after July 2004 in the United States. Starting in that month, the Federal Reserve hiked its policy rate by 425 basis points. However, the longer-term rate (10-year Treasuries) did not change, or changed very little. This is what then Chairman Alan Greenspan referred to as the “conundrum.” The most common explanation for this phenomenon is that in a globalized economy with interconnected financial markets, longer-term interest rates are determined by the global interaction between savings and investments, and are not susceptible to being influenced by domestic monetary policy, not even by large countries’ central banks. This view came to be known as the “savings glut” perspective, and was proposed and defended strongly by Ben Bernanke.

This point has been acknowledged by a number of central bankers. For example, in a 2016 presentation made at a conference in Singapore, CBI's Governor Már Gudmundsson argued, persuasively, that the traditional interest rate transmission mechanism is weakened (or broken) in open economies in the 21st century. This is particularly so if the country in question is very small, as is the case of Iceland, New Zealand, Thailand, Chile, and other similar nations. Governor Gudmundsson argues that under these open economy circumstances the main mechanism of transmission ceases to be the yield curve, and it is replaced by the nominal exchange rate.

This “exchange rate” transmission mechanism works as follows: a hike in the central-bank policy rate will generate, through the “carry trade,” an exchange rate appreciation. The stronger currency, in turn, will generate downward pressure on prices – through some version of the law of one price for tradable goods –, and in this way will reduce the inflationary pressure in the domestic economy. Likewise, a reduction in the policy rate will prompt a currency depreciation, and through this mechanism, will generate upward pressure on prices. In addition, currency depreciation will result in export expansion and an increase in domestic activity. Changes in foreign central banks policy rates will also have an impact on the value of the domestic currency: a hike in international interest rates generated by Federal Funds rate increase by the Federal Reserve, will tend to depreciate the small countries currency, and through this channel impact on domestic prices.

In order to understand fully the transmission mechanism through exchange rate channels, it is important to have models able to answer two questions: (1) what is the impact of changes in domestic (and foreign) policy interest rates on the exchange rate (both bilateral and multilateral) and, (2) what is the “pass through” coefficient that translates changes in the exchange rate into changes in domestic inflation. I address these two issues from Iceland's perspective in Part Two of this report.

To the extent that monetary policy is, indeed, transmitted through exchange rate changes, it is natural that the central bank in a small open economy will take the exchange rate into account – either directly or indirectly –, when formulating policy. In particular, central bankers should be concerned whether the real exchange rate is close to equilibrium, or if it is misaligned. If a country is facing misalignment, monetary policy actions triggered by inflation considerations may exacerbate this disequilibrium. This means, that there are reasons other than “fear of floating” for central bankers to worry about exchange rates – see Calvo and Reinhart (2000) on fear to float. I address some of these issues in Part Two of this report, as well as in the Annex devoted to real exchange rate overvaluation.

e. Do flexible rates buy full monetary policy independence?

An important policy issue for small open economies with inflation targeting and flexible exchange rates is how their central banks should react when advanced countries' central banks (and, in particular, the Federal Reserve and/or the European Central Bank) change their monetary policy stance. According to traditional models of international macroeconomics (i.e. the Mundell-Fleming model, in many of its versions), under flexible exchange rates countries are able to undertake independent monetary policies, and don't face the "trilemma."

That is, according to these traditional models, central banks in small open economies do not have to follow (or even take into account) the policy position of the advanced nations, such as the U.S. and the euro zone. More recently, however, some authors, including, in particular, Taylor (2007, 2013, 2015), and Edwards (2012, 2015a, b) have argued that even under flexible exchange rates there is significant policy interconnectedness across countries. In a highly globalized setting, even when there are no obvious traditional reasons for raising interest rates, some central banks will follow the Fed. This phenomenon may be called "policy spillover," and could be the result of a number of factors, including the desire by central banks to protect domestic currencies from "excessive" volatility. If this is indeed the case, then even under flexible exchange rates there is no such a thing as true "monetary independence."

The late Ron McKinnon from Stanford University captured this idea, when in May 2014, he stated at a conference held at the Hoover Institution that "there's only one country that's truly independent and can set its monetary policy. That's the United States."

Of course, not every co-movement of policy rates should be labeled as "spillover." It is possible that two countries (the U.S. and, say, Colombia) are reacting to a common shock—a large change in the international price of oil, for example. "Spillover" would happen if after controlling by those variables that usually enter into a central bank policy reaction function – the traditional Taylor rule variables, say –, there is still evidence that the small central bank has followed the Fed.

As Clarida (2014), Edwards (2016), Taylor (2015) and others have recently argued, there are at least two reasons why it may be optimal for central banks in small economies to include the interest rate in advanced countries central banks in their policy reaction function.²⁴ The first has to do with what Calvo and Reinhart (2000) called "fear to float." This phenomenon is usually present in countries where there is significant currency mismatch in the banking sector. There is plenty of evidence from Latin America – Chile in 1982, Mexico in 1994, Argentina in the 2000s,

²⁴ It should be noted that I am referring here to the direct inclusion of the foreign policy rate in the reaction function. From early on it was understood that the exchange rate was part of any countries Taylor rule, as long as there is not zero "passed through" coefficient.

for example – that indicates that due to currency mismatch large devaluations create havoc in the financial sector. If interest rate hikes by foreign central banks result in a (large) depreciation of the domestic currency, it may be optimal for the domestic central bank to react by hiking its own policy rate, as a way of avoiding the balance sheet effects of the depreciation in the context of significant currency mismatches.

The second reason for “policy spillover” has to do with potential real exchange rate misalignment. If currency “overvaluation” is costly – and there are many reasons why this is, indeed, the case –, then it may be optimal for the central bank to take misalignment under consideration when undertaken monetary policy. For instance, it is possible that an increased degree of overvaluation will generate export decline, and a large future output gap. This was the case of Mexico during 20015-2017.

In a world with two countries, this situation is captured by the following two policy equations, where r_p is the policy rate in the domestic country, r_p^* is the policy rate in the foreign country, and x and x^* are vectors with the traditional determinants of policy rates (the elements in standard Taylor rules, for example), such as deviations of inflation from their targets and the deviation of the rate of unemployment from the “natural” rate:

$$(1) \quad r_p = \alpha + \beta r_p^* + \gamma x$$

$$(2) \quad r_p^* = \alpha^* + \beta^* r_p + \gamma^* x^* .$$

In equilibrium, the monetary policy rate in each country will depend on the other country’s rate.²⁵ For the domestic country the equilibrium policy rate is (there is an equivalent expression for the foreign country):

$$(3) \quad r_p = \frac{\alpha + \beta \alpha^*}{1 - \beta \beta^*} + \left(\frac{\gamma}{1 - \beta \beta^*} \right) x + \left(\frac{\beta \gamma^*}{1 - \beta \beta^*} \right) x^* .$$

²⁵ The stability condition is $\beta \beta^* < 1$. This means that in Figure 2 the P*P* schedule has to be steeper than the PP schedule,

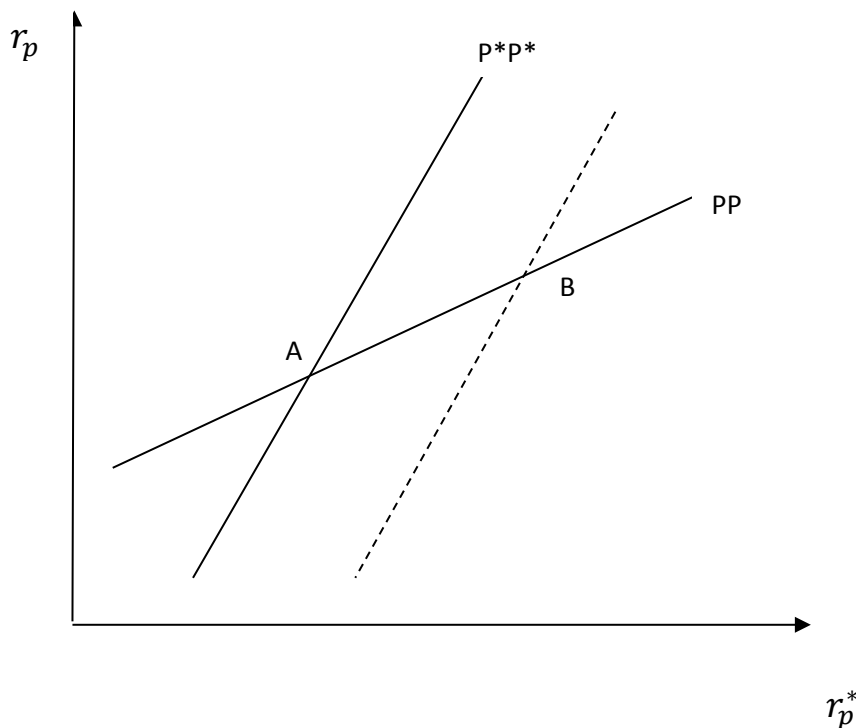


Figure 2: Policy rates equilibrium under “policy spillover” and large countries

Changes in the drivers of the foreign country’s policy interest rate, such as α^* , β^* , γ^* , or x^* , will have an effect on the domestic policy rate. This interdependence is illustrated in Figure 2, which includes both reaction functions (1) and (2); PP is the policy function for the domestic country, and P*P* for the foreign nation. The initial equilibrium is at point A. As may be seen, a higher x^* (say the gap between the actual and target inflation rate in the foreign country), will result in a shift to the right of P*P* and in higher equilibrium policy rates in both countries; the new equilibrium is given by B.²⁶ Notice that in this case the final increase in the foreign policy rate gets amplified; it is larger than what was originally planned by the foreign central bank. The extent of the effect of the foreign country’s policy move on the domestic country policy rate will depend on the slopes of the two curves; these, in turn, depend on the parameters of equations (1) and (2).

Given the concerns that have emerged in central banks from around the world in the last few years, it is possible to think that in some countries the actual policy rate would include other

²⁶ The new equilibrium will be achieved through successive approximations, as in any model with reaction functions of this type, where the stability condition is met.

global variables, including the “long” rate in the world economy (r^{*L}) and the extent of uncertainty in global financial markets (μ). In this case, equation (2) would become:

$$(4) \quad r_p = \alpha + \beta r_p^* + \gamma x + \delta r^{*L} + \theta \mu$$

In a number of papers Edwards (2012, 2015, 2016) estimated these type of equations for a group of small open economies in Latin America and Asia. His findings suggest that, indeed, there has been “policies spillovers” in most of these countries. However, it is in the Latin American nations – Chile, Colombia, and Mexico – where this phenomenon has been stronger during the period under study, 2000 – 2009. Similar results were obtained by Han and Wei (2016).

f. Capital controls and monetary policy

Capital controls have had a long history in modern currency crises. In most countries major and abrupt devaluations are preceded by a rapid decline in international reserves and massive capital flight.²⁷ Countries often try to stop this process by imposing capital controls on outflows. The empirical evidence indicates that, on their own, these types of capital controls tend to be ineffective. Economic agents quickly find ways around them, and manage to continue moving their funds out of the country in trouble. The most common way of circumventing these controls is by under-invoicing exports and over-invoicing imports. At the same time, it has been found that the temporary imposition of controls may play a role in the short run, if they are part of a comprehensive stabilization program with other components related to monetary and fiscal policies adjustment.²⁸

The imposition of capital controls was an important component of Iceland’s heterodox response to the 2008 crisis. Today, most analysts agree that these controls – which were opposed at the time by a number of analysts – played a key role in stopping the freefall, and eventually stabilizing and launching a recovery of the economy. As noted above, the reason why the controls worked in Iceland is that they were a component of a broad and well-designed comprehensive adjustment and recovery program. They were not, as it has usually been the case

²⁷ The IMF has expressed its stance regarding capital controls in a number of publications on the “institutional view.” IMF (2016). The position taken by the IMF has been recently severely criticized by analysts such as John Taylor, for being vague and for not recognizing that the final most desirable situation is one with capital mobility. See, for example, the proceedings of the Hoover Institution 2018 conference on monetary policy.

²⁸ Iceland after 2008 is an example of a nation where controls on outflows worked properly. The reason if that they were part of a comprehensive – albeit heterodox – stabilization and adjustment plan.

in Latin America and other emerging regions, isolated measures merely aimed at stopping the bleeding of international reserves.

Recently, the government of Iceland lifted capital controls on outflows. Icelandic nationals and companies are now allowed to rebalance their portfolios taking advantage of the existence of international securities. At the time of this writing –December 2017/January 2018 – Iceland still has controls on capital inflows, in the form of unremunerated reserves requirements (URR). This type of capital controls was first implemented in Chile in the early 1990s, as a way of reducing short-term “hot” capital inflows that were deemed to be speculative and disruptive. These types of controls on inflows were later implemented in a number of countries, including Thailand (2006) and Colombia (2007). The controls on inflows that exist in Iceland exhibit some differences with respect to the Chilean case. In particular, in Iceland flows are subject to a uniform reserve requirement, independently of maturity.

In Chile the percentage of the funds that had to be deposited as reserve requirements varied with the maturity of the funds. Longer-term inflows were subject to lower requirements, and foreign direct investment was free of such controls – in Iceland the URR rate is 40% and applies only for bond-related flows irrespective of maturity.

An important feature of this type of capital controls on inflows is that they act as a tax and, thus, introduce a wedge between domestic and international interest rates. If the domestic interest rate for a k -months investment is denoted by i_k , and the implicit tax by μ_k , then it follows that (where i is the international interest rate; in order to simplify the exposition risk premia issues are assumed away):

$$(5) \quad i_k = i + \mu_k$$

Given the rate of the reserve requirement, it is possible to calculate the (approximate) tax equivalent of these controls. Assume that the investor will keep his funds in the country for k months. Assume, further, that if k is lower than some maturity h , the investor needs to deposit a fraction u of the funds in the central bank. Then, the tax equivalent to the URR is given by:²⁹

$$(6) \quad \mu_k \approx i \left(\frac{u}{1-u} \right) \left(\frac{h}{k} \right)$$

²⁹ This ignores the presence of other taxes. In Chile, in fact there were other costs to foreign investors. See, for instance, De Gregorio, Edwards, and Valdes (2000) for details.

In a paper that evaluated the effectiveness of Chile's controls on inflows, De Gregorio, Edwards and Valdés (2000) computed the tax equivalent of these URRs. For a maturity of one month the tax equivalent was 31%. It did decline rapidly for longer maturities, however. For instance, for six months' maturity the tax equivalent was slightly above 5%, and for a maturity of 12 months it was only 2.6%.

In their empirical analysis these authors reached a number of conclusions that are relevant for any country relying on controls on inflows, including Iceland. Their most important findings may be summarized as follows:³⁰

- Because of the controls Chile was able to maintain a significant policy interest rate differential with the rest of the world. More specifically these authors state the following: “we only find a significant effect on the central bank interest rates, which suggests that the URR was indeed used more intensely to accompany monetary tightening.”
- The impact on longer term rates was not clear. It appeared that after 18 months' maturity the effect was very small.
- The effects of the URR on the RER were not conclusive, in the sense that different estimation techniques yielded different results. This let the authors to believe that using controls on inflows was not the best policy for dealing with short-term real exchange rate appreciation. The authors pointed out that one of the possible reasons for not finding much of a connection between the URR and the RER was the existence, at the time, of an exchange rate band in Chile. (On the exchange rate band see the discussion below, in the section on currency intervention).
- The one thing that the URR did for sure was change the composition of flows, reducing short-term flows and increasing longer-term ones. The total magnitude of inflows aggregated across maturities, however, did not appear to change.
- With time, market participants found large number of loopholes, reducing the effectiveness of the capital controls.
- One of the main reasons why capital controls were somewhat successful in Chile was that they were supported by the right type of fiscal policy, which provided the required overall credibility to macroeconomic policy in the country.

³⁰ See, also, Edwards and Rigobon (2009).

It is important to note is that the positive effects, or benefits, of the URR should be compared to the distortionary costs that they introduced in the form of a tax. One of the obvious consequences of these taxes is that they may impact on the ability of certain firms to tap the capital market. The controls result in higher domestic cost of capital. In a detailed analysis using data from the stock exchange in Chile, Kristin Forbes (2007) found that the controls imposed a severe cost to smaller firms. She concluded that as a consequence of the URR policy, smaller traded firms faced a significant financing constraint, and had a higher shadow cost of capital than larger firms that could circumvent the controls.

g. Currency intervention

As noted, one of the goals of capital controls has been to keep speculative flows in check, and in that way reduce exchange rate volatility. Of course, capital controls are not the only tool which may be used to moderate volatility; in addition, many central banks have used direct currency intervention to achieve this goal. In some cases, including Chile in the 1990s, the two policies coexisted. In this particular case, the URRs discussed above were accompanied by “exchange rate bands.” The central bank was committed to intervening every time the currency hit one of the bands. Throughout this period the exchange rate experienced significant forces towards appreciation and, thus, the currency was mostly at the bottom of the band. See Figure 3 for the evolution of the exchange rate in Chile between 1991 and 1999.

An important inquiry is whether this type of combined policy – direct currency market intervention, coupled with capital controls on inflows – is effective in reducing exchange rate volatility. Notice that this combined policy exists currently in Iceland, making this question particularly relevant for the current report.



Fig. 2. Exchange rate and exchange rate bands. All exchange rates measured in logs.

Figure 3: Nominal exchange rate and bands in Chile, 1991 – 1999

From a purely technical point of view it is not straightforward to answer this question, since the two policies interact with each other in complex and highly nonlinear ways. In addition, the probability distribution of exchange rate values is truncated at the bands. Edwards and Rigobon (2009) devised a two-step procedure to test the effectiveness of capital controls in this environment. In the first step they computed a “shadow” exchange rate, which reflected market forces beyond the bands. In the second step they investigated the way in which the controls affected this “shadow exchange rate.” Their results confirmed those obtained by other researchers, and suggested that a tightening of the controls on inflows were related to slight real exchange rate depreciation; that is, with the controls the RER was somewhat weaker than what it would have been without the reserve requirements. In addition, it resulted in an increase in the unconditional variance of the nominal exchange rate, and a reduction of the vulnerability of the exchange rate to external shocks.

In 2013 the BIS published a book titled “*Market volatility in foreign exchange intervention in EMEs: What has changed?*” Although this volume deals with the experiences of emerging markets, many of the episodes discussed are of relevance, and provide some lessons, for Iceland.³¹ After examining 24 cases, the main conclusions of the analysis were that:³²

³¹ The volume reviews the cases of Brazil, Chile, Colombia, the Czech Republic, Hong Kong, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Turkey, the United Arab Emirates, and Argentina.

³² BIS (2013), p.5.

“[E]xchange rate intervention needs to be consistent with the monetary policy stance. Persistent one sided intervention, associated with sharp expansion of central bank balance sheets creates risks for the economy.”

In addition, there was generalized agreement among the central bankers that participated in the conference that currency market intervention could be harmful if it precluded the real exchange rate to move towards new equilibria. The report showed that most countries in this sample intervened in the spot market, and that they preferred to maximize effectiveness by intervening in an unannounced (and rather non transparent) fashion.

It is important to notice that an effective intervention policy requires that the central bank in question has some notion about the “appropriateness” of the real exchange rate at a particular moment in time. That is, it is key that the central bank has an informed judgment on whether the currency is consistent with its “fundamentals.” This requires having appropriate and efficient models of real exchange rate behavior, an issue that I address in some detail in Part Two and in the Annex to this report.

Currency market intervention is much less frequent in advanced nations. Among these, the most relevant case is that of New Zealand, the pioneer country in the use of inflation targeting. In the year 2004 the Reserve Bank of New Zealand announced a new policy of foreign exchange market intervention. The purpose of this policy was to make corrections to currency values, when these were *clearly out of line with fundamentals*. This policy was based on two key provisions:

- it was to be very infrequent,
- and it would be based on a transparent and well-known framework.

Since its inception this program has been used sparingly. Figure 4 contains data on intervention since the program was launched in 2004, and through July 2017. As may be seen, the RBNZ participated in the market infrequently, and when it did, and with possibly one exception, it bought and/or sold relatively small amounts of foreign currency. It is interesting to compare this figure to that of the Central Bank of Iceland’s intervention since 2014. In contrast to New Zealand, Iceland frequently and massively since the year 2011 (see chart VII-40 in the CBI’s Economic Indicators, September 2017; also see the discussion in Part Two of this report).

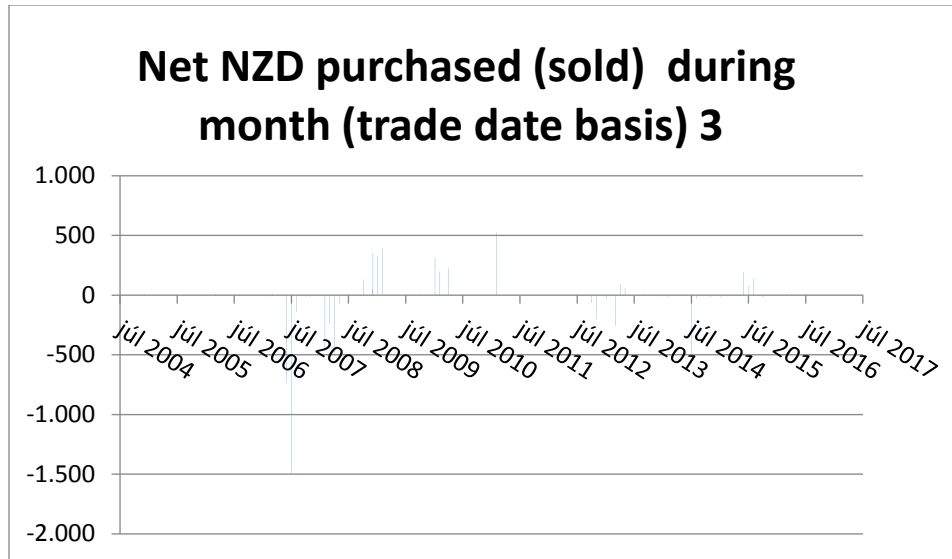


Figure 4: Exchange rate market intervention in New Zealand, 2004 – 2017

It is interesting to review, and to quote extensively what the RBNZ wrote about its intervention policy. A first important aspect was to recognize that the objective of this policy is to alter the value of the currency; this is, the policy aimed at influencing the *level* of the New Zealand dollar. In a paper published in 2004 the RBNZ stated (emphasis added):

“Foreign exchange intervention... is the purchase or sale of New Zealand dollars in exchange for foreign currencies..., with the objective of influencing the *level* of the exchange rate.”

In explaining this policy the RBNZ further declared that,

“[T]here may be times when exchange rate fluctuations do not fully reflect fundamentals. Examples might include instances where the short run value of the exchange rate over or under shoots its ‘fair value’ because of non-fundamental factors such as the trend following behavior implied by some ‘technical’ cratering rules followed by foreign exchange rate dealers, or other short-term speculative behavior.” (RBNZ 2004, p. 2).

The Reserve Bank of New Zealand explains that there were two important requirements in order to implement this intervention policy successfully. First, the Bank has to have sufficient international reserves in order to undertake the intervention, and it should be willing to live with an open position in the foreign exchange market. Second, the RBNZ affirmed that it was essential to have a firm and well-defined criterion for assessing the appropriateness of

intervention at any moment in time. According to the bank of these criteria were the following (these bullet points are a direct quote from the RBNZ):

- “The exchange rate must be exceptionally high or low;
- the exchange rate must be unjustified by economic fundamentals;
- Intervention must be consistent with PTA [the inflation target]; and
- conditions in market must be opportune and allow intervention a reasonable chance of success.”

One of these fundamental requirements is assessing whether “the exchange rate is exceptionally high or low.” In this regards the RBNZ makes this very important point is that although, “the extreme rate could be exceptional by historical standards... it does not automatically follow that the level is unjustified.”

An important point made here -- and a point that I emphasize in Part Two of this report --, is the need for central banks – including, of course, for the CBI – to have reliable models of real exchange rate behavior, in order to properly assess whether this fundamental relative price is close to its equilibrium.

New Zealand’s intervention policy has often been referred to as a “traffic lights” system, with green, yellow, and red lights. One of its main features of this system is that the authorities explain publicly their views about the exchange rate, and “warn” the market about possible future interventions. Notice that “warning” is not the same as “announcing.” The RBNZ “warns,” but does not “announce.” Indeed, in 2014 the Governor issued 13 warnings before intervening. These warnings constitute the “yellow light” phase and often result in some market reaction.

Before intervening the RBNZ’s governor usually states that he (and the staff) believes that the currency is out of line with fundamentals, and that if the situation persists the Bank will “opportune” intervene. The following quote from an October 2014 news analysis illustrates the way the system works. The quote deal with the the process that led to actual intervention on Monday September 29, 2014:³³

“The central bank quietly confirmed on Monday that it sold a net \$NZ521 million worth of the currency in August and had bolstered its foreign exchange intervention capacity by \$NZ938 million to \$NZ9.558 billion... The confirmation followed a detailed “*final, final warning*” statement from [Governor] Wheeler last Thursday, *that explained why the New Zealand dollar was extremely and*

³³ <https://bluenotes.anz.com/posts/2014/10/what-the-rba-can-learn-from-the-rbnz>. Emphasis has been added. Interestingly this article referred to lessons that Australia could learn from the Kiwi’s policy.

unjustifiably high and why intervention was being considered... The New Zealand dollar fell more than a cent on the news and has fallen more than four cents to around US78c since [Governor] Wheeler's final warning last week...It's still early days, but Wheeler's second big intervention in his two years as Governor appears to have been effective.”

In New Zealand, currency intervention has usually been consistent with monetary policy actions. However, the two measures – selling NZD and changing the policy rate – are usually not implemented at the same time. An acute observer of the New Zealand scene had this to say about the 2014 intervention:³⁴

[T]he Reserve Bank saw that currency intervention would *not directly conflict with a monetary policy* tightening, as would have been the case between March and July when it was hiking the OCR...The RBNZ specifies the 'opportune-ness' of intervention as one of the 'traffic lights' it considers when intervening. The more 'opportune' the moment, the more likely intervention will be effective.”

In order to be as transparent as possible, in the 2004 position paper the RBNZ described its intervention framework by using the chart presented in Figure 5.A. The upper part of the graph depicts exchange rate behavior: the red line is the actual currency RER index; the lower part, which includes the line in blue, depicts the net international reserves position on the RBNZ.

In the upper part of Figure 5.A the horizontal black line is a de-trended measure of the equilibrium RER. The upper and lower dashed lines around the equilibrium define the zone of normal deviation from equilibrium; this is the “green traffic light” where the market is allowed to operate without central bank interference. When the RER gets close to the dashed lines the system enters into the “yellow traffic light zone,” and the RBNZ states that it is becoming concerned about the currency value. Once the actual RER crosses the dashed line the RBNZ intervenes directly in the currency market by going short NZD and long foreign currency. This is reflected in the lower panel of Figure 5.A where the blue line corresponding to net international reserves goes up, indicating reserves’ accumulation. Notice that accumulation is restricted to the initial period when the real exchange rate is in the “intervention zone.” Further, once the real exchange rates is squarely back in the “green light zone” the RBNZ squares up, and international reserves go back to the long term desired trend.

An important question is the expected effectiveness of this type of intervention in the currency market. The RBNZ believes that under most circumstances by directly buying or selling foreign currency it is able to temporarily impact the real exchange rate. Under intervention it will have a

³⁴ <https://bluenotes.anz.com/posts/2014/10/what-the-rba-can-learn-from-the-rbnz>. Emphasis added.

somewhat different behavior than in the absence of such intervention. This is illustrated in Figure 5.B, also taken from the RBNZ. In this figure the black horizontal line represents the long run average real exchange rate obtained through a simple PPP calculation; the red line is the actual exchange rate, while the blue dashed line represents the equilibrium real exchange rate that is consistent with fundamentals. This figure captures two important points: first, the equilibrium real exchange rate is not a constant number, and it can depart (at times, quite significantly) from its long run PPP average. Market intervention of the type undertaken by the RBNZ and at the most expect to close the gap between the red and the blue dashed lines; that is the difference between the actual and the equilibrium (fundamental determined) real exchange rate.

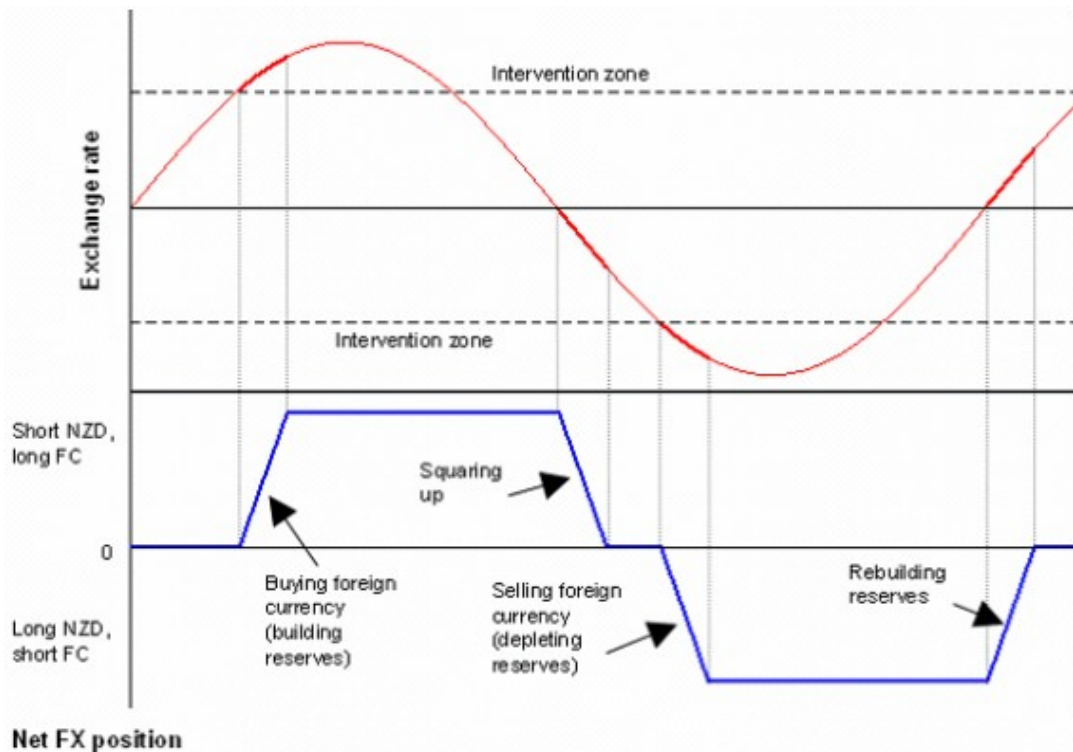


Figure 5.A: The mechanics of currency intervention in New Zealand

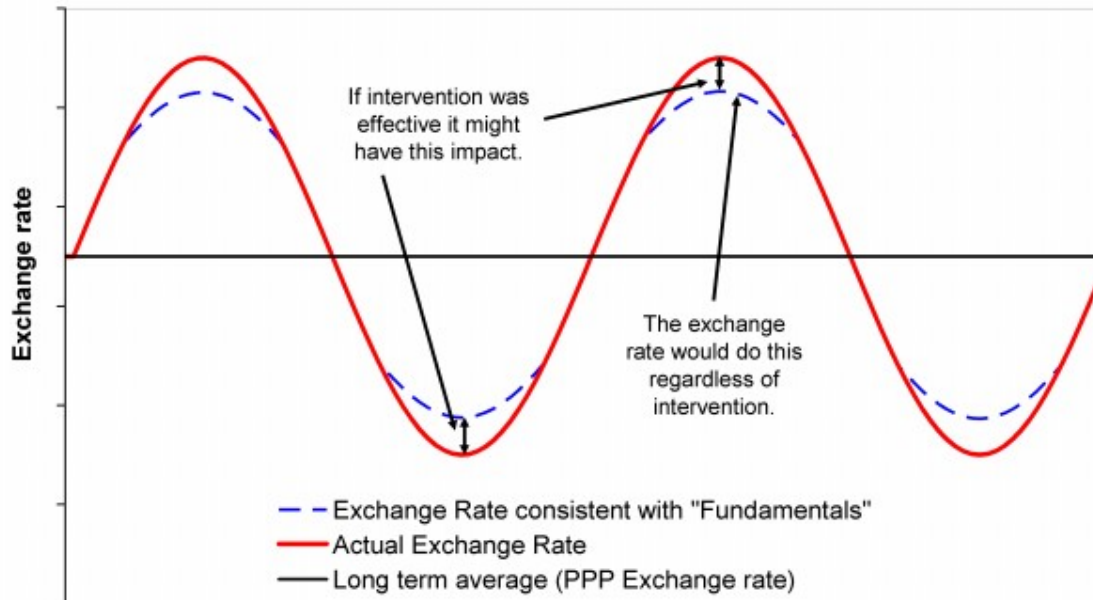


Figure 5.B: RER behavior with and without RBNZ intervention

h. Monetary regimes, monetary policy, fiscal policy and labor markets

Robert Mundell was awarded the Nobel Prize for a number of contributions, including his discussions in the early 1960s on the “effective policy assignment.” This work discussed how to assign different policy tools to different objectives. An important corollary of this analysis is that the “policy mix” is important. As noted, another Nobel laureate, James Meade, argued strongly that the institutional arrangement of labor markets interacted in a very important way with the exchange rate regime and with monetary policy.

The lessons of these two eminent economists indicate that in order for monetary policy to be effective, it has to be supported both by the appropriate fiscal policy as well as by the appropriate arrangement in labor markets. In particular, it is important for fiscal policy to be “countercyclical.” That is, during boom years the public sector should build up reserves, and during lean or recession years it should use them up, in order to generate an expansion in aggregate demand. One of the greatest mistakes made by countries with “hard pegs” has been not to have such countercyclical fiscal policies. The most recent example of this problem was in Argentina during the “convertibility law”. Between 1991 and 2001 Argentina had a currency board; the arrangement required that monetary expansion be backed by foreign exchange reserves. However, the country pursued two policies that were in contradiction with the currency board. First, fiscal policy was clearly “pro cyclical.” Second, instead of being liberalized, labor markets were regulated further. This meant that Argentina was left with no shock absorber to

accommodate external disturbances. Starting in 1997, and as a result of the East Asian crisis Argentina was hit by a number of severe external shocks, which greatly affected its degree of competitiveness and its external sector and that eventually contributed to the crisis of 2001-02.

It is of essence, then, to consider both the fiscal and labor market when thinking and evaluating a monetary policy regime. In the case of Iceland the approval of the Organic Budget Law is an important step forward. However, labor market negotiations continue to be based on a system that creates inertia and significant cost pressures. I deal with these two issues in Part Three of this report.

PART TWO:

AN ASSESSMENT OF CURRENT MONETARY POLICY IN ICELAND

A. Introduction

The purpose of this part is to assess current monetary policy in Iceland. This is done in light of the basic principles discussed in the previous section. The discussion is based on an analysis of significant bodies of data, the review of a large number of CBI documents, and interviews with central bank officials, academic economists, market participants, professionals in the financial and banking sectors, members of Parliament, representative of the business sector, government officials, and leaders in the unions sector.

B. The CBI's September 2017 Report

The report “*Monetary policy based on inflation targeting: Iceland’s experience since 2001 and post-crisis changes, Special Publication No. 11*” was published by the CBI in September 2017, as a contribution to the discussion on possible reforms and improvements to Iceland’s monetary policy framework. This document, jointly with the quarterly *Monetary Bulletin*, and a number of CBI working papers are the basis of the analysis presented in this report. Particular attention was given to two prior CBI documents: Special Publication No. 6, and Special Publication No. 7. In addition to this written material, I interviewed a number of people, as noted in the preceding paragraph. I also analyzed in detail Iceland’s macroeconomic and monetary data.

The September 2017 report *Special Publication No. 11* is a timely and well written document. It provides a brief historical analysis, and an in-depth discussion of Iceland’s experience with inflation targeting since 2001. The report is divided into seven chapters; it includes a large number of informative graphs, and has a useful bibliography. The report correctly emphasizes the role of inflationary expectations and inflation anchors.

The most important point made in the document is that there was a structural break in monetary policy and macroeconomic behavior around 2010–2012. While monetary policy was rather ineffective during the first sub period of the inflation targeting experience – a sub period that led to the 2008 crisis –, it has greatly improved in terms of efficiency and effectiveness since then.

The main conclusions from this important report may be summarized by the following quotes taken directly from the document published in September 2017 (emphases added).³⁵

- “Inflation has been *at or below* the Central Banks inflation target for over three years... Increased price stability has been achieved in spite of considerable domestic inflationary pressures stemming from large pay increases, and this stability is due in

³⁵ The 10 bullets that follow are quotes and may be found in pages 34 – 36 of the “Monetary policy based on inflation targeting: Iceland’s experience since 2001 and post-crisis changes” report.

- no small part to a steep decline in import prices, which in turn is due to domestic inflation and the appreciation of the *króna*.”
- “As inflation has fallen in recent years, it has also grown less volatile.”
 - “Deviations from the inflation target have also diminished greatly.”
 - “Short- and long-term *inflation expectations have gradually subsided* to the targets and have become less volatile.”
 - “Inflation appears to be less persistent than before.”
 - “The inflation target has gained credibility.”
 - “Business cycle fluctuations have diminished.”
 - “Fluctuations in the exchange would have diminished... and there are signs that their characteristics have changed in recent years.”
 - “Exchange rate movement seemed increasingly to counteract the effects of aggregate supply and demand shocks.”
 - “Fluctuations in real interest rates have diminished as inflation expectations have become more firmly anchored.”

That is, the unmistakable conclusion that one draws from reading these quotes is that the CBI considers that in the last few years – since 2012, approximately – the inflation targeting approach has worked (very) well in Iceland, and has helped achieve a number of important goals.

However, as the document points out, the reduction in inflation and volatility is, at least partially, the result of changing international conditions and currency appreciation. An important question, then, is to what extent this improved performance is the result of a more effective monetary policy, and to what extent it is a consequence of more propitious international conditions.³⁶ Another way of phrasing this question is: How effective would monetary policy had been under a less favorable external environment?

In addition, the presence of controls on capital flows – on both inflows and outflows from 2008 to 2015, and on inflows since 2015 --, may have bolstered the “effectiveness” of monetary policy.³⁷ By placing substantial amounts of “sand” in the wheels of capital markets, the authorities have increased the CBI’s ability to operate in a way that is independent of international capital market conditions.

³⁶ Clearly both types of forces have been at play. The challenge is to assess the extent to which greater effectiveness in monetary policy was behind these

³⁷ it should be noted that the extent and target of capital controls changed in Iceland in a pragmatic way, and in an effort to deal with the crisis. During the initial period the emphasis, of course, was on controlling capital outflows. That is, there were no controls on inflows from October 2009 through June 2016.

Although, the CBI report covers a lot of terrain, some topics are addressed briefly, and there are some omissions. In what follows I elaborate on these issues. The main objective of this discussion is to signal areas for additional research that would help improve monetary policy effectiveness in the future.

An in-depth analysis of the effectiveness of monetary policy requires information on a number of issues which are only outlined in the report. Most of these issues have to do with four broadly defined areas:

- (a) the transmission mechanism(s) of monetary policy;
- (b) optimal Taylor rule for small open economies such as Iceland;
- (c) the determinants of the equilibrium value of key macroeconomic variables, including the real exchange rate;
- (d) the effectiveness of capital controls and currency market intervention.

As may be seen, many of these policy areas mirror the conceptual discussion presented in Part One of this report. In what follows reference will be made to the different issues addressed above.

C. Transmission mechanisms

C.1 Monetary policy and the yield curve

As noted in Part One of this report, the traditional transmission mechanism of monetary policy under flexible exchange rates and inflation targeting is the yield curve. In a very straightforward way, the degree of “effectiveness” of monetary policy may be measured through a two-stage procedure:

- First, to what extent do changes in the policy rate affect the longer-term benchmark rates (both nominal and indexed);
- Second, to what extent do changes in this benchmark rate affect aggregate expenditure, and in this way inflationary pressure.

A key issue in evaluating the “effectiveness” of monetary policy in Iceland is how these two questions are answered. Surprisingly the CBI’s report is rather scanty on this subject. It addresses the connection between policy and longer term interest rates in section 6.1 (pages 28 and 29), and their relationship is presented in Chart 6.2. In addition, there is also a rather lengthy footnote (footnote 25, page 28) with some technical discussion. However, there is no detailed presentation of the way in which the policy rate affects longer-term interest rates in Iceland (5 year Treasury

bonds, for example), nor whether this relationship has changed through time (one suspects that it has). This, in spite of the fact that the report emphasizes strongly – and correctly – the notion that there has been a breakpoint in structural economic relationships in Iceland; mechanisms in operation during the first few years of this century, do not work any longer.³⁸

The CBI undertook a study on the transmission of policy rates along the yield curve in the year 2001.³⁹ That study is interesting, and very professionally done. In the third issue of the *Monetary Bulletin of 2006*, Appendix 1 is devoted to discussing the transmission mechanism of monetary policy in general and in the case of Iceland in particular. However, as pointed out above and as emphasized in the September 2017 CBI report, there have been important changes in the structural economic relations in Iceland. This means that there is need to update this type of analysis, in order to have greater clarity of the way in which changes in monetary policy affect the key variables in the economy.

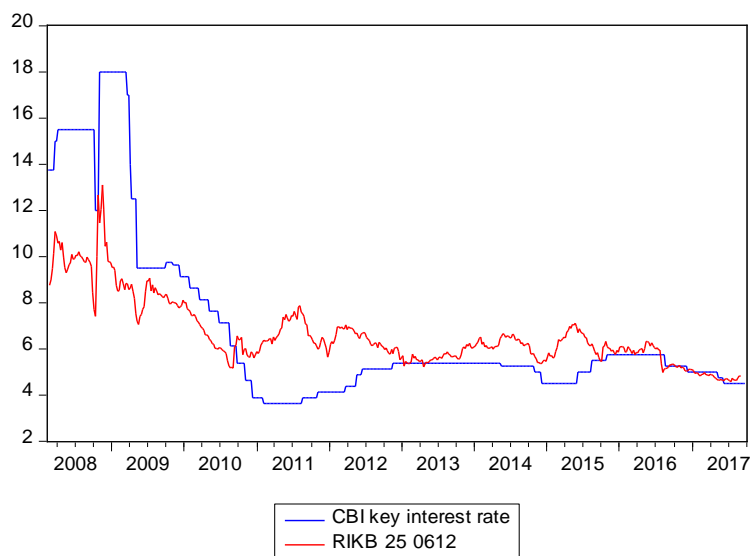


Figure 6: Policy rate and long bond rate in Iceland, 2008-2017

As noted in Part One, a number of experts have argued that monetary policy in the U.S. has lost effectiveness during the last few years. Changes in the Federal Funds rate are not transmitted into

³⁸ In the traditional Mundell–Fleming model, under most circumstances domestic and foreign assets are imperfect substitutes. In its graphical representation this means that the external sector equilibrium condition (the so called FF curve) is represented by an upward sloped schedule. In this case the transmission mechanism includes both the interest rate and the exchange rate. Notice that most analyses assume that currency depreciation is expansionary. There are circumstances, however, where the opposite is true, and where depreciation is contractionary.

³⁹ See, Petursson (2001).

longer rates in the same fashion as they did in the past. Central bankers such as Ben Bernanke have pointed out that in a globalized economy with interconnected financial markets, longer-term interest rates are determined by the global interaction between savings and investments, and are not susceptible to being influenced by domestic policy, not even by large countries' central banks. In his 2016 article, Governor Már Gudmundsson recognizes this point, and makes a very clear presentation of the way in which interest rates are determined in globalized economies.⁴⁰ In order to illustrate the situation, in Figure 6 I show the evolution of the CBI's policy rate and the yield on a long-term government bond (RIKB 25 0612) between the years 2008 and 2017; these data are weekly. As may be seen, there are periods through which these two interest rates moved in the opposite direction. During the most recent circumstances – since late 2015 – they appear to be moving with greater synchronicity. However, the overall lesson from this diagram – and from econometric work -- is that if one takes the last 10 years, the relationship between the policy rate and the longer-term interest rate is weak. This is confirmed by a number of regression analyses using various techniques – not reported here due to space considerations.⁴¹ Not surprisingly, given the high-frequency nature of these data, the results also indicate that during this period there was significant persistence in long-term interest rates. Figure 6 also shows some interesting developments during the earlier post crisis years. As may be seen, between 2008 and mid 2010 the policy rate was above the long-term interest rate. This was possible because of the existence of stiff capital controls.

The widespread use of indexation has also been a source of weak yield curve transmission. Indeed, in Iceland there most mortgage loans – approximately 80% -- are indexed and have 40 year maturities. The existence of this widespread market represents a challenge for the CBI. Changes in the policy rate will have limited impact on the housing and real estate markets.

In the mid-2000s, the “conundrum” situation described by Chairman Greenspan in the U.S. was also seen, although to a lesser extent, in Iceland. Between 2005 and 2007, the real CBI policy rate went from 2% to almost 10%, while the real long-term rate merely increased by 100 basis points, from 4% to 5%. Given the importance of the housing market, central banks with a limited capacity to affect long term rates –as seems to be the case for the CBI --, should rely on other tools in order to ensure financial stability, and in particular in order to avoid the type of housing frenzy that characterized many advanced economies in the period leading to the “Great Recession.” These tools are part of “macro prudential” regulations and include measures as determining maximum “loan to value ratios” in the mortgage market.

⁴⁰ The question of the transmission mechanism goes back to, at least, the Mundell–Fleming model. See discussion below.

⁴¹ In fact, in some of the error correction regressions the sign of the policy rate was slightly negative and marginally significant.

Interestingly, the Reserve Bank of New Zealand instituted these types of housing market regulations in October 2013. In November 2017 the RBNZ announced that it was easing the LVR, starting on January 2018. It is illustrative to quote extensively from the Bank's communique from November 29 2017 (I return to the issue of the relationship between monetary policy and the housing market below):⁴²

“Domestically, LVR policies have been in place since 2013 to address financial stability risks arising from rapid house price inflation and increasing household debt. These policies have helped improve banking system resilience by substantially reducing the share of high-LVR loans. Over the past six months, pressures in the housing market have continued to moderate due to the tightening of LVR restrictions in October 2016, a more general firming of bank lending standards and an increase in mortgage interest rates in early 2017.

“Housing market policies announced by the Government are also expected to have a dampening effect on the housing market.

“In light of these developments, the Reserve Bank is undertaking a modest easing of the LVR restrictions. From 1 January 2018, the LVR restrictions will require that:

- No more than 15 percent (currently 10 percent) of each bank's new mortgage lending to owner occupiers can be at LVRs of more than 80 percent.
- No more than 5 percent of each bank's new mortgage lending to residential property investors can be at LVRs of more than 65 percent (currently 60 percent).

“The Bank will monitor the impact of these changes and will only make further LVR adjustments if financial stability risks remain contained. A cautious approach will reduce the risk of resurgence in the housing market or deterioration in lending standards.”

It is important for the CBI to continue to work on this subject, and to have a clearer sense of the extent to which the relationship between its policy rate and the longer-term benchmark rates has changed. Without exaggerating, it may be argued that without that kind of knowledge it is difficult to truly assess the degree of effectiveness of monetary policy.

⁴² <https://www.rbnz.govt.nz/news/2017/11/reserve-bank-to-ease-lvr-restrictions>

C.2 Monetary policy and the exchange rate

As mentioned in Part One of this report, a number of authors have argued that in open economies, and in particular in small open economies, the exchange rate is the most important transmission mechanism of monetary policy. Short-term interest rates hikes generate a nominal exchange rate appreciation, and through this mechanism, and some version of the “law of one price,” a downward pressure on tradable goods’ prices.

The CBI September 2017 report addresses the connection between interest rates and exchange rates throughout its argument on the different components of CPI inflation. The report makes the important distinction between housing inflation, and imported goods inflation (See, for example, Chart 4.1, and the analysis in pages 16 – 17; see also Sections 5 and 6).

The discussion, however, is not undertaken within the context of “transmission mechanisms,” or monetary policy effectiveness. For instance, there is no detailed information on the (expected) magnitude of the impact of an interest rate hike on the value of the ISK, either in the short or long run. It is recommended that the CBI addresses this question empirically, in order to evaluate and improve the effectiveness of monetary policy. Further, an analysis of CBI reports and other publications provide limited information about this important relationship.⁴³

It should be noted, however, that this is a somewhat challenging exercise, given the fact that Iceland has had capital controls, and that these have changed in intensity during the last few years.⁴⁴ These changes in controls may have introduced structural breaks that are usually difficult to assess in a precise fashion. It is also difficult, since the international evidence suggests that, although the nature of the relationship between short-term interest rates and currency values is well-established (higher rates tend to strengthen the domestic currency), the magnitudes of these effects are usually estimated in a very imprecise fashion.⁴⁵ In addition, there are feedbacks from exchange rates expectations an interest rates.

However, to the extent that the nominal exchange rate provides the main transmission mechanism for monetary policy, it is fundamentally important to have some kind of notion of the

⁴³ There are numerous references to the problem in speeches by the CBI's governor, but would is missing is technical work that would pin down the nature of this relationship within the context of the transmission mechanism discussion.

⁴⁴ Edwards and Rigobon (2009).

⁴⁵ This has to do with the traditional difficulty in not rejecting the uncovered interest parity condition. Most empirical studies that have attempted to analyze whether this arbitrage condition holds have ended up estimating the corresponding coefficients in a very imprecise fashion.

quantitative relationship between monetary policy actions and changes in the exchange rate. The point is this: a useful way of evaluating the effectiveness of monetary policy is using a two-stage procedure similar to the one proposed above: in the first stage it is assessed the extent to which monetary policy affect the exchange rate – with other things given –, and in the second stage it is determined how exchange rate changes affect the inflation target.⁴⁶

Additional information is needed on the relationship between these key variables – policy rate and exchange rate – in order to assess fully the degree of effectiveness of monetary policy. This additional information is of two types: (a) historical/empirical. That is, there is need for better measures of the impact of changes in the policy rate on exchange rates (with other things given); and (b) doctrinal, in the sense understanding how the CBI views the interplay between these two variables in its quest to fulfill its mandate.

C.3 Exchange rates and pass-through

As noted above, and as emphasized in the literature – including in the article by Governor Gudmundsson –, in small open economies the exchange rate provides one of the fundamental transmission links for monetary policy. This means, as already mentioned, that in order to assess its effectiveness it is necessary to have an approximate (and updated) notion of the “pass-through” coefficient, or the extent (in percentage terms) to which changes in the currency will impact different price indices. The CBI has done some work on this subject in the past. For example, 2011/3 issue of the *Monetary Bulletin* devotes a Box (VIII-1) to the subject. In this Box the literature is reviewed, and different findings by different authors are confronted. It is argued that after the crisis the pass-through coefficient in Iceland did not decline. *Working Paper 14*, from 2001, by the CBI’s chief economist Dr. Pétursson also deals with this question. This is an interesting and well-constructed paper, but it has not been updated, and its results correspond to a different era in Iceland’s economic history.

The CBI September 2017 report addresses the connection between currency values and inflation. For example, on page 25 we read:

“...currency appreciation also helps to keep domestic inflationary pressures under control, and furthermore, it directly reduces inflation through lower import inflation. In the same manner, currency depreciation can mitigate a downturn. Without exchange rate flexibility, business cycles could become more volatile, as an important part of the economy’s shock absorbing capacity has been removed and an important channel for monetary policy transmission to the real economy has been closed off.”

⁴⁶ See, for example, Edwards (2018a).

However, the term “pass-through” does not appear in the document, nor is there a discussion on the quantitative effect of currency changes on the different inflationary indices. It is important to notice that this kind of analysis should look in detail at different measures of inflation. The point is a subtle but important one; in order for the exchange rate to be as successful and effective shock absorber it should be able to accommodate required changes in the *real* exchange rate, or relative price of tradable to nontradables. This means that it is desirable that nominal exchange rate changes affect tradable goods, without impacting on prices for domestic goods. In other words, this means that in an ideal world currency depreciation would have a large impact on the domestic price of tradables, while there would be no pass-through to nontradables goods. In this way the nominal depreciation would be effective, in the sense of altering the real exchange rate in the desired direction. In a number of countries the pass-through coefficient is relatively high, and relatively similar for tradables and nontradables.⁴⁷ In this case, and for all practical purposes, “inflation targeting” becomes very similar to “exchange rate targeting.” The reason is that changes in the nominal exchange rate barely contribute to RER adjustments. At the same time, they result in high (across the board) changes in prices.⁴⁸

As noted above, the CBI has done a number of studies on this issue in the past. An interesting contribution is the 2008 *Working Paper* titled “How hard can it be? Inflation control around the world.”⁴⁹ This analysis suggests that the pass-through for Iceland is in the vicinity of 0.40. However, as in other instances, the information in this particular paper seems to be outdated. As noted above, and as the CBI itself has pointed out, there has been a structural break in economic relationships in Iceland. In order to improve the conduct of monetary policy, and to have better tools to assess its effectiveness, it is necessary to have new estimates of pass-through coefficients, for different price indices. In particular, it is important to have this information for the housing component of the index.

C.4 Monetary policy and the housing sector

The September 2017 CBI report points out that the housing sector is fundamentally important in Iceland. In particular, it is argued that the contribution of housing to inflation – via the imputed rent of owner occupied dwellings – has been relatively high; See Chart 4.1, and the discussion in pages 16–17.

The deconstruction of inflation in different components, emphasizing the contribution of housing, is correct and is welcomed. The following quote from the document is useful (page 17):

⁴⁷ Historically this has been especially the case in Latin American nations.

⁴⁸ Edwards (2006, 2007).

⁴⁹ Pétursson (2008).

“... inflation excluding housing has fallen very rapidly in the recent term. This reflects the swift rising house prices in the recent past: for inflation including housing to be close to the target it is clear the price of other goods and services must rise modestly or even fall.”

One could speculate that the surge in the tourist sector has been related to the rapid increase in housing prices. However, in order to have a clearer idea of these trends it is important to undertake detailed analyses of the dynamics of housing prices. This should be done in detail, distinguishing between different types of dwellings, and different parts of the country. As noted below, however, it is not only important for close on housing prices, but also on construction and the “quantity” aspect of the problem.

Recent research in other countries – and in particular in the United States – suggests that housing is not only important as a determinant of inflation, but also as one of the main drivers of the business cycle. Edward E. Leamer (2015) has even argued that “housing *really is* the business cycle.” The point made by Leamer and other authors is that although housing is a relatively small component of GDP, it has the important feature of being the most important large-ticket durable in any economy. This means that economic agents can either accelerate or postpone in time the decision to invest in new housing structures. If agents believe that interest rates will go up in the future, they will build today more housing than what is “normal,” and in this way they will move expenditure from the future into the present. This will tend to accelerate the boom during good times, and make the slowdown more profound during bad times. According to Professor Leamer there is a role for monetary policy here. He writes,

“the only way to stop a durable cycle [driven by housing] is to intervene to prevent the stock from becoming excessive, which means high interest rates of interest when housing starts have been above the normal... for an extended period of time.”⁵⁰

Leamer goes as far as arguing that monitoring the housing market (in terms of quantities) is fundamental for a central bank. Although he does not state it explicitly, one could argue, based on his analysis that central banks should have a specialized unit that monitors the behavior of the housing sector, and follows both prices and construction activity. The cyclical movement of the sector, Leamer argues, should be a fundamental determinant of any decision to alter the policy interest rate.⁵¹

This amplifying effect of housing – or more generally the construction sector – in the business cycle is possibly even more important in small open economies, where construction booms are

⁵⁰ Leamer (2015), p. 5.

⁵¹ Recently the CBI has been looking at the housing market, including at the effect of AirBnb.

many times financed with foreign capital. In that regard, if the upswing in this sector goes hand in hand with a current account deficit and a stiff currency appreciation – as was the case in Iceland before the crisis –, the probability of a large disequilibrium situation is higher – this is related to what we can call the “*Robert Aliber cranes index of disequilibrium*.”

In light of this international evidence and discussion, it is recommended that the CBI undertakes research along the lines suggested by Leamer, in order to understand truly the way in which this housing channel operates in Iceland’s business cycle. It should be noted that according to Leamer, policy changes are transmitted into the housing market through the term structure. This raises the question of whether there is still a “housing cyclical effect” when the yield curve effect is weak, and when the exchange rate is the main transmission mechanism. It is possible, for instance, that agents consider their net wealth position (partially) in foreign currency (dollars or euros). If this is the case, we would still see the housing effect in economies where the exchange rate is the main transmission mechanism. At the end of the road, this is an empirical issue, which could/should be analyzed by the CBI.

In Iceland a significant fraction of construction project are financed by banks with short term or revolving credit lines.⁵² This makes the supply side sensitive to changes in monetary conditions. High policy rates tend to restrict supply. On the other hand, most mortgages are 40 year loans indexed loans, with fixed payments. This means that on the demand side monetary policy conditions tend to be less important. This reinforces the need to have a better and more complete understanding of the construction sector.

The above discussion suggests that in Iceland housing is particularly important, and that it should play a prominent role in the CBI analysis of the macroeconomic situation and on the conduct of monetary policy. An important question addressed below is whether the CBI should incorporate a “housing variable or index” as an additional variable in its policy rule.

D. Taylor rules for a small open economy

For some time now the Taylor rule has provided guidance to central bankers from around the world. In the past, the CBI has done extensive work on the subject, and has referred to this rule in many of its publications and research papers. For example, this is done in *the Monetary Bulletin 2002 (2)*. In this publication it is argued that if a “strict Taylor rule” had been followed, policy interest rates in Iceland should have been slightly higher between 2004 and 2007. The *Monetary Bulletin, 2013 (2)* relies on a Taylor Rule analysis to explain why policy interest rates are higher in Iceland than in other advanced nations. Also, Box I-2 of 2007/3 issue of *Monetary Bulletin* is devoted to this problem.

⁵²Icelandic Chamber of Commerce (2017)

The CBI September 2017 report mentions this rule in various passages. The analysis is interesting and professional. In particular, the discussion in section 5.2 is quite illuminating and clever. The document, however, does not get into the specifics of how the Taylor rule is currently used as a policy guide in Iceland. Moreover, the coefficients presented in the discussion (see, for example, page 24 of the September 2017 CBI report) are those originally used by Taylor in his analysis of the U.S. economy. There is no reason, however, for these parameters – 0.5 and 1.5 respectively -- to be the same across countries; indeed, it would be surprising if this is the case. In this regard, what is always clear is that the coefficient of the deviations of inflation from target should be greater than one. The reason for this, of course, is that it is necessary that changes in the policy rate stemming from changes in actual inflation are translated into *real interest rate* changes. How much greater than one it should be, is a country specific issues that can only be answered after undertaking specific research.

In an important, and yet little read paper, John Taylor discussed how monetary rules should be applied in small open economies without fully developed capital markets.⁵³ Taylor concluded that if a country opted for a flexible exchange rate – as opposed to an exchange rate anchor --, using a Taylor rule was still the most effective way of conducting monetary policy. However, he added that in these cases “may require modifications of the typical policy rule recommended for economies with more developed financial markets.” In addition, Taylor insisted on a key point which is often forgotten: the purpose of policy rules is to provide guidance to policy makers; they are not to be followed mechanically.

An important question, as noted, is whether traditional policy rules with two terms (inflation and unemployment deviations) should be modified in small open economies.⁵⁴ Three specific questions that are relevant for the case of Iceland arise. (1) Should housing prices and the exchange rate enter *directly* into the monetary rule, as additional terms? (2) Should foreign central banks’ policy rates (FED and ECB, say) enter explicitly into the monetary rule as additional terms? (3) What should be the coefficients of the traditional terms in the policy rule (another way of phrasing this, is how different should they be from the standard/historical rule?

Answering these queries in detail and in a precise way is beyond the scope of this report; doing it for Iceland would require extensive econometric and modeling work. However, in what follows I provide some reflections on some of these issues from Iceland’s perspective. Hopefully these reflections will provide some guidance until more definitive evidence is available.

The first points to make is that simple and traditional two-terms monetary policy rules -- with deviations of inflation from target, and deviations of real activity from full employment – already

⁵³ Taylor (2000, 2014).

⁵⁴ These are not original questions. They have been raised in the past in different academic and policy circles.

include *indirectly* the exchange rate and the housing sector. The former through the affect that currency changes have on prices of tradables (and other goods, through second-round effects), and the latter through imputed rent of owner occupied housing, and via the effect of housing on economic activity. The question, then, is whether monetary policy rules should have *additional* terms that incorporate these variables *directly*. John Taylor had this to say on why he excluded the exchange rate in his original formulation of his monetary rule:⁵⁵

“[T]he policy evaluation research that helped design the Taylor rule considered the role of the exchange rate. Simulations of multicountry models led me to believe that if the central bank reacted too strongly to the exchange rate then inflation-output performance would deteriorate. It was for that reason that I omitted the exchange rate in the Taylor rule for the United States.”

However, Taylor opined that this was not necessarily the case in every country; in particular, there were instances where it was possible that a different prescription made sense for a small open economy. He stated that:

“...the same conclusion would not necessarily be reached for other countries, especially small open economies. A country’s size, openness, capital mobility, and degree of exchange market development would matter.”

Most evaluations of policy rules with an additional exchange rate term have been in terms of the standard deviation of inflation and output. However, it is possible that in a very open small economy policymakers have additional objectives. If one of such goals is to avoid real exchange rate misalignment – and in particular real exchange rate overvaluation of a Dutch disease type –, there may be an independent role for the exchange rate in the monetary rule. Two comments are in order here: first, whether there is, indeed, such an independent role for the exchange rate should only be determined after careful empirical evaluation of the specific Icelandic situation. Second, it should be noted that including foreign central banks’ (Fed or ECB) interest rate into the domestic policy rule, as has been suggested by Taylor and Edwards among others, would incorporate some of the forces that may create short-term misalignment. This because, when the foreign central bank policy rate is included, there is a lower probability that interest rate differentials will become “too large.” In this case it is unlikely that there will be (very) large changes in the nominal exchange rate that would trigger (short and medium run) deviations of the RER from its fundamental equilibrium.

⁵⁵ Taylor (2000), p. 16.

It is important to emphasize that it is not possible to make a final and firm recommendation on these issues before having additional information obtained through detail and thorough research. Not all “housing sectors” are the same. Their importance varies from country to country for a number of reasons, including the institutional characteristics of the mortgage market, the historical ownership ratio, the depth of the capital market, and the modality of financing use by construction companies. In Iceland all of these variables are important and somewhat different from advanced countries in continental Europe. In particular, and as noted, the boom in the tourist sector, the long term indexed mortgages, and the funding of construction firms in the short term capital market are fairly unique attributes. This suggests that a renewed effort should be made to give this sector a more central role in monetary policy decisions, a point made in other countries by scholars such as John Taylor and Edward Leamer. It is too early to know however, if housing sector variables (or index) should be added to the policy rule. This can only be determined through additional research.

To summarize; There is a need to rethink – and possibly to reformulate -- the use of policy rules in Iceland. This means, at least two things: updating the research on the subject, and making the rule use more transparent. As a number of authors have pointed out, one reason for transparency is that once the rule is known (in the understanding that it only provides guidance) policy actions are more likely to affect expectations about the future and in this way will affect longer term rates; this means an improved and stronger transmission mechanism. As noted above, some of the questions relevant for the case of Iceland -- are:

- Should the exchange rates be incorporated as a separate term to the rule? This issue was addressed in Part One of this report, when the concern about “policy spillovers” was addressed.
- A second important question is whether in a small open economy with factor mobility, is it still pertinent to consider the traditional output gap in the Taylor rule? And if the answer is yes, should the coefficient be the same as in traditional rules? If, on the contrary, the answer is “no,” which measure of output gap should be used?
- Should asset values, including housing prices, be considered by the Taylor rule? This question has to do with the “asset bubbles” and monetary policy question. Since housing is one of the most important assets in many households portfolios, this question is intimately related to whether the housing sector should be incorporated directly into the policy rule.

- In countries where the exchange rate is the main transmission mechanism, should the interest rate in other central banks be part of the Taylor rule?⁵⁶

The unifying theme of all of these questions is what form, and which coefficients, should the Taylor rule have in Iceland in order for monetary policy to be as effective as possible. The report does not address this issue, and it would be useful that in future documents the CBI comments on these questions.

E. Assessing the long term equilibrium value of the real exchange rate, the sustainable current account balance, and the long-term sustainable NIIP

An important goal of macroeconomic policy in general, and of monetary policy in particular, is maintaining macroeconomic stability. At a basic level this means keeping inflation close to its target, and avoiding excessive volatility. Macroeconomic stability is endangered if some the macroeconomic variables get significantly out of line with respect to their long-run equilibrium values. This is particularly the case with respect to the exchange rate.

Along these lines, it is important for the CBI to have a very clear idea of three key macroeconomic variables: (1) the long-run equilibrium or “fair” value of the real effective exchange rate (EREER), (2) the long-run sustainable current account balance, and (3) the equilibrium, and stable, sustainable net international investment position over GDP ratio for the country (NIIP). The September 2017 CBI refers to all three of these. However, from reading the report it is not possible to know what type of models the Bank currently uses to assess the appropriateness of these three key variables at any moment in time. In the 2017/3 *Monetary Bulletin* the CBI acknowledges that there is significant uncertainty surrounding the equilibrium value of the RER:

“The equilibrium [real exchange] rate is expected to rise somewhat less than previously assumed, in line with a poorer outlook for terms of trade and a forecast of a smaller external trade surplus, as is discussed below. Both the outlook and the estimate of the equilibrium real exchange rate are always subject to some uncertainty, however.”

Similar issues arise with the NIIP, and with the sustainable current account balance.⁵⁷ Figure 6 contains data on Iceland’s current account balance relative to GDP, and on the NIIP to GDP ratio for the period 2005-2016.⁵⁸ These data show clearly the remarkable changes experienced by the

⁵⁶ See, for example, Edwards (2012, 2016)

⁵⁷ The report refers to the current account several times – pages 12, 14, 16 and chart 3.4 –, but it does not provide a discussion of the approach used by the CBI to determine whether the current account balance is within sustainable brackets. The report, however, is almost silent with respect to the NIIP; see for example chart 3.5.

⁵⁸ The paragraphs that follow are taken from the body of this report; see Part Two.

Icelandic economy. As may be seen, and as discussed in the Annex, in 2006 the current account deficit was close to 25% of GDP, possibly the largest deficit ever experienced by an advanced country. As the chart shows, in 2008 the NIIP ratio exceeded 125% of GDP. Again, this is possibly the largest negative NIIP ever experienced by an advanced nation; it even exceeds the very large (negative) values in New Zealand during the early 2000. But the large imbalances during the earlier years in the chart are not the most impressive aspect of it. What is really unique is the fact that over a period of 10 years, Iceland has moved from having a massive negative NIIP to having a slightly positive one. As the chart shows since 2009 the country has posted very large current account surpluses.

The most important question that emerges from this graph, and one that the CBI needs to address head on, is what is the long run, stable equilibrium NIIP in for Iceland. Is this a nation that in the next decades ought to be a net creditor, such as Switzerland and Germany? Or is this a country that will have a stable negative NIIP, such as the United States and the UK? This is not clear at this point; in fact, the different CBI reports and publications are silent with respect to it. And yet, having a better notion will be fundamental in determining the appropriateness of the current real exchange rate, and thus the interaction between its value and monetary policy actions.

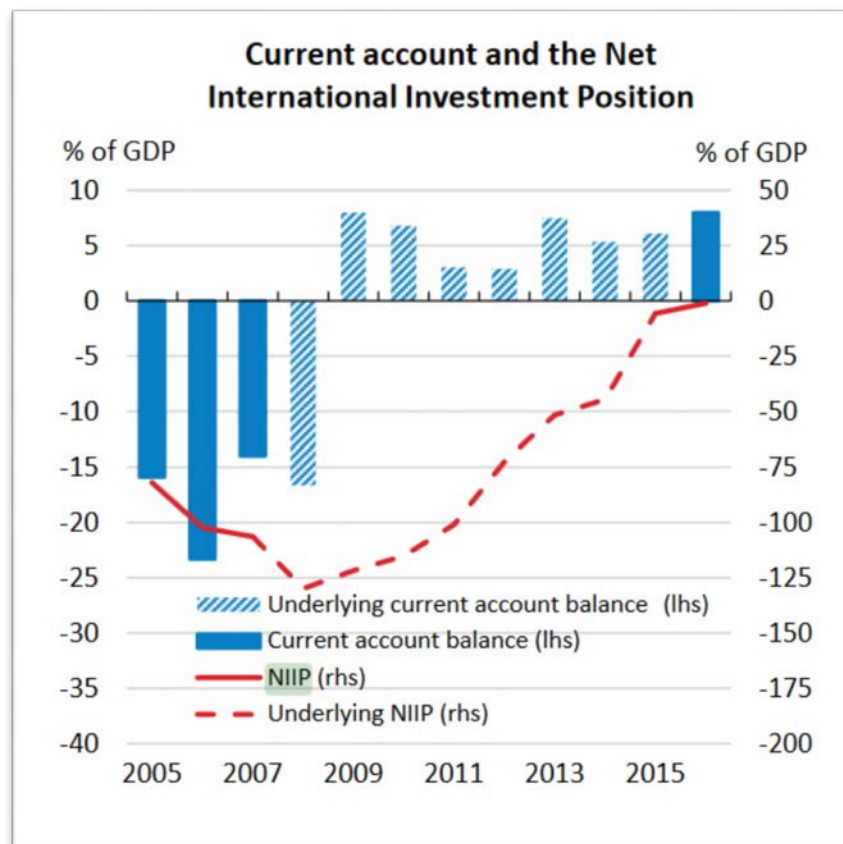


Figure 7: Current account balance and NIP racial to GDP in Iceland, 2005 – 2017,

(OECD calculations)

As noted, in the Annex to this report I review the different approaches used to evaluate whether the RER is close to its long run equilibrium. I do that within the context of the Icelandic case, and I refer to some data from Iceland. My main conclusion from that discussion is that the CBI needs to update its work on the subject, and it needs to establish a more comprehensive approach to evaluating real exchange rate equilibrium. Currently, the CBI uses its quarterly model QMM to deal with this issue and to provide some guidance. It is unclear, however, how well this model has operated with respect to this issue, and whether it has captured the structural changes through which the economy has gone.

F. The effectiveness of capital controls and currency intervention

According to the International Monetary Fund, Iceland’s monetary stance could be characterized as “*inflation targeting plus*.”⁵⁹ Within this description, the “plus” component refers to the fact that traditional inflation targeting is supplemented with two additional attributes: controls on capital inflows in the form of “unremunerated reserve requirements,” and interventions in the foreign exchange market in order to reduce exchange rate volatility. Likewise, the CBI has defined its “inflation targeting” as traditional inflation targeting supplemented with macro- and micro-prudential regulations, including FX intervention and capital controls.⁶⁰

Since 2013, the CBI has made an effort to avoid (or reduce) real appreciation of the ISK. This for three main reasons: A) ensure that the real exchange rate would not be too high when the controls would be abolished, B) prevent over-appreciation of the currency and Dutch disease effect and C) to build up currency reserves before lifting the capital controls.

A key question, and one that the CBI report under consideration (September 2017) does not tackle in details, is what is the contribution of these two components to the effectiveness of monetary policy. As noted in Part One of this report, there is an abundant literature on both of these questions, and it would be extremely important that when evaluating the effectiveness of its own policy, the CBI provides its view with regard to their specific contributions. To what extent do they provide additional degrees of freedom? To what extent do they increase these the bank’s ability to control macroeconomic aggregates, and thus to keep the rate of inflation close to its target? Is there evidence that market participants are looking for ways to circumvent the controls

⁵⁹ See also the different speeches and statements by the CBI's governor.

⁶⁰ See <https://www.cb.is/library/Skraarsafn---EN/Reports/Monetary%20policy%20in%20Iceland%20after%20capital%20controls.pdf>

on inflows? Do market participants believe that the CBI has implicit “exchange rate bands” and operate accordingly?

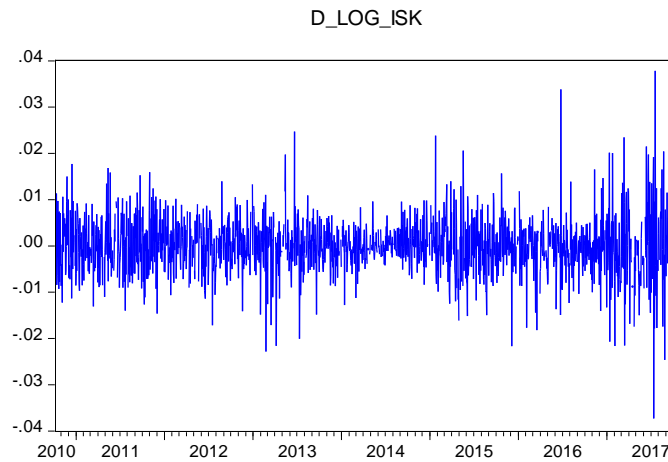


Figure 8: Daily percentage changes in USD/ISK exchange rate, 2010-2017

The CBI has stated clearly that its currency intervention policy is not geared towards protecting a particular “level” of the exchange rate.⁶¹ According to several policy statements the goal of this policy is to avoid excessive exchange rate volatility. An important question, and one that is not addressed in the different CBI publications, is what is meant by “excessive,” and whether this definition is static through time, or if it is altered depending on changing international financial market conditions. In order to address this issue in Figure 8 I present data on the *daily* percent the change of the ISK/USD rate since the year 2010. Perhaps the most interesting aspect of this graph is that the period of lower volatility corresponds to the second half of 2013 and the first half of 2014. The graph also show a point made by the CBI’s Governor, in the sense that in early 2017, immediately after the controls on capital outflows were removed, there was a hike in volatility. The data also indicates that volatility has subsided, and that towards the end of 2017 it had declined significantly.

It is important to note that the low degree of transparency of currency market intervention decisions adds noise to the market, and may result in destabilizing speculation. An important policy recommendation is to move decisively towards a more translucent system.

An analysis of the time series of exchange rate changes allows us to understand how volatility has evolved through time, but does not provide information on the comparative situation of Iceland with respect to other nations. In order to provide some comparison of volatility in Iceland

⁶¹ it should be noted that there is a box in Monetary Bulletin 2017/4 where exchange rate volatility in Iceland and other nations is addressed.

and in other commodity exporting countries, in Figure 9 I present the percent the change of the bilateral exchange rates in Chile and New Zealand, both with respect to the US dollar.

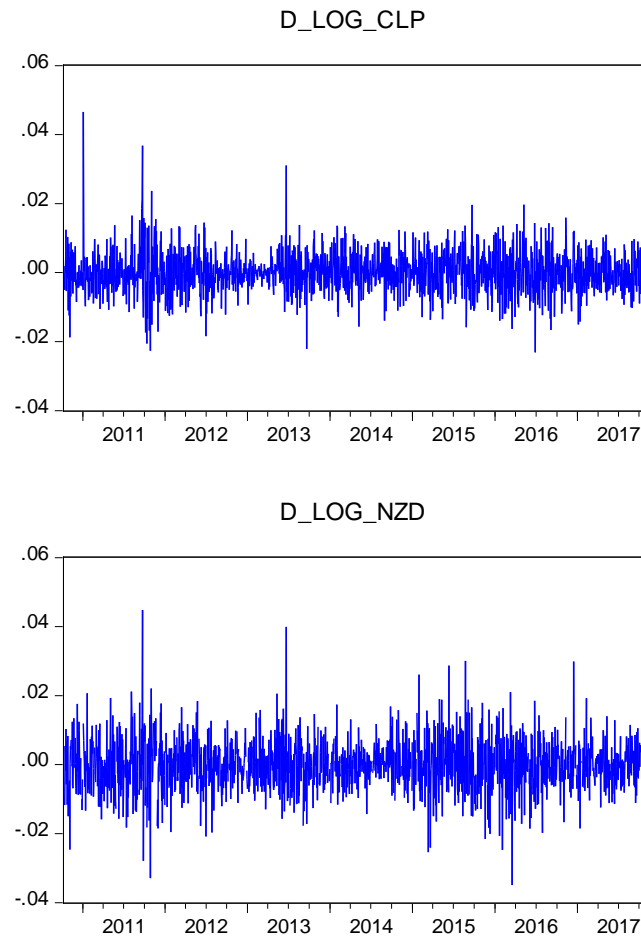


Figure 9: Dailey change in the exchange rate for the bilateral US dollar to Chilean peso and US dollar New Zealand dollar exchange rates, 2010 – 2017

The data in the table that follows provides a summary of the behavior of *daily* exchange rate changes for these three commodity exporting countries for the period 2013-2017. As may be seen, the mean percentage change (in absolute terms) in the bilateral exchange rates in Iceland sits between that of Chile and New Zealand. The same is true of the standard deviation. Interestingly, if one restricts the sample to the year 2017, the extent of volatility in Iceland exceeds that of the other two nations.

	D_LOG_CLP	D_LOG_ISK	D_LOG_NZD
Mean	0.000116	-0.000212	0.000185
Median	-2.93E-05	-0.000265	0.000239
Maximum	0.031042	0.037888	0.039957
Minimum	-0.023041	-0.037228	-0.034835
Std. Dev.	0.005690	0.006366	0.007268
Skewness	0.111958	0.134406	0.149373
Kurtosis	4.110633	7.414931	5.070571
Jarque-Bera	57.28256	873.0379	195.3019
Probability	0.000000	0.000000	0.000000
Sum	0.124336	-0.227323	0.197839
Sum Sq. Dev.	0.034637	0.043358	0.056525
Observations	1071	1071	1071

These graphs and table indicate, one more, that there is need for further analysis on behalf of the CBI. Additional information is needed with respect to both the effectiveness of the capital controls and the currency intervention policy. In that regard, the points made in the overall discussion presented in Part One of this report are relevant.⁶²

All of these are important questions which should be addressed by the CBI, in order to provide a firmer terrain on which to discuss the important issue of monetary policy effectiveness.

G. Summary

After reading different CBI report, analyzing the data in detail, and interviewing a number of individuals from many sectors, my conclusion is that monetary policy in Iceland has been run in an effective way since approximately the mid-of 2012. Indeed, an important conclusion is that

⁶² An attempt to estimate Markov-switching regressions with equation dependent variances, failed to identify clearly two volatility regimes for Iceland during this period. This is a preliminary and tentative result, which deserves additional analysis. It is interesting to note that when the Markov regressions are estimated with a common variance, it is possible to identify two regimes. However, providing the details of this type of technical analysis is beyond the scope of the current report.

since that time (2012-13) monetary policy has contributed in a significant way the recovery of the Icelandic economy.

At the same time, it is important to acknowledge that the good economic performance of the economy – including the low rate of inflation – is partially a consequence of the benign international financial conditions during these years. A key point of my evaluation is that in spite of significant and clear progress with respect to monetary policy, there are still a number of loose ends and areas where additional knowledge is required in order to increase even further the effectiveness of monetary policy. Part Three of this report, which follows, provides more detailed conclusions, and a score of specific recommendations. As noted, in the Annex I include a detailed discussion on alternative techniques for identifying real exchange rate misalignment. This is an important issue in Iceland, and one that the CBI should take seriously into account.

The main points made in this Part of the report may be summarized around five themes, all of them related to the need to improve the understanding of the functioning of the economy, and to consider and evaluate introducing some adjustments to the monetary policy framework:

- a) Currency intervention: There is a sense in the market and among observers and analysts that the current policy is not particularly transparent. An effort should be made to make it clearer, possibly following the lead of the Reserve Bank of New Zealand. In addition, it would be beneficial if decisions on market intervention are discussed in depth by the MPC.
- b) Capital controls: Controlling capital movements played a very important role in Iceland recovery. However, as the country moves towards a “new normal,” the remaining controls on inflows should be lifted gradually. The first step would be to set the rates of the reserve requirements at zero. This may be done in steps. Initially the measure could affect longer term bonds, followed by bonds with a high degree of liquidity (the yields on these bonds are less likely to be affected by sudden changes in inflows).
- c) Monetary rule: During the last few years the CBI has used a monetary rule (Taylor rule) as guidance. However, it is not clear what the form of that rule is at the current time (value of coefficients and/or terms), nor if it incorporates the structural break in economic relations in Iceland. It is important for the CBI to consider modifying the rule. More specifically, two issues should be addressed: Should the policy rule include as an additional term housing sector variables? Should the policy rule be modified, as to incorporate the policy rate in major central banks, such as the Federal Reserve and/or the ECB? It is important to note is that other central banks are also grappling with these issues.

- d) Transmission mechanism: As was pointed out in Parts One and Two of this report, there is increasing evidence that in a globalized setting the nominal exchange rate becomes the main transmission mechanism for monetary policy. This seems, indeed, to be the case in Iceland. Although this is not the same as “exchange rate targeting,” it does mean that the exchange rate becomes a central component and concern of monetary policy. Thus, there is need for the CBI to update its models, in order to understand better the way in which changes in the policy rate affect the currency, and how, in turn, these changes impact on prices. This last point has to do, of course, with the “pass-through” coefficient. A related topic has to do with fully understanding the determinants of the long term equilibrium real exchange rate, in order to evaluate at every point in time whether the observed RER is consistent with fundamentals.
- e) Housing sector: New research suggests that in a number of countries the housing sector is one of the most important drivers of the business cycle and of inflationary expectations. There is preliminary evidence that this is, indeed, the case in Iceland. For this reason, it is important that the CBI update its models on housing, and to consider, as discussed above, whether a housing sector- related variable should be incorporated directly into the monetary policy rule.

PART THREE:

CONCLUSIONS AND RECOMMENDATIONS

Iceland has made remarkable progress during the last few years. Gross domestic product has returned to trend and unemployment has all but disappeared. With tourism, the country has found a new source of foreign exchange.

The main conclusion of my analysis is that monetary policy has contributed in an important way to Iceland's recovery, and to the return of confidence. On March 17, 2017, Standard & Poor's upgraded Iceland's sovereign debt to an A rating with a stable outlook. This was a very positive showing, in particular if one considers that as recently as July 2015 the same rating agency had given the country a BBB minus rating.⁶³ A review of monetary policy actions since 2012-2013 does not show any mistakes, or steps in the wrong direction. Of course, one could quibble here and there on the timing and intensity of particular measures – the pace at which the policy rate was reduced after June 2016, for example – but the overall conduct of policy by the CBI has been professional and effective.

This does not mean, however, that there should be no changes/adjustment/reforms. As I have pointed out above, and as I argue in greater detail in what follows, there are a number of areas where improvements should be made. Most of these have to do with increased knowledge by the CBI of the way in which the economy works at the current time. As noted repeatedly in this report, Iceland has gone through a very major structural change during the last few years. This means that with all likelihood the empirical relationships between different macroeconomic variables have broken down, and changed drastically. In order for monetary effectiveness to continue to be high, or even to improve, there is need for major investment in research on the economy, there is a clear need to update the CBI's models.

At the risk of being repetitious, it is important to go back to the historical background before providing the main recommendations. In 1970, after the collapse of the Bretton Woods system, Iceland adopted an adjustable peg with respect to the USD; this policy lasted until 1974. From 1974 through 1983, the degree of flexibility of the exchange rate was somewhat increased and the country followed what the CBI a "managed float" policy. This constituted a direct attempt at targeting the exchange rate. At first it was targeted relative to the USD and then relative to various currency baskets. Between 1984 and 1989 the exchange rate policy became more rigid, and the exchange rate target more focused. However, since inflation didn't subside, small devaluations – ten overall – were engineered as a way of avoiding RER overvaluation; for all practical purposes the country was following a variation of a "crawling peg" regime. Between 1990 and 1995 a renewed effort at exchange rate stability was made, and several exchange rate bands were used. Initially, the reference point was given by a 17 currencies basket, and the band width was narrow: +/- minus 2.25% relative to the benchmark. The basket was redefined in 1992;

⁶³ Standard & Poor's upgraded Iceland to BBB on July 17, 2015.

the USD was given an 18% weight, the Japanese yen 6%, and the ECU 76%. The *króna* was devalued in 1992 and 1993. In 1996 the width of the band was increased to +/- 6%, and a new basket of 16 currencies was defined. From 1996 through 2000 the currency was allowed to move freely within the band; in February 2000 the band was once again widened, this time to +/- 9% relative to the basket target. This represented an important step towards a flexible/floating exchange rate regime. In 2001 the exchange rate target – or target zone – was eliminated and an inflation target was adopted. This regime lasted until the 2008 crisis. This history, then, may be summarized as follows: the ISK has only floated freely from 2001-2008, a very volatile period. It is generally recognized that during the first phase of inflation targeting – from 2001 through 2008 – results were very poor. It is not an exaggeration to say that the policy stance during those years, including extremely high interest rate differentials and lax supervision of the financial sector, contributed significantly to the 2008 crisis. Since 2012 there has been a major change in policy. Inflation targeting has been taken seriously, inflationary expectations have been properly anchored and a much better communications policy has been followed. As noted, this improved monetary policy, jointly with other measures, including the imposition of capital controls, have contributed to the recovery of the economy.

There are four *main recommendations*, going forward. While one is generic, and applies to every country, the other three are specific to Iceland. Each one of these *main recommendations* has a number of specific – and sometimes quite detailed – suggestions.

1. It is important to realize that *there is no “silver bullet” in terms of monetary regime/policy*. Although a country’s monetary regime is a fundamental component of its economic/political institutions, it will not provide, by itself, all the solutions to every one of the nation’s problems. Of course, the monetary regime and the concomitant monetary policy can contribute significantly to achieving the goals of growth, low inflation, and sustained stability. But contributing to these goals is not the same as ensuring them. At the end, socio-economic performance is the result of the interaction, in a very complex way, of many policies and institutions; monetary policy is only one of them.

It is fundamental to note, however, that there is an important asymmetry: while the monetary regime cannot, on its own, ensure good socio-economic outcomes, monetary policy mistakes (and irresponsibility) may result in crises and in significant instability. That is, and to put it bluntly, an irresponsible monetary policy can, single-handedly, ruin a country. History is replete of cases where flawed monetary policy has been at the heart of major crises. Argentina is, perhaps, the best example of this type of sad story. This means that having a solid and efficient monetary policy is a required but not a necessary condition for a country to achieve its goals.

Along similar lines, it is important to realize that there is a close connection between the exchange rate regime and the monetary policy regime. The central proposition that captures this relation is the “trilemma”; it is not possible to simultaneously have a fixed exchange rate, and open capital account and an independent monetary policy. Countries that have tried to violate this theorem – mostly by undertaking expansive monetary policy under fixed exchange rates -- have paid for it dearly. In addition, there are trade-offs regarding exchange rate regimes: while more flexible exchange rate arrangements will tend to act as absorbers for external shocks, more rigid ones (if credible and sustainable) will help attain lower interest rates in most countries. This situation is known in the economics profession as the “flexibility-stability” trade-off.

2. After analyzing the data, scrutinizing the current policy procedures, investigating the pros and cons of alternative options (flexibility vs credibility), after interviewing more than twenty people, and considering the country’s history, culture and traditions, my conclusion is that at the current time the best monetary regime for Iceland is “*flexible inflation targeting*.”⁶⁴

This is, generally speaking, the monetary regime that the country has at the current time. In that regard, my advice is not earth-shaking, and may be seen as espousing continuity and defending the status quo. This, however, is not the case. There are a number of areas where the current framework for monetary policy could, and should, be improved. Also, here are a number of areas where the CBI should consider adjustments. In that regard, my recommendation is that Iceland moves to what we may call, for lack of better terminology, an “*improved inflation targeting*” monetary policy regime.

As was pointed out earlier, most modern discussions on the optimal monetary and exchange rate regimes are couched within the “credibility versus flexibility” approach. As noted, countries that lack credibility and that mostly face domestic monetary shocks, will benefit from a (hard) peg exchange rate regime, such as a currency board. This will help them gain credibility and anchor inflationary expectations.

For a long time, a number of authors recognized the fact that Iceland had an important credibility deficit. This problem has historically been reflected in a succession of crises. As a consequence, the nation’s rate of inflation exceeded, quite significantly, that of other advanced nations. Moreover, repeated attempts at using pegged exchange rates to gain credibility failed. These failures were mostly the result of the fact that the exchange rate arrangement was characterized by “soft” pegs, which were seen as having permissive “escape clauses.” It was, precisely, the fact that these soft pegs did not work what

⁶⁴ As noted above, the report only considered options with a “currency of its own.”

prompted a number of analysts, members of parliament and policy makers to suggest that it was time for the country to consider moving to a more rigid type of institutional arrangement, along the lines of a currency board or joining a pre-existing monetary union, such as the Euro Zone. The problem with this type of regime, however, is that it leaves the country without a shock absorber to accommodate external shocks. As noted above, there is ample evidence that flexible exchange rate regimes do provide that shock absorber feature; this is particularly important in countries such as Iceland, with a highly concentrated export sector and volatile terms of trade (see the discussion in the Annex).

At the end of the road, then, the selection of the optimal monetary regime will depend on the combination of two factors: How important is the country's "credibility deficit," and what is the nature of the external shocks. The larger is the former, the more beneficial it will be to have a rigid exchange rate regime. If, on the other hand, terms of trade shocks are particularly severe, there would be a preference for a more flexible arrangement. As pointed out in Part One, however, under flexible exchange rate regimes there is the danger that the monetary authority follows an excessively lax policy that results in rapid inflation. In that regard, flexible exchange rates – which take advantage of the shock absorber feature of variable currency values – will work better when the monetary authority has a credible commitment towards low inflation.

It is undeniable that during the last few years – since approximately 2012 – the degree of credibility of the CBI has increased significantly. As the IMF and other external institutions have pointed out, inflationary expectations are now quite firmly anchored, and the inflationary target has been achieved, something that did not happen in the past. This means that the attractiveness of hard peg regimes has declined during the last few years. At the same time, it continues to be true that Iceland's terms of trade are highly volatile. In Figure 12 I present the difference of (the logarithm) of terms of trade for five commodity exporting countries – Iceland, Australia, Canada, Chile, and New Zealand, as well as for the OECD. Summary statistics for these data are summarized here:

These data show that terms of trade volatility in Iceland is three times higher than the average for the OECD countries. Although it is not the highest among the commodity exporting countries in the sample, it is higher than that of Canada and not much higher than that of New Zealand. Interestingly, all of these nations have flexible exchange rates and an inflation targeting monetary regime. That is, they have all opted for having a system that provides them with the shock absorber feature discussed above.⁶⁵

⁶⁵ These data are from the OECD. See <https://data.oecd.org/trade/terms-of-trade.htm#indicator-chart>.

	DLOG_ISL	DLOG_AUS	DLOG_CAN	DLOG_CHL	DLOG_NZL	DLOG_OECD
Mean	-0.002827	0.012503	7.62E-05	0.022577	0.011362	0.000304
Median	-0.006194	0.009414	-0.007105	0.005283	0.000848	0.001318
Maximum	0.065034	0.187555	0.053570	0.219570	0.109871	0.027855
Minimum	-0.080827	-0.111198	-0.095877	-0.196889	-0.069270	-0.026611
Std. Dev.	0.033614	0.074031	0.033504	0.091047	0.040165	0.013288
Skewness	-0.039464	0.457898	-0.568926	0.065555	0.511552	-0.125208
Kurtosis	2.710778	2.972369	3.436920	3.131650	2.908546	2.977054
Jarque-Bera Probability	0.134819 0.934813	1.259169 0.532813	2.228406 0.328177	0.043152 0.978655	1.582661 0.453241	0.055331 0.972714
Sum	-0.101786	0.450119	0.002744	0.677322	0.409023	0.006392
Sum Sq. Dev.	0.039547	0.191822	0.039287	0.240396	0.056464	0.003531
Observations	36	36	36	30	36	21

Moreover, there are other characteristics of Iceland's external sector and exports that indicate that a flexible exchange rate that allows for the accommodation of shocks is desirable. Iceland's exports are highly concentrated. Indeed, according to an OECD index, Iceland exports are significantly less diversified than those of Australia, Canada, Chile, Finland, and New Zealand. The values of the concentration indexes for these nations are as follows (higher index means less diversified): Iceland 3.91; Australia, 2.99; Canada, 2.07; Chile, 3.69; Finland, 1.94; and New Zealand, 2.28. Furthermore, Iceland's exports have relatively low value added content; 65.3%. The equivalent figure for Chile is 81%, and for New Zealand 84.2%.⁶⁶

In addition to these "credibility versus flexibility" arguments, it continues to be the case, as Paul Krugman argued 25 years ago, that Iceland does not satisfy the main requirements for an "optimal currency area." This has to do with the degree of factor mobility, and the lack of a common fiscal and monetary policy frameworks with the European Union and Euro Zone.

The above discussion, and the arguments developed in the preceding parts of this report suggest that at the current time the most convenient monetary regime for Iceland is one characterized by exchange rate flexibility and inflation targeting. As noted, however, there is room for improvement relative to current practices. Specific suggestions for policy reforms/adjustments are presented in the numerals 3 and 4, below.

⁶⁶ <https://data.oecd.org/trade/domestic-value-added-in-gross-exports.htm#indicator-chart>

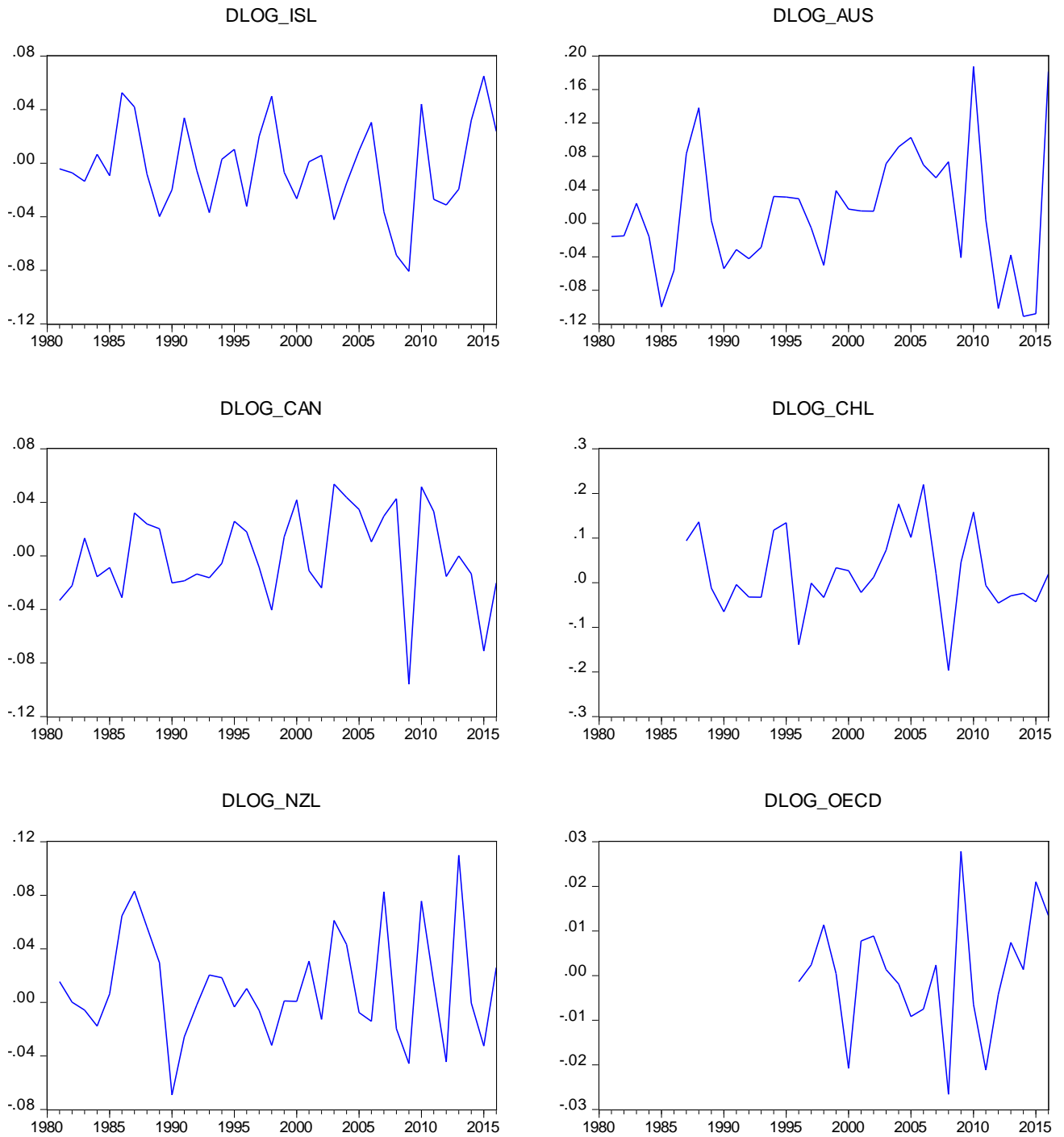


Figure 12: Change in log of terms of trade in five commodity exporting countries and OECD

3. The most important suggested reforms/changes/alterations to the current policy framework are the following. (For details see the body of the report, and the discussion in the Annex):

- Controls on capital inflows: The remaining controls on capital inflows should be lifted gradually. As pointed out in Part One of this report, the international evidence regarding “unremunerated reserve requirements” (URR) suggest that these don’t work effectively in the medium to longer run, as investors who want to take advantage of the “carry trade” find ways of circumventing the controls. In addition, URR introduce sizable distortions, since they work as an implicit tax on capital.

My recommendation is that the reduction of the rate of the URR is reduced gradually, *pari pasu* with policy rate adjustments downward.

It is also recommended that, at least for some period of time, the rate of the reserve requirements is set at zero, which is different from totally eliminating the policy. By following the suggested path, the URR would still be available in the policymaker’s tools kit, in case of need. The reduction in the URR may be done in steps. Initially the measure could affect longer term bonds, followed by bonds with a high degree of liquidity. The yields on long term liquid bonds are less likely to be affected by sudden changes in inflows. This means that some heavily traded corporate bonds are good candidates for having their URR reduced to zero at an earlier stage.

Notice that by making this recommendation I am not minimizing the potential problem generated by massive (and unstable) capital inflows that may be used to finance local investment and/or unsustainable increases in consumption. Indeed, as many authors have documented, currency crises are usually preceded by significant credit booms, which many times are funded by speculative flows coming from abroad, and which are seeking yield. This problem, however, is best dealt with at the “financial stability” level, through the use of macro and micro prudential regulations. These regulations should be aimed at making sure that there are no currency mismatches in banks’ balance sheets. In the last few years the CBI has made significant progress in implementing an effective system of prudential regulations; this is an area where improvement has been important; this issue is being analyzed in the context of the current policy review by Professor Kristin Forbes of MIT.

- *Reserve accumulation policy*: In the last two years the Central Bank of Iceland has followed a reserves' accumulation policy that has resulted in a sizable stock of foreign reserves. At the current time this stock is estimated to be somewhat above 1.5 times the amount recommended by the IMF (RAM).

It is suggested that going forward the CBI continues to have a reserves accumulation policy that will maintain the stock of foreign assets at the central bank significantly above the standard recommended level -- this is a prudent "self-insurance" policy for a very small and very open economy that faces volatile terms of trade. In that regards, between 1.5 and 1.8 times RAM seems to be a prudent stock. However, it is suggested that the process through which the central bank accumulates these reserves is made clear and is perfectly transparent to market participants.

- *Intervention in the currency market*: Besides the policy of reserves accumulation mentioned in the previous bullet point, exchange rate market intervention by the central bank should be minimal, and follow a very transparent framework.

Currently, the CBI tries to smooth (large) changes in the ISK. The purpose of this policy, as stated by the CBI, is not to defend a particular level of the currency; its sole objective is to reduce volatility. Decisions on when to intervene and with which amounts to do it are currently taken by the governor. However, at this time the exact decision-making rule is not particularly clear or transparent. This is so in spite of (very) recent efforts by the CBI to clarify its policy stance in this area. This adds noise and uncertainty to financial markets. On these issues, see the discussion in Part One of this report. It is recommended that the CBI considers the experience of other countries. In particular, the case of New Zealand, with its "traffic lights" system, seems to be relevant for this discussion.

The policy followed by New Zealand, including the warnings by the monetary authorities, was explained in great detail in the text, and should be considered seriously by the CBI. In addition, it would be beneficial if decisions on market intervention are discussed in depth by the MPC. This is likely to add stability to the market.

- *Policy interest rate differentials*: The traditional view in monetary policy in open economies – as captured, for example, by the Mundell-Fleming model with imperfect asset substitution – was that countries with floating exchange rates could have an independent monetary policy; they could escape the so-called "policy trilemma." Recent research, however, has suggested that this is not

necessarily the case – see the discussion in Part One. With a fair degree of capital mobility there is a connection between domestic policy rates and the policy rates of the major global central banks – the Fed and/or the ECB – even under purely floating exchange rates. This phenomenon has been called “policy contagion” or “policy spillovers.”

Although defining the “optimal” policy rate differential between the CBI and the global banks is well beyond the scope of this report, it is clear that December 2017 level – 300 basis points with respect to the FED and 425 bps with respect to the ECB – is not an equilibrium one. It is important for the CBI to consider/research this issue, and define an equilibrium range for policy differentials that reflect risk premia. It is suggested that in revising and improving its policy framework the CBI takes a clear stance regarding the role policy rates in the major financial centers will play in determining its own policy. As noted during the discussion in Part Two, it is not possible to make a firm recommendation without the proper research to back it. However, preliminary data analysis and considerations based on other small open economies indicate that it may very well be appropriate for Iceland to formally consider the type of monetary rule that has been developed in the “spillover” literature on monetary policy.

- *Understanding the transmission mechanism(s)*: The effectiveness of monetary policy depends on the degree of understanding that central banks have of the economy. This is particularly challenging in Iceland, since after the crisis there have been significant structural and policy-induced changes.

The Central Bank of Iceland has a quality and active research department, which has conducted serious and important research through the years, and has provided detailed analyses of the monetary and financial sectors. This department should be strengthened and supported strongly, as additional knowledge of the most important relations between key variables will help improve the degree of effectiveness of policy. As the CBI argues in *Special Publication No 11*, there was a structural change in macroeconomic conditions (including policy) in Iceland in 2012 or so. As a consequence of this, some of the relations – at the quantitative level – that were valid in the years surrounding the crisis do not apply today.

Along these lines, it is fundamental that the authorities improve their understanding of the following mechanisms/phenomena (this is a list of “expanded knowledge for greater monetary policy effectiveness”):

- The way in which changes in the policy rule affect the yield curve, for both indexed and nominal securities. There is evidence, for different countries, suggesting that in the last few years changes in policy interest rates have failed to affect long rate in the same way as in the past. This is related to what Alan Greenspan called the “conundrum”. It is important to know, exactly, the extent to which this has happened in Iceland. How strong (weak) is the transmission of policy changes along the yield curve? Are there differences with respect to indexed and non-indexed securities? Naturally, this is a key question for assessing the effectiveness of monetary policy.
- The way in which changes in the policy rule affect the exchange rate, both bilateral and trade weighted. A number of authors – including CBI Governor Már Gudmundsson – have argued that in small open economies the main transmission mechanism of monetary policy is the exchange rate. However, currently there are no quantitative empirical estimates of the impact of policy changes affect the value of the ISK. However, it should be noted that this is a difficult relationship to estimate with any degree of confidence/precision. It is not an exaggeration to say that the nominal exchange rate has become one of the most important – if not the most important – intermediate variable in monetary policy. Without deep knowledge on the interactions between exchange rates, interest rates, inflation, economic activity, the housing market, and investment, it is not possible to run a truly effective monetary policy.
- A clear and precise understanding of the “pass-through” mechanism is of essence for an effective monetary policy design in a small open economy. This is particularly relevant in the case of Iceland, where recently there has been an important divergence between the different components of the CPI – housing and imported goods, in particular. While housing has been increasing at robust rates, the imported (or tradable) goods component has declined, mostly as a result of the strengthening of the currency.
- The way in which changes in policy rates affect the housing market, both in terms of prices and quantities. This is important for a number of

reasons, including the fact that owner-occupied imputed rents are a key component of Iceland's CPI. But this is not the only reason. Recent research indicates that in some countries – most notably in the U.S. – the housing is one of the most important drivers of the business cycle. Although the sector itself is not a very large component of GDP, changes in investment in housing predict most cycle turning points. The CBI – and other central banks, for that matter – should have a clear view of the way in which changes in the housing market affect the cycle. This analysis, of course, should be accompanied by research establishing the way in which changes in monetary policy affect this key sector. Given the recent surge in the tourism sector, the housing market has acquired heightened importance in Iceland. The CBI should pay particular attention at its developments when formulating monetary policy. A possibility discussed above is to incorporate a variable related to housing as an additional term in the policy rule. Whether this is an improvement over more traditional approaches can only be determined after significant research.

- An important question is the form – including the coefficient values – of the “Taylor rule” used to guide policy. In many countries this rule is considered in a rather mechanical way, maintaining the original coefficients and the form suggested by John Taylor in the early 1990s. However, there is no reason for the “best” rule in a small open economy to be the same as in the United States; and of course, there is no reason for the optimal rule in Iceland well enter the 21st century is the same as in the United States in 1993. In particular, and as noted a number of times in this report, there are issues related to whether additional terms should be incorporated in such a rule, and/or whether the coefficients should continue to be the traditional 1.5 for the inflation gap and 0.5 for the output gap. Further analyses along these lines would be more than welcome and would help the CBI improve its monetary policy.

4. As noted above, the effectiveness and efficiency of monetary policy depend on other institutions and policies. This means that for the “*improved inflation targeting*” regime proposed in the previous bullets to work properly, and for it truly contribute to growth and stability, it is necessary to consider reforms in a number of other policies. In particular, in this report the following areas have been identified:

- *Labor markets flexibility*: Iceland has a highly centralized wage negotiation system, where unions play a central role. One of the main characteristics of this system is that each union tries to match the salary increase of other unions. This process results in wage rate ratcheting, and in inflationary pressures, which in the past have many times been validated by the monetary authorities. Historically, this has resulted in high inflation, real exchange rate appreciation, and eventually in major crises. Reforming this process, and moving to a more stable wage negotiation system, that accomplishes similar real wage results, at a much lower nominal wage levels is essential.

This is not a surprising suggestion: everyone in Iceland, and in the multilateral institutions, is aware of the importance of this modernization of the negotiation system. However, for political reasons, the country has been unable to do it. It should be emphasized with extreme forcefulness that going through this reform is absolutely of essence for Iceland to maintain the very hard fought stability that it has obtained during the last few years. Without a modern, reasonable, and more stable wage negotiation system – a system similar to the one in place in the other Scandinavian countries –, it will be very difficult for monetary policy to be effective, and for the country to maintain macroeconomic stability.

- *Increasing pension funds overseas investments*: An important and (very) positive characteristic of the Icelandic economy is that it has made a significant effort to move towards a fully funded pension system. As a result of this effort pension funds have accumulated assets in excess of 150% of GDP. This has put significant pressure on the local financial market, which for a number of reasons has been unable to provide enough instruments and securities to invest in. After the crisis, and as a result of the capital controls, the percentage of pension fund assets invested internationally declined significantly, from close to 40% to barely over 20% of the portfolio. It is important to encourage pension funds to increase their international investments. This is beneficial for a number of reasons, including portfolio diversification; it is also positive to have less pressure from these huge pension funds, which sometimes act as monopsonies, in the local financial markets.
- *Organic budget law*: As Robert Mundell argued 50 years ago, macroeconomic outcomes depend on the policy mix: the combination between monetary, fiscal, exchange rate, and wage rate policies. In that regard, it is fundamentally important for fiscal policy to support the monetary regime. The approval of Iceland's organic budget law, and the efforts to design budgets for a five-year horizon

represents an important step forward, and one that should be maintained, and improved on in the future. In that regard, issues related to optimal debt management are of paramount importance.

ANNEX:

**MODELS FOR ASSESSING EXCHANGE RATE EQUILIBRIUM: A BRIEF
REVIEW AND SOME REFLECTIONS REGARDING ICELAND**

Introduction

One of the main points of this report is that for a small open economy to run an effective monetary policy it is essential for the central bank to have a clear idea of whether the real exchange rate is close to its equilibrium value. In this Annex I discuss different approaches used in the literature to assess whether the real exchange rate departs (significantly and systematically) from equilibrium. Throughout the analysis I make references to the case of Iceland. It should be clarified at the outset, however, that this discussion is not an attempt to estimate the equilibrium RER in Iceland. Doing that is well beyond the scope of this report.⁶⁷

It is possible to classify the different methods used to evaluate the appropriateness of the (real) exchange rate into four groups: (1) models based on the purchasing power parity approach; (2) models based on the country's external sustainability; (3) regression-based models based on real exchange rate "fundamentals"; and (4) an approach based on macro-econometric and DSGE models.⁶⁸ In this section I review them briefly, and I argue that none of them provides a fully satisfactory way of looking at the problem. I argue that in order to have a clear assessment of RER values it is fundamental to combine these approaches in a careful way.

In the year 2007 IMF economist Robert Tchaidze published a Working Paper where he used some of these methods in an attempt to calculate the equilibrium value of the RER in Iceland. This is a valuable report, done in a professional competent way. However, it was done before the 2008 crisis and, consequently, does not take into account the major structural changes through which the Icelandic economy has gone through. During the first half of the 2000's the CBI also undertook significant work trying to determine the equilibrium value of the RER. Some of the results obtained were reported in the first and third 2005 issues of the *Monetary Bulletin*. Again, these efforts were undertaken before the crisis, and do not capture the new reality of the Icelandic economy.

PPP and the equilibrium real exchange rate

As late as the 1930s there were very few economists who had thought thoroughly about the subject. The two most important were Cassel (1918, 1922) and Keynes (1924). Another active participant in this discussion was the Italian economist Bresciani-Turroni (1937), who analyzed inflation and the equilibrium value of the German mark after the First World War, and who emphasized the fact that the law of one price did not hold on the aggregate if countries had

⁶⁷ There is an extensive literature on trying to determine the equilibrium value of the real exchange rate. One of the important point made in the report few examples going back to the 1980s include Edwards (1989), Williamson (1994), Wren-Lewis and Diver (1998), Montiel (1999), Edwards and Savastano (2001), Cline and Kim (2010).

⁶⁸ For a detailed discussion of this topic see, for example, Edwards and Savastano (2001). In a comprehensive review article, Isard (2016) points out that there are six methods for assessing equilibrium real exchange rates. However, two of the methods that he describes, are variants, or sub methods, of the ones discussed here.

different production baskets. These three authors based their analyses on variations of the purchasing power parity (PPP) doctrine. While Cassel and Keynes focused on price *levels*, Bresciani-Turroni (1937, p. 139) emphasized rates of change, or the so-called “relative” version of PPP.

The PPP approach is based on the notion that at some point in the past the real exchange rate was in equilibrium, and that the value it had during that “base year” is representative of equilibrium at the current moment. The application of the methodology implies undertaking at least two steps: First, some kind of real exchange rate index is calculated for the base and subsequent years. Second a comparison is made between the value of the index in the current moment and during the “base or equilibrium” year. If at the present time (or at the time we are evaluating) the real exchange rate index departs significantly from its value during the “base year,” it is said that the currency is misaligned; in these analyses “significantly” is not clearly defined a priori.

Possibly one of the most lucid application of this methodology was undertaken by Lloyd Metzler (1947), who estimated whether the currency value that the members of the International Monetary Fund had declared as initial equilibrium, in December 1946, were in line with economically defined equilibrium. In this analysis Metzler used the average real exchange rate between October 1936 and June 1937 as the “base year” for every country in his sample. Metzler justified the use of this benchmark year as follows (p. 117):

“This period was selected because it was relatively close to the war years but at the same time reasonably free of war influences. If an earlier period had been used, difficulties would have arisen from the wave of currency devaluations which occurred in the early thirties and mid-thirties. If later period had been used, on the other hand, complication would have been introduced both by the American depression of 1937–38 and by the effects which the eminence of war had upon foreign exchange markets.”

In explaining why using PPP was appropriate and reasonable, Metzler said (p. 129): “The virtue of the parity rate is that it preserves the earlier real exchange ratio between the goods and services of one country in the goods and services of another.”

Of course, Metzler understood that there were a number of limitations associated with this approach. A particularly serious problem was that individual prices moved in different ways within each country and that these relative price movements were not captured appropriately by price composites or indexes. In his words (p. 132):

“When some prices or costs rise more rapidly than others within the same country, no simple comparison between price movements in different countries

can be made. The best that can be done is to use an average or index number of price changes, and if the discrepancies in price movement between different commodities in the same countries are large such an index number at best is only a rough indication of the changes in the value of the monetary unit. Moreover, since several types of price index numbers are usually available, the calculation of parity rate is not a simple procedure, but involves a considerable element of judgment as to what prices and costs are important for a country's balance of payments.”

This difficulty in deciding which price level to use has led a number of analysts to suggest that it is most appropriate to focus on “unit labor costs” instead of price indices.⁶⁹ The attraction of this alternative is that by emphasizing costs in different countries, it provides an intuitive measurement of countries's degree of *international competitiveness*. However, this methodology is subject to many of the same limitations as more straightforward PPP based analyses, which are discussed below.

As noted, the main goal of Metzler's study was to undertake a comparison between the initial “equilibrium” parities actually announced by the International Monetary Fund, and the rates calculated by him using different versions of purchasing power parity. Metzler concluded that a number of nations had announced “overvalued” exchange rates to the IMF. This was not an auspicious way of launching the institution, since its mandate was to provide financial assistance to countries that run into financial difficulties because of having an inadequate exchange rate level.

The PPP method for assaying the appropriateness of the real exchange has been criticized by trade theorists for a number of reasons. A central limitation is that a mechanical application of the method may lead to very misleading conclusions. This is because there is no reason for the “base period” to capture the equilibrium conditions at the present time or at the time of interest. It is possible that the terms of trade, the degree of openness, and other variables – including geopolitical ones – have changed through time, rendering the old equilibrium an irrelevant historical relic. In an important paper Rogoff (1996) showed that there are large and persistent deviations of purchasing power parity, which are only corrected very slowly in time. Indeed, this finding is considered to be one of the exchange rate related puzzles by the literature.

Another serious limitation of simple PPP calculations is that they don't take into account the fact that productivity gains differ across countries. According to the Samuelson-Balassa effect the equilibrium real exchange rate will appreciate – the currency will strengthen in real terms – in countries that experience of faster productivity growth than their trading partners and

⁶⁹ Indeed, the CBI calculates several of our ER indices, including one based on unit labor costs.

competitors. For details, including a survey of empirical studies, see for example Edwards and Savastano (2001). This fact has led some analysts such as Isard (2007) to argue that it is important to distinguish between the simple application of the PPP method, and a “productivity differentials adjusted” PPP approach, where an effort is made to explicitly correct the simple PPP calculations by productivity differentials.

In spite of its problems, this methodology continues to be used around the world by central banks, investment banks, large conglomerates, consultants, journalists, and even some academics. Isard (2007) reports that the simple application of the PPP methodology suggested that in 2006, the USD was roughly in line with its long-term equilibrium. At the same time, the “productivity adjusted” PPP approach indicated that that same year the dollar was 11.5% overvalued. Interestingly, Isard (2007) shows that when alternative methods are used, including the external balance approach discussed below, extremely different results are found for the USD in 2006: according to some of these methods the dollar was overvalued by as much as 25%, while other methodologies suggested equilibrium.

The CBI publishes several RER indexes, using alternative prices/wage indexes. In the publication *Economic Indicators* it publishes an index based on a relative unit labor costs and relative consumer prices; it appears as Chart III-25. Although there is no reference to a base year, or to a situation of equilibrium in the past, that chart presents the average value for both indices during the last 25 years. Some readers of the CBI report may interpret that as providing some kind of benchmark with respect to which the appropriateness of the current real exchange rate as to be measured. According to these data, in the 2nd quarter of 2017 the RER index calculated using consumer prices was 26.7% stronger than the 25 year average; the index computer using unit labor costs was, in turn, 41.2% higher (that is, more unappreciated) than the long-term average.

In the most recent *Monetary Bulletin*, the CBI discusses the fact that the real exchange rate has strengthened, and attributes, at least part of this movement, to changes in RER fundamental, and in particular to improved terms of trade. According to the *Bulletin*:

“The equilibrium real exchange rate is likely to have risen in the recent term, owing primarily to improved terms of trade and rapid export growth, which supported the current account surplus and improved Iceland’s external position (see, for example, Box 3 in *Monetary Bulletin* 2016/2). The revised estimate of the equilibrium real exchange rate suggests that the real exchange rate is close to equilibrium or perhaps slightly below it. But this assumption is also subject to considerable uncertainty. Furthermore, the equilibrium real exchange rate could

fall again if the economy is hit by external shocks such as those described in the alternative scenario above, with a weaker outlook for exports.”

This quote also includes information about the interpretation of the data by the CBI at the current time – end of 2017, beginning of 2018. In particular, it is interesting that, as noted in the body of this report, the wording is rather guarded, when it says “revised estimate of the equilibrium real exchange rate *suggests* that the RER is close to equilibrium...”

Figure A-1 present the evolution of the BIS RER index for Iceland between January 1994 and July 2017. These data, which were shown in the body of this report, capture different phases in the external sector history of Iceland. In particular, the stability of the real exchange rate during the early pegged exchange rate regime appears clearly; it’s strengthening due to higher inflation; the 2000 – 2001 depreciation; the subsequent strengthening followed by the very large depreciation as a result of the 2008 crisis. It also shows that the RER has strengthened significantly until mid-2017, and retreated somewhat since then until the current time.

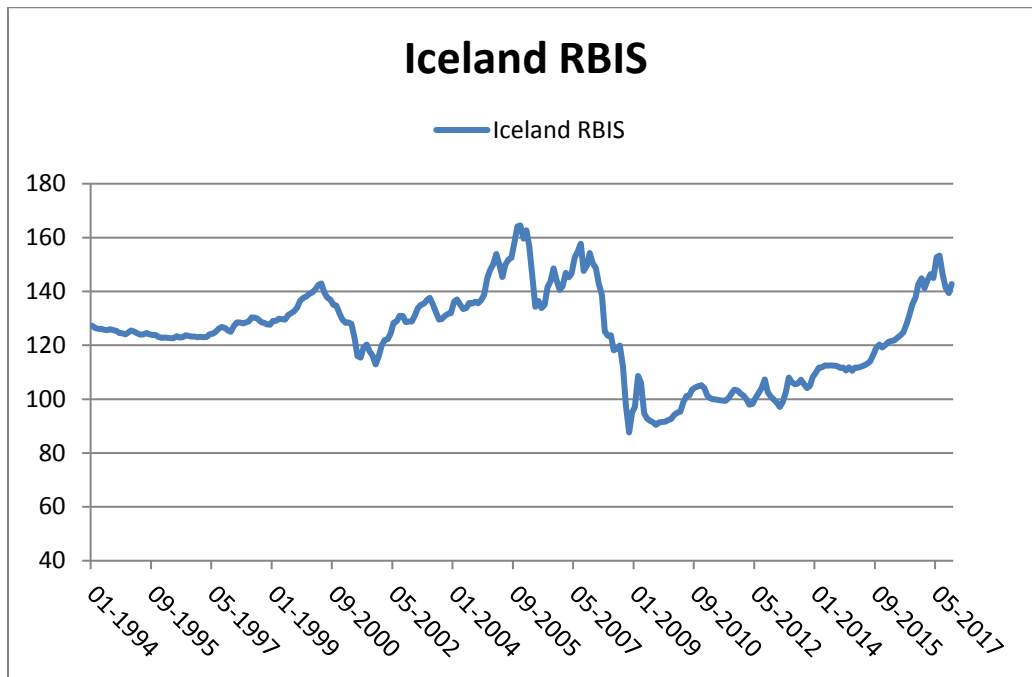


Figure A-1: Real exchange rate index for Iceland, BIS calculation

Current account balance, NIIP, and the equilibrium real exchange rate

A second popular methodology for assessing if a country's RER is close to equilibrium, is to analyze whether the current value of the RER is consistent with the country achieving "external balance." In the simplest version of this approach the analyst asks what is the level of the RER that is consistent with the country's current account balance being equal to zero. Naturally, in order to answer this question, it is necessary to have an opinion about variables that, jointly with the exchange rate, determine the current account balance. These are the so-called "real exchange rate fundamentals" and include the terms of trade, country risk premium, global interest rates, degree of openness of the economy, demand for nontradables, and other.

A more advanced version of this method recognizes that a country may have, for prolonged periods of time, current account balances that are different from zero. This approach, thus, concentrates on the "sustainable current account balance." See, for example, Milesi-Ferretti and Razin (1998) for a discussion, including for some rules of thumb on levels beyond which a current account deficit becomes dangerous. Once the *sustainable* level of the current account balance is determined – say, a deficit of 2.5 % of GDP –, the analyst calculates the level of the RER that is consistent with that particular current account balance.

The simplest way to derive the "sustainable" current account balance is to undertake an analysis of the net international investment position (NIIP) of the country in question. Roughly speaking, this methodology consists of the following steps: First, and through a global portfolio analysis, the researcher determines the "equilibrium" net international demand for the country's assets. Once an equilibrium or stable ratio of the NIIP to GDP is established – this may be either a positive or negative number –, it is straightforward to estimate the sustainable current account to GDP ratio. At this point, the analyst can extract, after assuming specific values of the "fundamentals," the equilibrium real exchange rate which is consistent with this specific sustainable NIIP to GDP ratio, and associated current account balance. It is important to note that this method requires -- as any sophisticated version of PPP does -- having a judgment about the long-term equilibrium value of the "fundamentals."

This type of analysis has been used quite extensively in effort to determine whether the USD is out of line with long-run equilibrium. For example, in an extensive paper based on this methodology, and published by the *Brookings Papers on Economic Activity*, Edwards (2005) estimated that in the year 2004 the dollar was overvalued by around 11%. Using a similar analysis, where the NIIP analysis is based on considerations related to savings and investment, Isard (2007) estimated that in 2006 the USD was overvalued by more than 20%. Obstfeld and Rogoff (2005) use of slightly different model that emphasized the role of tradable and

nontradable goods, to analyze the extent of misalignment of the dollar in 2004, and concluded that at the time t it was overvalued by approximately 25%.

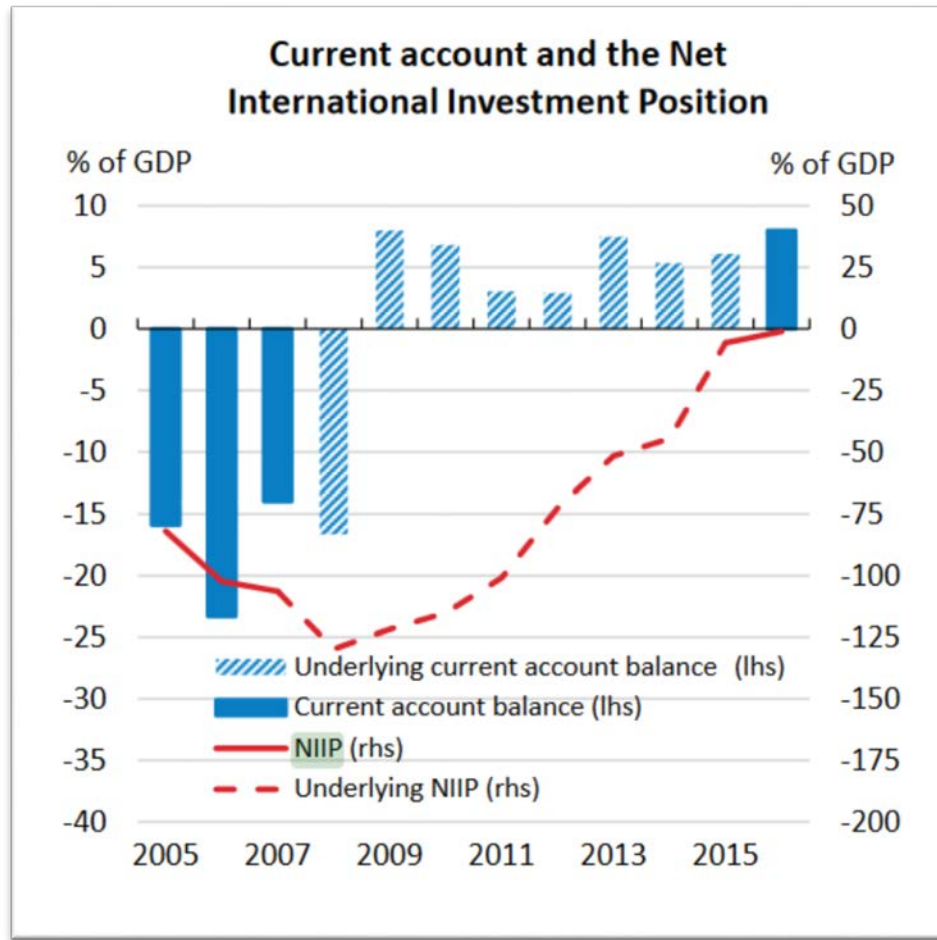


Figure A-2: Current account balance and NIIP racial to GDP in Iceland, 2005 – 2017,

(OECD calculations)

Applying this methodology to Iceland is particularly difficult, given the significant structural changes experienced by the economy. Figure A-2 – which is reproduced from the body of the report -- contains data on Iceland's current account balance relative to GDP, and on the NIIP to GDP ratio for the period 2005-2016.⁷⁰ These data show clearly the remarkable changes experienced by the Icelandic economy. As may be seen, and as noted in the body of this report, in 2006 the current account deficit was almost 25% of GDP, possibly the largest deficits ever

⁷⁰ The paragraphs that follow are taken from the body of this report; see Part Two.

experienced by an advanced country. As the chart shows in 2008 the NIIP ratio exceeded 125% of GDP. Again, this is possibly the largest negative NIIP inner experience by an advanced nation; it even exceeds the very large values in New Zealand during the early 2000. But the large imbalances during the earlier years in the chart are not the most impressive aspect of it. What is really unique and quite remarkable, is the fact that over a period of 10 years, Iceland has moved from having a massive negative NIIP to having a slightly positive one. As the chart shows since 2009 the country has posted very large current account surpluses.

The most important question that emerges from this graph, and one that the CBI needs to address head on, is what is the long run, stable equilibrium NIIP in for Iceland. Is this a nation that in the next decades ought to be a net creditor, such as Switzerland and Germany? Or is this a country that will have a stable negative NIIP, such as New Zealand, Australia, the United States and the UK? This is not clear at this point and having a better notion will be fundamental in determining the appropriateness of the current real exchange rate, and thus the interaction between its value and monetary policy actions.

Regression analyses of real exchange rate “fundamentals”

A number of authors – including economist at major investment banks – have used small econometric models to assess whether a country’s real exchange rate is compatible with long-run equilibrium. As a background for estimating such systems, many authors derive theoretical models of open economies, which included the usual building blocks – representative consumer, optimizing firms, and other –, and consider the existence of a number of external shocks, including terms of trade and productivity shocks.

A simplified rendition of this methodology is as follows: from the theoretical model, and as noted, a reduced form for the real exchange rate is derived and estimated. The covariates consist of the “fundamentals.” Depending on the degree of sophistication of the model, some monetary variables may be allowed to have a short run effect on the real exchange rate (but not in long-run equilibrium). Roughly speaking the RER is said to be “misaligned” if it’s actual value at any given moment in time deviates “significantly” from the regression fitted value. Many of the authors that have used this approach, including officials and researchers at investment banks such as Goldman Sachs and J.P. Morgan, use single equation regression models.⁷¹

A number of authors have argued that in order to perform this type of analysis correctly, it is necessary to use “long-term equilibrium” values of the fundamentals. That is, the analyst needs to make a judgment call with respect to, say, the long-run equilibrium value of the country’s terms of trade. The simplest way of doing this is by decomposing the “fundamentals” into a

⁷¹ For an early application of this approach for a group of Latin American nations, see Edwards (1989).

permanent and a transitory component. The estimated “equilibrium” real exchange rate is obtained by using the permanent components of the fundamentals in the estimated regression. Examples of work along these lines include Baffes, Elbadawi and O’Connell (1997), Ades (1996), Razin and Collins (1997), Halpern and Wyplosz (1997), and Iossifov and Loukoianova (2007).

In his 2007 paper on Iceland Tchaizde used this regression-based methodology; he included the following fundamentals in the (logarithm of the) RER regression: net foreign assets as a fraction of import/export, a productivity differential that captures the Balassa-Samuelson effect, the logarithm of the terms of trade, and the ratio of government expenditure over GDP. When this equation was used by the CBI to assess the appropriateness of the RER in 2012, it was concluded that the króna had to depreciate by 8% to 10% relative to its 2006 average in order to achieve long term equilibrium.

In spite of their popularity, these type of models have a number of shortcomings. First, by construction, these models assume that the real exchange rate has been, on average, in equilibrium during the period under study (this is the case if an intercept is included in the regression). However, from an economic point of view there is no reason for this to be the case in every country. A second problem is that these models will tend to give very different results, depending on the sample used, and on this specification considered. For example, Montiel (1997) estimated that the Thai baht was significantly overvalued from 1981 to 1987, as well as from 1992 to 1994. On the other hand, the model of Ades (1996) indicates that the Thai currency was persistently undervalued between 1985 in 1993. Other examples include the Mexican peso: according to Broner et al (1997) the Mexican currency was overvalued already in 1990; artists suggest that overvaluation started in 1987; while Warner (1997) argues that the patient was slightly undervalued until mid-1993.

Macro and DSGE models

In the last 20 years a number of authors have developed dynamic simulation models of open economies and have used them to assess how the equilibrium exchange rate responds to different shocks, both policy induced as well as exogenous. Some of these models have asked whether central banks should respond to changes in global interest rates that stem from policy action in large nations. See, for example, Lubik and Schorfheide (2007).

Many of these models followed the framework developed by Obstfeld and Rogoff (2005). As has become customary these models assumed utility maximizing consumers and profit maximizing firms. They differ, however, on the assumptions with regard to the relationship between domestic and international prices. While some models consider a version of the “law of one price,” others assume that there is “pricing to market.” One of the challenges of these type of models is

incorporating a well specified financial and banking sector. See, for example, Edwards and Vegh (1996) for an attempt along these lines.

From a practical perspective, many of these DSGE models generate results that are in line with those obtained when using the external sustainability approach discussed above. For example, Isard (2007) reports that when these type of models were used to assess the value of the dollar in 2006, they found that the USD was overvalued in the order of 20%, a number similar to that obtained from his “external sustainability” model.

In addition to these DSGE models, a number of institutions, including the CBI and other central banks, have used midsize macroeconomic models with estimated equations to analyze external equilibrium conditions, and the appropriateness of the RER at given moment in time. The CBI’s model has been used for a number of years, and has gone through a number of improvements and refinements. This is the way the CBI describes its QMM model:

“QMM is used in the Central Bank of Iceland to assist in analyzing the current economic situation, making economic projections, assessing the effect of policies and shocks, evaluating risks, handling uncertainty and with communication both within and outside the bank... QMM is a one sector representation of the Icelandic economy, containing 28 empirically estimated behavioral relations and 119 other equations, such as accounting identities and definitions.”

This model has helped CBI to conclude, as expressed in the latest 2017 *Monetary Bulletin*, that in the months, there will be further strengthening of the RER. More specifically:

“The equilibrium rate is expected to rise somewhat less than previously assumed, in line with a poorer outlook for terms of trade and a forecast of a smaller external trade surplus, as is discussed below. Both the outlook and the estimate of the equilibrium real exchange rate are always subject to some uncertainty, however.”

Summary: On the need of a holistic approach

This Annex shows two related things: First, there has been relatively little progress in the economics profession in the last 20 years, with respect to methods for assessing RER equilibrium. The methodologies in vogue today are not very different from those used at the end of the 20th century. Second, these different methodologies, when used in their simplest versions, tend to generate ranges of estimates that, in some cases, may be very large. These very wide intervals are not very useful for policy makers that need to assess the external situation when making policy decisions regarding the monetary policy rate.

From Iceland's perspective, this means that the CBI has to make further efforts in order to update its own models, and try to find narrower intervals for estimating the equilibrium real exchange rate. In particular, it is necessary to understand the whole issue of the long run equilibrium NIIP. In principle, there is no reason why Iceland cannot be a long run creditor nation. However, given the country's history as a debtor one, this requires strong justification, and convincing.

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