

Rethinking exchange rate policy in a small open economy: the Israeli experience during the great recession

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Abstract

In this paper we describe and analyze the intervention by the Bank of Israel (BOI) in the foreign exchange market during 2008-11. The purchases started in March 2008 with a fixed daily amount of \$25 million, and were increased in July to a daily amount of \$100 million. In August 2009, the BOI announced that it would cease to purchase a fixed daily amount, but that it could intervene in case of fluctuations in the exchange rate that it judged to be inconsistent with fundamental economic forces. Thus, between August 2009 and July 2011, the BOI occasionally purchased foreign exchange. The initial motivation was the assessment that the foreign exchange reserves needed to be increased. The timing was chosen following a period of rapid appreciation deemed inconsistent with Israeli economic fundamentals. The continued intervention during the recession was aimed at offsetting the forces for appreciation against the background of a sharp drop in demand for Israeli exports. We show that the intervention moderated the over-appreciation of the shekel during part of the period, and thus helped mitigate the negative effects of the global crisis on Israeli exports and growth. The experience of Israel and other economies also supports the upward revision of the level of reserves that is considered adequate.

Keywords: foreign exchange intervention, foreign exchange reserves, exchange rate

JEL classification: F31, E58

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We thank Kobi Braude, Stanley Fischer, and Nathan Sussman for their valuable comments. We thank Meir Dubitsky for carefully editing this paper.

Introduction

Following 10 years without intervention in the foreign exchange market, the Bank of Israel (BOI) began to purchase foreign exchange in March 2008 – on the eve of the global crisis – and continued purchasing until July 2011. The purchases started with a modest fixed daily amount of \$25 million, and then increased to a daily amount of \$100 million. In August 2009, the BOI announced that it would cease to purchase a fixed daily amount of foreign exchange, but that it could intervene in the market in case of fluctuations in the exchange rate that it judged to be inconsistent with fundamental economic forces. Thus, between August 2009 and July 2011, the BOI continued to occasionally purchase foreign exchange. Since July 2011, the BOI has not intervened in the foreign exchange market.

The initial motivation for the foreign exchange purchases was the assessment that the level of foreign exchange reserves was inadequate and needed to be increased. The timing was chosen following a period of rapid appreciation deemed inconsistent with Israeli economic fundamentals. The continued intervention during the great recession was aimed at offsetting the forces for appreciation of the NIS against the background of sharp drop in demand for Israeli exports resulting from the sharp drop in world trade. The intervention in the foreign exchange market was estimated to have affected the NIS exchange rate by an average of close to 7% over the period of the fixed daily intervention.²

The accumulation of \$28.1 billion in reserves brought reserves to 28.6% of GDP by August 2009, the equivalent of about 120% of foreign exchange ST liabilities and about 8 month of imports – levels that the BOI considers to be close to the lower bound of the adequacy range. However, continued concern over upward pressure on the NIS resulting from short term capital inflows, related, at least in part, to the interest rate spread between Israel and the major economies, led the BOI to leave the door open for further intervention following the cessation of the daily purchases.

In this note we review and analyse the intervention by the BOI in the foreign exchange market during 2008–11. We begin by providing some background to the intervention episode by reviewing the evolution of the exchange rate regime in Israel over the past two decades, discussing the adequacy of foreign exchange reserves, and describing the shock experienced by the Israeli economy resulting from the Great Recession. We then describe the various stages of the intervention, move on to discuss the consistency of this policy with evolving international practices and standards, and conclude with an assessment of the intervention's effects on the economy.

² Avihay Sorezky, "Did the Bank of Israel Affect the Exchange Rate", *Discussion Papers – Research Department – Bank of Israel* (September 2010), p.18.

1. Background

a. The evolution of the foreign exchange regime³

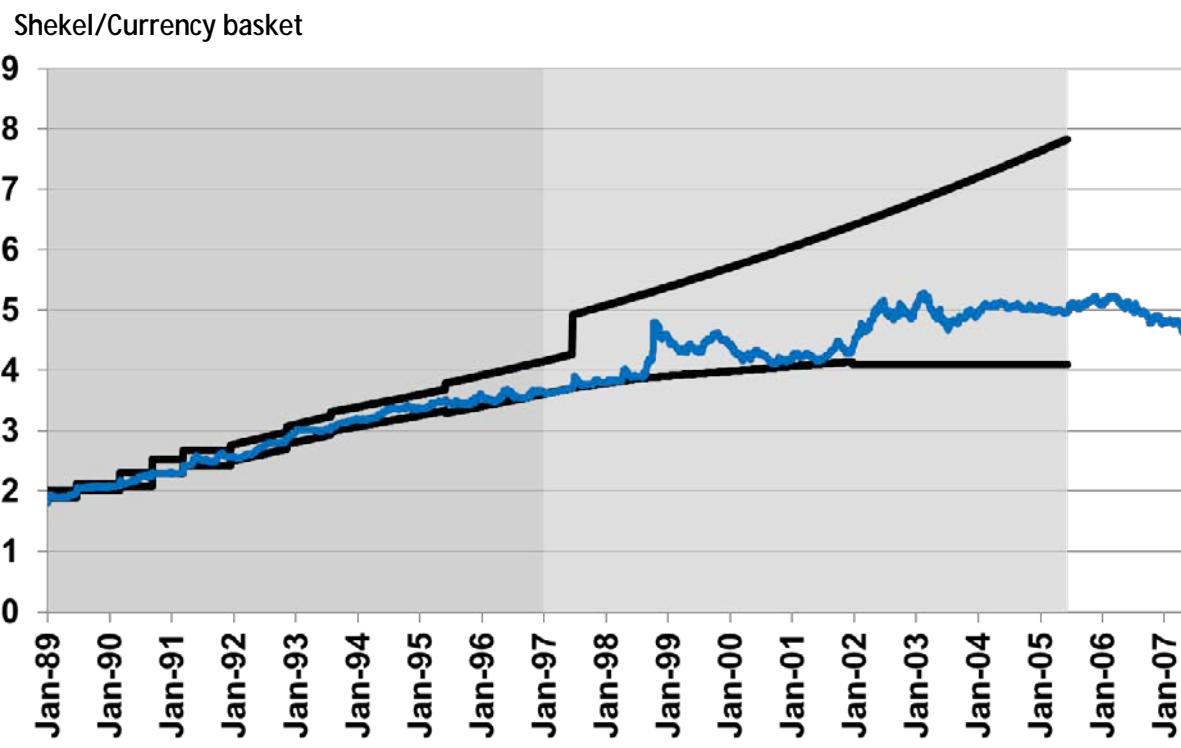
The stabilization of the exchange rate of the shekel against the dollar (and later against a currency basket) was a cornerstone of the 1985 stabilization program of the Israeli economy. When the program was launched, it was initially hoped that stabilizing the exchange rate would lower inflation to Western levels. However, the inflation rate continued to be relatively high, and with time a cumulative real appreciation necessitated rate adjustments.

At the beginning of 1992, the exchange rate regime was changed to an upward sloping exchange rate band. At the same time the BOI began to announce inflation targets. From the end of 1994, the BOI began to use the interest rate as the main monetary policy tool for attaining the inflation targets. Initially, the BOI continued to intervene in the foreign exchange market in order to keep the exchange rate along the midpoint of the sloping band. However, the high interest rates that were needed to support disinflation led to substantial capital imports during 1995 and 1996 that pushed the exchange rate down towards the lower limit of the band.

The exchange rate regime in Israel

(1989-2007)

Figure 1



³ David Elkayam, "The Long Road from Adjustable Peg to Flexible Exchange Rate Regimes: The Case of Israel", *Monetary Studies – Discussion Papers*, (November 2003), pp. 1-14.

At the beginning of 1996, the BOI announced that it would no longer intervene in the foreign exchange market unless the exchange rate approached the limits of the band. In mid-1997, the upper limit of the band was expanded appreciably, which changed dramatically the risk-reward trade-off for market participants to buy the shekel, and except for a number of days at the beginning of 1998, the BOI completely ceased its intervention in foreign currency trading. From 1998 to 2005, the band expanded considerably, until it was finally abolished in June 2005 (see figure 1). Since then, the exchange rate has floated freely and the BOI did not intervene in the market until March 2008.

b. Adequacy of the level of foreign exchange reserves⁴

The holding of an appropriate level of foreign exchange reserves is considered to be one of the main indicators of a country's economic stability in the eyes of domestic and foreign financial institutions, firms, households and rating agencies. Increasing a country's foreign exchange reserves improves the economy's resilience as it increases the ability of policy makers to deal with shocks. Large foreign exchange reserves also tend to lower the rates of interest that are paid both by the government and by the private sector for financing from abroad. Thus, an appropriate level of reserves is an important factor in determining the resilience of an economy to shocks. As stated by the IMF: "...holding reserves carries a number of benefits compared with available insurance or financing instruments, such as high degree of certainty of immediate availability and international status, including in the eyes of markets and rating agencies... In empirical studies, a higher level of reserves tends to reduce spreads and exchange rate volatility."⁵

The standard approach to assessing the adequacy of the level of foreign exchange reserves in an economy has evolved over the years. Key variables used in this respect are the number of months of imports that the reserves could finance and the ratio of reserves to foreign currency liabilities (public and private sector). The adequate level was at one point defined as the country's foreign currency liabilities for one year (the Greenspan-Guidotti, or 100%, rule).

Following the global crisis, the adequate level of reserves was revised upward to a range of 100–150% of the short term liabilities "for a typical country", according to the IMF, as presented in the paper "Assessing Reserve Adequacy".⁶

The BOI has adopted an approach that assesses the reserves level relative to potential uses: the "Eclectic Approach" – which is based on potential uses of the reserves in a state of emergency. It takes into account both the level of imports and the size of capital flows as relevant factors.

In the period 2000–07, the level of foreign exchange reserves held by the BOI was stable at about 80% of Israel's short term liabilities, but in terms of months of imports it was gradually eroded from 6 to 4 months of imports. This factor, together with the fact that the level of reserves was only 80% of the economy's short term liabilities over the next twelve months and the geopolitical risks Israel faces, led to the conclusion that the level of reserves was less than adequate.

⁴ Bank of Israel, Investment of the Foreign Exchange Reserves, *Annual Report*, (2011).

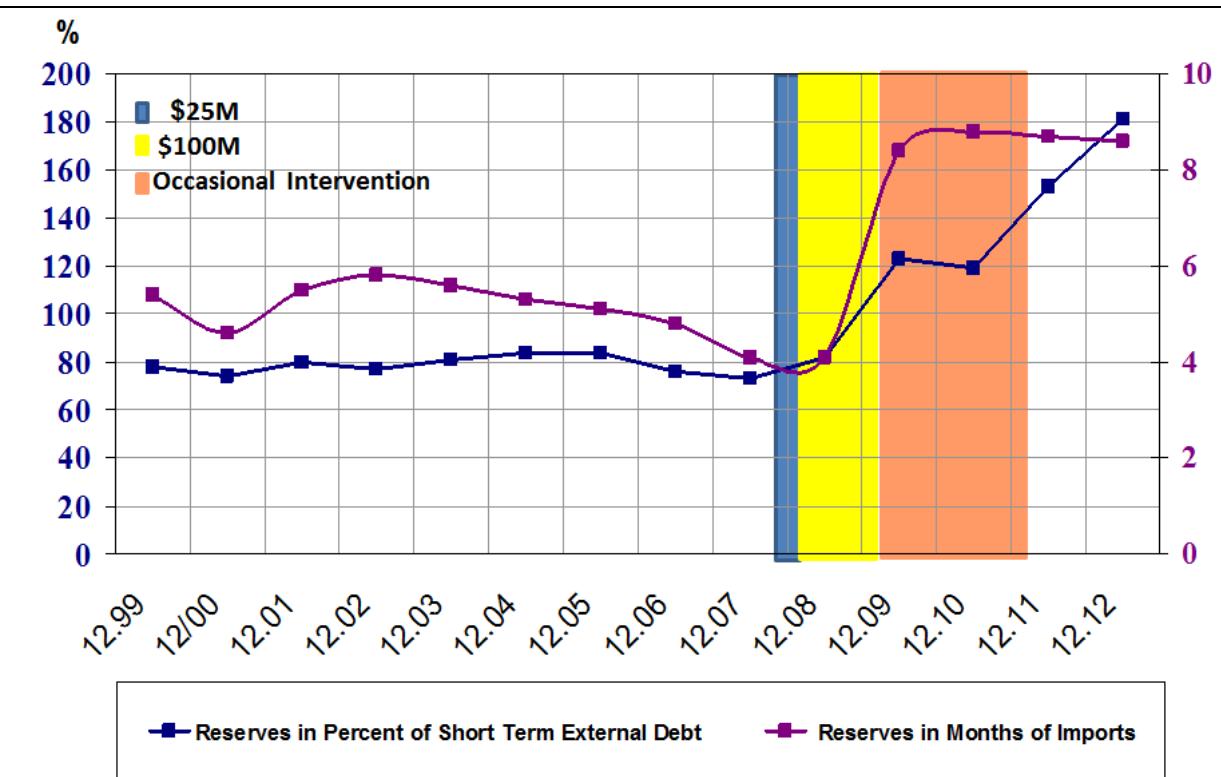
⁵ IMF, "The Fund's Mandate – Future Financing Role", (March 2010), p. 10.

⁶ IMF, "Assessing Reserve Adequacy", (February 2011), p.13 and p. 27.

During the global crisis that began in 2007, it became clear that countries that held large foreign exchange reserves were better able to handle the crisis. The main examples are Brazil and Russia, each of which held foreign exchange reserves that exceeded 100 percent of their short term foreign currency liabilities. These countries used their reserves effectively to stabilize their exchange rates and/or to maintain financial stability.

Foreign exchange reserves adequacy indicators

Figure 2



In March 2008, the Bank of Israel began purchasing foreign exchange at fixed daily amounts. This policy was first adopted in order to increase the size of the reserves which were considered to be below the appropriate level of \$35–40 billion at the time. The Bank's initial plan was to add \$10 billion to the reserves over the course of approximately two years (see figure 2).

Subsequent work conducted at the BOI put the adequate level of reserves at \$65–90 billion. The upward revision of the level of reserves that is considered adequate was, of course, affected by the experience gained during the global crisis. In August 2009, when reserves reached \$57.7 billion – near the lower bound of the adequate level range, and as part of exiting the extraordinary measures taken during the crisis, the BOI announced that it would cease its fixed daily purchases. (On subsequent intervention see section 2.).

c. Israel and the global crisis, 2007–2009^{7,8}

The global crisis hit Israel after five years of rapid growth, which began with the exit from the previous recession in 2001–03, and which was supported by global economic prosperity and growth-oriented macroeconomic policy. The first signs of the global crisis appeared in the financial markets, and at the start these signs were only partial and ambiguous. The financial markets in the second half of 2007 reflected the assessment that the effect of the crisis on the economy would be small relative to advanced economies. This was manifested in share prices, the real appreciation at the end of 2007, the continued flow of foreign investments into Israeli securities, and the repatriation of Israeli foreign investments to Israel. However, tax revenue began to fall in mid-2008, which was one of the earliest signs of a slowdown in real activity.

The situation in Israel, a small open economy, changed dramatically following the bankruptcy of Lehman Brothers, especially during the last quarter of 2008. In the financial markets, stock and corporate bond prices fell sharply and volatility increased significantly, and risk spreads in the credit market rose sharply, thus raising the price of credit. Volatility also increased significantly in the foreign exchange market (against the background of the intervention by the BOI in the foreign exchange market).

The main channel of pass-through from the crisis to the domestic economy was demand for Israel's exports, which decreased sharply due to the collapse of world trade. From the third quarter of 2008 to the first quarter of 2009, total exports of goods and services declined by 20%, matching the rate of decrease in global trade. In addition to the decline in volume, the profitability of Israel's export industries lost ground due to steep currency appreciation in 2007 and early 2008.

By the beginning of the second quarter of 2009, the crisis had passed its peak in Israel. As signs of recovery appeared abroad, a gradual recovery began in Israel, first in the financial markets, and a short time later also in real activity.

2. BOI policy in the period leading up to and during the crisis⁹

The BOI purchased foreign currency on March 13–14, 2008 – after some 10 years of not intervening in the foreign exchange market – due to disorderly markets as identified by certain market indicators (these indicators include intra-day volatility, spreads and nonlinear changes in the exchange rate). On March 13, several of these indicators suggested that the foreign exchange market was trading in a disorderly manner.

⁷ Kobi Braude, Zviya Erdman and Merav Shemesh, *Israel and the Global Crisis 2007–09*, ed. by Zvi Eckstein, Stanley Fischer and Karnit Flug (Jerusalem: Bank of Israel, 2011).

⁸ Jacob Braude, "Israel and the Global Crisis: Events, Policy, and Lessons", in *The Great Recession, Lessons for Central Bankers*, ed. by J. Braude, Z. Eckstein, S. Fischer, and K. Flug, (Cambridge: MIT Press, 2012), pp. 307–336.

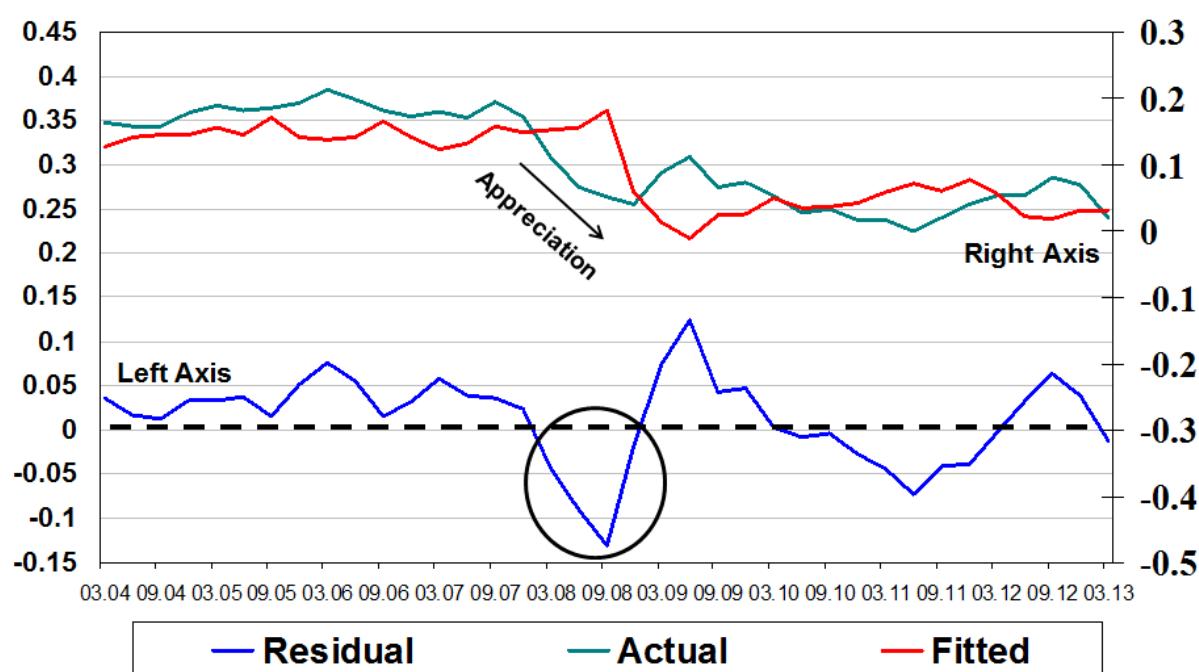
⁹ Kobi Braude, Zviya Erdman and Merav Shemesh, *Israel and the Global Crisis 2007–09*, ed. by Zvi Eckstein, Stanley Fischer and Karnit Flug (Jerusalem: Bank of Israel, 2011).

On March 24, 2008, the BOI began to purchase foreign exchange as part of a program aimed at building up the foreign reserves from \$29 billion at the end of February to \$35–40 billion. The decision was the implementation of a contingency plan that the Bank had devised several years earlier. The timing of the implementation of this program – beginning in the first quarter of 2008 – was chosen in view of the steep continuing appreciation of the NIS, and the assessment that an overvalued domestic currency would make it hard for the economy to cope with the repercussions of the crisis (see figure 3).

The Equilibrium Real Effective Exchange Rate

2004Q1-2013Q1

Figure 3



Source: Zvi Eckstein and Amit Friedman, "The equilibrium real exchange rate for Israel", BIS papers, vol. 57, (October 2011).

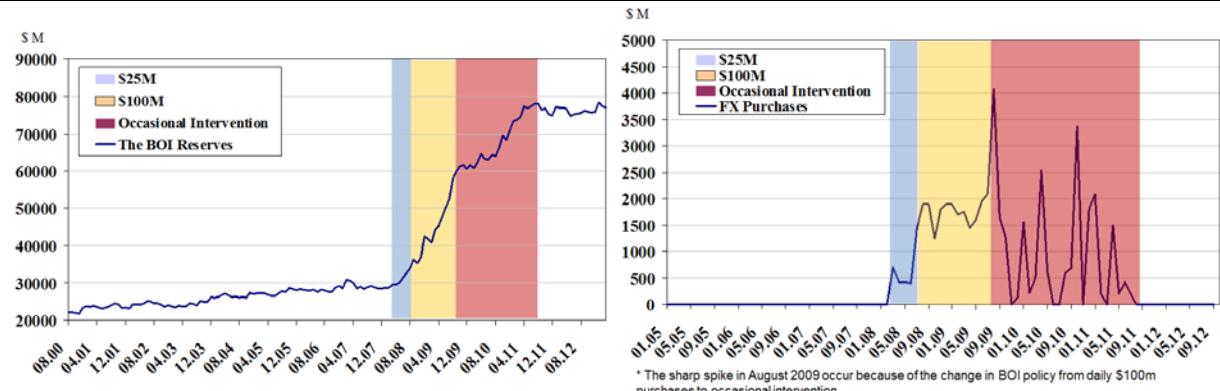
From March 24, 2008 onward, the BOI purchased \$25 million in foreign currency daily. From July 2008 onward – against the background of steep NIS appreciation – the bank stepped up its daily purchases to \$100 million. In late 2008, the BOI announced that the (updated) desirable level of the reserves was now \$40–44 billion, and in March 2009, by which time the reserves had attained the upper limit of this range, it decided to continue buying \$100 million daily. This time, due to the prolongation of the global crisis, it didn't set a target for the level of the reserves.

In August 2009, the BOI announced that it would no longer make regular daily purchases. However, it also announced that in cases of unusual exchange rate fluctuations which were incompatible with the economy's fundamentals it could intervene in the market. This policy change was part of the process of gradually withdrawing the exceptional policy measures that the Bank had adopted in response to the crisis (see figure 4).

The Bank of Israel reserves

Figure 4a Foreign exchange purchases

Figure 4b



Source: Bank of Israel

The global crisis increased the awareness of the potential destabilizing effects of short term capital flows. However, continued intervention on a large scale may also be associated with some costs and side-effects. In some cases, domestic markets may not be sufficiently deep to absorb a significant increase in sterilization bonds. Also, there is a fiscal cost associated with the differential between interest paid on domestic bonds and interest earned on reserves. Thus when sterilization possibilities have been exhausted, or the accumulation of further reserves is judged to be too costly, inflows can be reduced through macroeconomic policies or more direct methods (for a discussion of this point see J. Ostry (2012)).¹⁰

The continued large short term capital inflows during 2010 led the BOI in early 2011 to adopt macro-prudential measures aimed at discouraging such inflows. These included a reporting requirement on activities in the FX derivatives market, and in the *makam* (central bank bills) and short term government bond markets, as well as the imposition of a reserve requirement of 10 percent on FX derivative transactions by nonresidents.¹¹

3. The interplay between interest rate policy and foreign exchange market intervention

The Israeli experience of intervening in the foreign exchange market in the period leading up to the global crisis, during the crisis, and in the initial phase of recovery can also be looked at from the angle of the use of a set of policy tools. These tools – interest rate and foreign exchange intervention – interacted differently over the cycle (see figure 5). In the period of sliding into a recession and during recession,

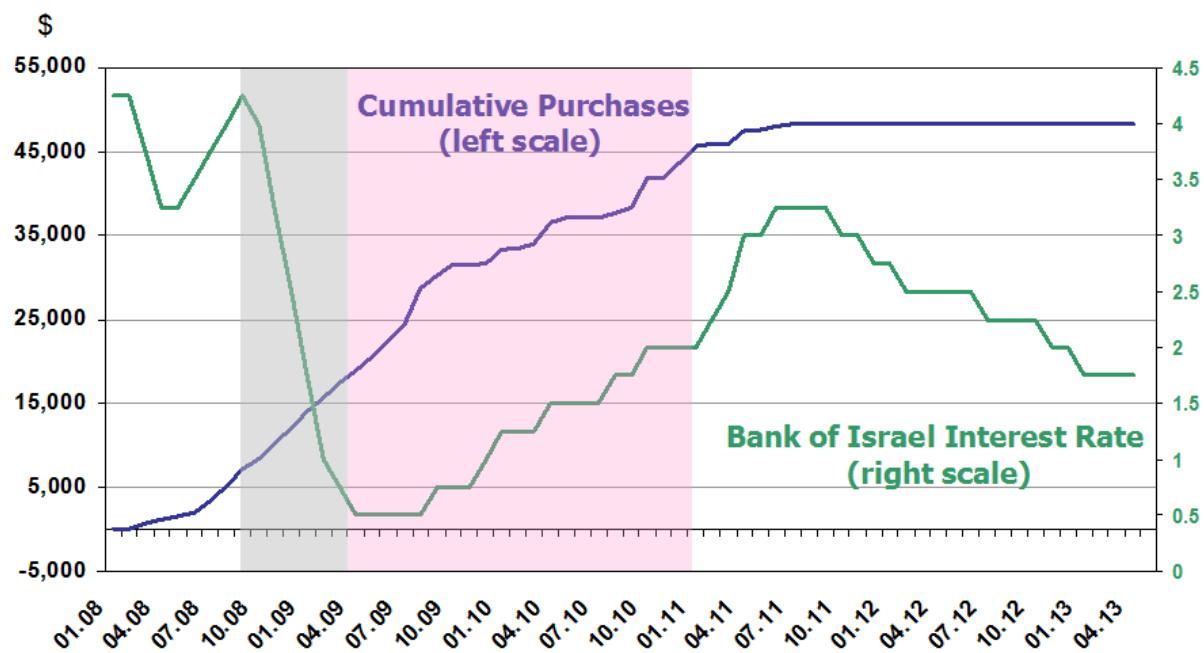
¹⁰ Jonathan D. Ostry, "Managing Capital Inflows: Old and New Debates", in *The Great Recession, Lessons for Central Bankers*, ed. by J. Braude, Z. Eckstein, S. Fischer, and K. Flug, (Cambridge: MIT Press, 2012), p. 169.

¹¹ In addition to the measures taken by the BOI, the tax exemption for foreign residents on interest income from government bonds with maturities of less than thirteen months was cancelled in July 2011, as was the tax exemption on capital gains on those same securities in December 2011.

both policy tools – the sharp reduction of the BOI policy rate, and the purchase of foreign exchange – were enhancing each other in supporting growth, by reducing financing costs and improving competitiveness in the tradable sector.

Foreign exchange purchases and Bank of Israel interest rate, 2008-2013

Figure 5

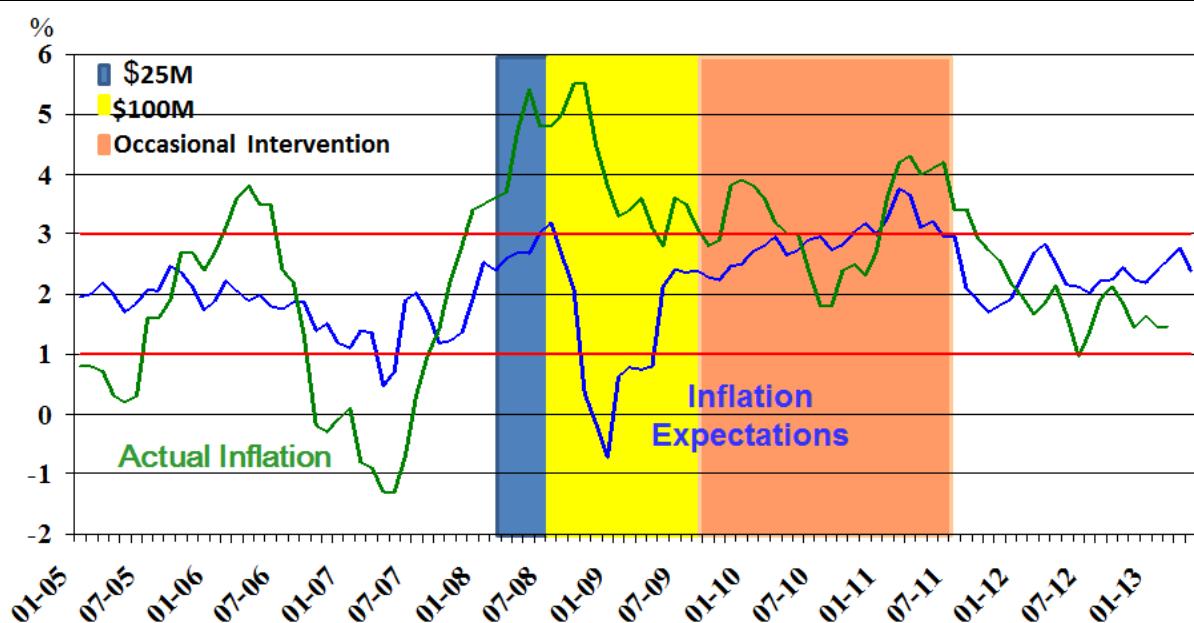


Source: Bank of Israel

Actual Inflation* and Inflation Expectations**

(2005-2013)

Figure 6



* Inflation over past 12 months.

**Break-even inflation expectations for 12 months.

During that stage, the inflationary outlook was also for an inflation rate below the lower bound of the inflation target range, and there was even, for a short period, an expected negative inflation over a 12-month horizon. Thus a low policy rate and a more depreciated exchange rate due to intervention also supported bringing inflation up – back into its target range. However, when signs of a recovery (albeit hesitant) became evident, and expected inflation was moving up towards the upper limit of the target range, it was clear that the policy rate needed to be raised (see figure 6). Thus, the BOI started to gradually raise the interest rate. However, during this period short term inflows persisted and led to a persistent upward pressure on the NIS exchange rate. The result was an exchange rate that was rapidly appreciating in a movement that was inconsistent with the economy's fundamentals. Therefore, the BOI continued to intervene in the foreign exchange market.

The intervention in the market, while increasing the interest rate, implies that the transmission of monetary policy through the exchange rate channel was somewhat muted. The burden of the adjustment was to some extent shifted from the export sector to the rest of the economy.

4. Foreign exchange intervention

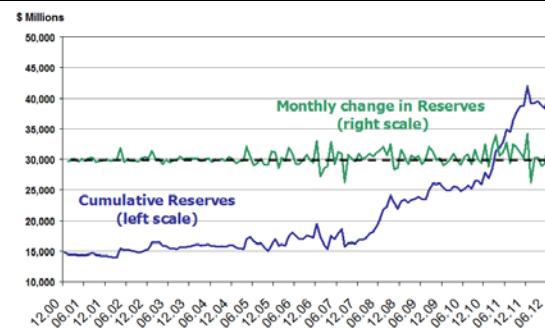
a. International practices¹²

Israel is not unique in having intervened in the foreign exchange market in recent years. While some economies have had a fairly regular presence in the FX market in the years prior to the Great Recession (eg Brazil and Uruguay), others had not been intervening in the market and, like Israel, began to do so following a long period of no intervention (eg Chile, Thailand and Switzerland; see figure 7).

During the crisis and upon emerging from it, foreign exchange intervention was evident in other countries, particularly those that are very open to capital flows, highly dependent on international trade, and significantly affected by the exchange rate. It also characterized economies that were only moderately affected by the crisis and thus became an attractive destination for capital flows (see figure 8).

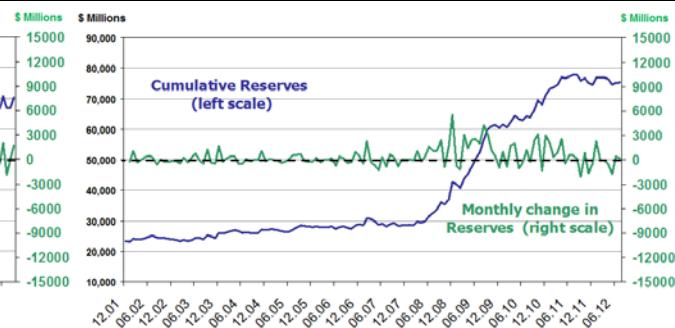
¹² Gustavo Adler and Camilo E. Tovar, "Foreign Exchange Intervention: A Shield against Appreciation Winds?", *IMF Working Paper*, (July 2011), pp. 3–8.

Foreign exchange reserves Chile



Source: IMF data and Bank of Israel calculations

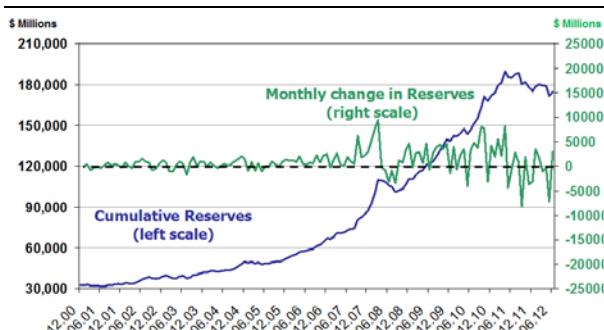
Figure 7a Foreign exchange reserves Israel



Source: IMF data and Bank of Israel calculations

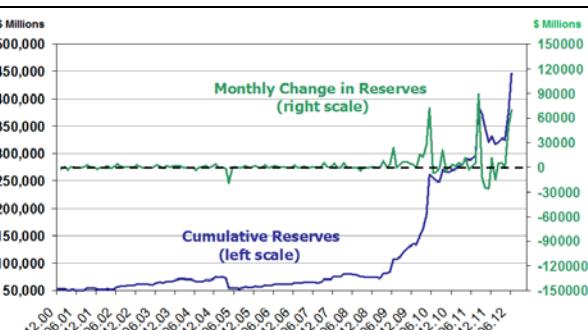
Figure 7b

Foreign exchange reserves Thailand



Source: IMF data and Bank of Israel calculations

Figure 7c Foreign exchange reserves Switzerland



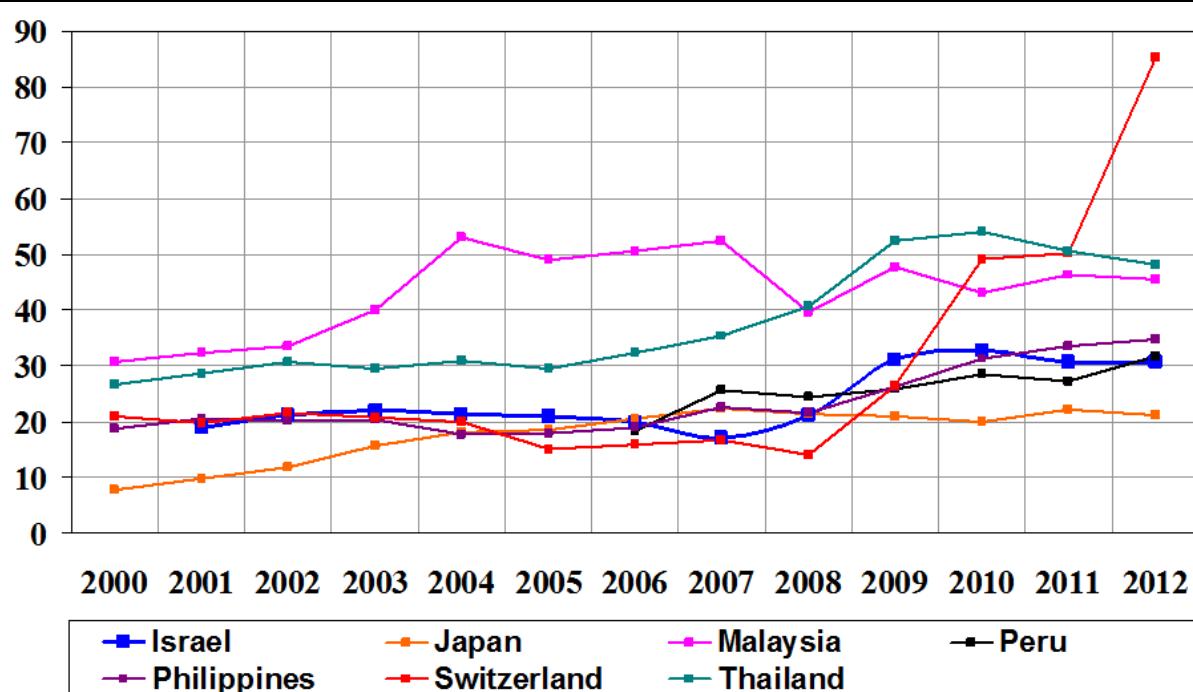
Source: Bank of Israel

Figure 7d

Official Reserve Assets

(Percent of GDP)

Figure 8



Source: IMF Database

b. IMF policy guidelines and BOI policy^{13, 14}

According to the IMF, the appropriate policy mix for addressing macroeconomic stability risks to which inflow surges can give rise depends on a variety of country-specific considerations. The appropriate policies would include rebalancing the monetary and fiscal policy mix, consistent with inflation and growth objectives, allowing the currency to strengthen if it is not overvalued relative to the fundamentals, and building foreign reserves if these are not more than adequate.¹⁵

According to the IMF guidelines, countries with foreign exchange reserves that are not more than adequate from a precautionary perspective can respond to inflows by building reserves. Reserve accumulation can also help to limit excess exchange rate volatility in the short term, and smooth the impact on balance sheets. However, the IMF also notes that countries need to be cautious about intervention: excessive reserve holdings are associated with diminishing marginal benefits and rising costs. Moreover, heavy intervention during a period of sustained inflows can exacerbate the inflows by fuelling expectations of further appreciation.

The BOI policy in the foreign exchange market can be characterized as broadly consistent with these guidelines as they are characterized for the different phases. The BOI did not intervene in the market as long as the NIS exchange rate was not considered overvalued.

Following a continuous appreciation and a long period of erosion of the foreign exchange reserves, in March 2008 the BOI started intervening and began purchasing foreign exchange. This policy was adopted in order to increase the reserves, which were considered to be below the appropriate level at the time (they amounted to 82% of the short term external debt and about 4 months of imports). Furthermore, when the BOI reached 120% of ST liabilities and 8 months of imports, it announced that it would stop the daily purchases, but that it would intervene in the FX market in cases where fluctuations in the exchange rate did not match fundamentals. The BOI continued to intervene in the FX market until July 2011. At that time, reserves reached \$77.9 billion, a level which was considered within the range of adequate reserve levels.

According to the IMF guidelines, in cases where (a) the exchange rate is not undervalued on a multilateral basis, (b) reserves are in excess of adequate precautionary levels or sterilization costs are excessive, and (c) the economy is overheating (where the inflation outlook is not benign or there is a developing credit or asset-price boom), precluding monetary easing, Capital Flow Management Measures (CFMs) may be needed. CFMs are needed to mitigate macroeconomic and financial-stability risks related to capital inflows, and they could be used to complement fiscal tightening plans already in place. Furthermore, the design and implementation of the CFMs should be targeted, temporary, preferably equal for residents and nonresidents, and should be lifted once the surge abates.

¹³ IMF, "The Liberalization and Management of Capital Flows – An Institutional View" (November 2012), pp. 17–38.

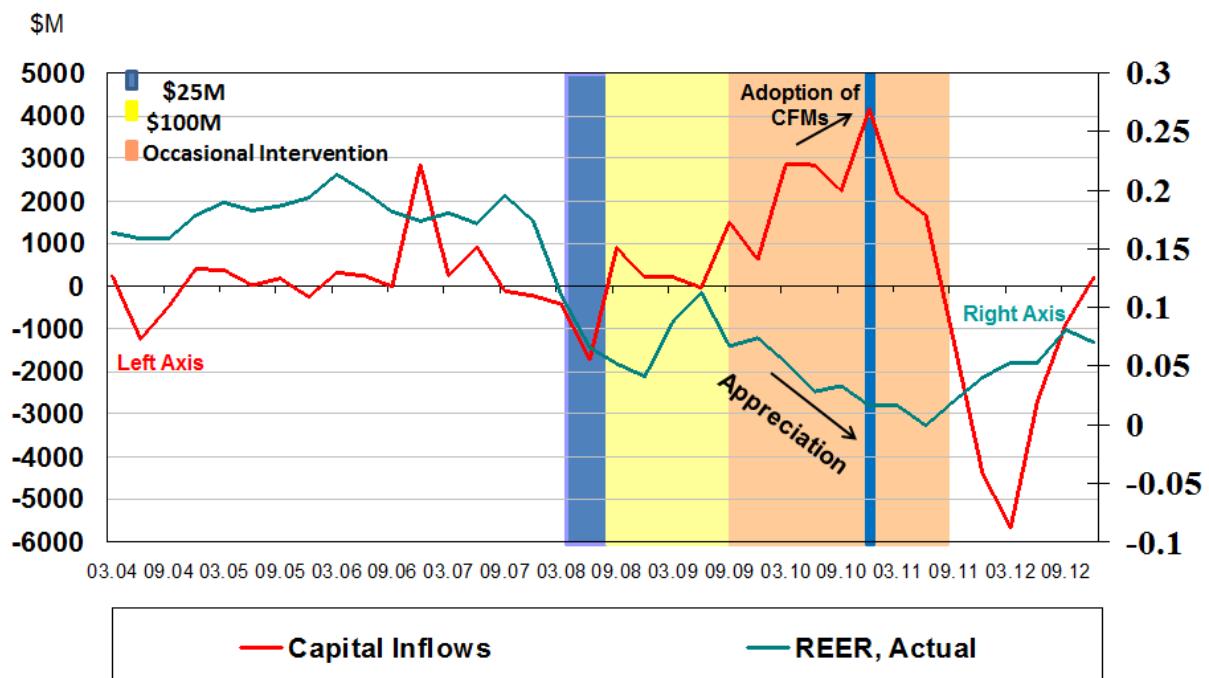
¹⁴ IMF, "Recent Experiences in Managing Capital Inflows – Cross-Cutting Themes and Possible Policy Framework" (February 2011), pp. 4–50.

¹⁵ According to the VEE (Vulnerability Exercise for Emerging Markets) criteria, reserves are judged to be adequate if the ratio of reserves to the sum of short term debt and the current account deficit exceeds 100 percent.

Short term capital inflows and real effective exchange rate

2004Q1-2012Q4

Figure 9



* The short term capital inflows include the Makam (short term BOI bonds), government bonds traded in TA stock exchange and deposits in Israeli banks from abroad (non-residents and foreign banks).

In January 2011, the BOI adopted macro prudential measures (or CFMs in the IMF's terminology) to mitigate macroeconomic and financial stability risks associated with ST inflows (see figure 9). These measures, as mentioned above, included a reporting requirement on activities in the FX derivatives market and the *makam* (central bank bills) and short term government bond markets, as well as the imposition of a reserve requirement on FX derivative transactions by nonresidents. This policy can be described as generally consistent with the IMF guidelines: Criteria a-c (above) were met, and the measures were published and targeted at short term transactions, in order to reduce these inflows and their potential destabilizing effect. The reserve requirement on derivative transactions deviates from the guidelines in that it referred only to nonresidents and didn't have an expiration date.

5. Macroeconomic effects of the foreign exchange intervention

A study performed at the BOI regarding the effect of the intervention on the nominal effective exchange rate of the NIS during the period of the global crisis suggests that over a period of approximately 12 months from the beginning of the intervention, NIS levels were 6.75% more depreciated, on average, than those that would have prevailed in the absence of intervention. In the short run, given the very low pass-through from changes in the exchange rate to inflation, and especially in a period of dampened inflation pressure due to low demand, one can assume that

most of the depreciation of the nominal effective exchange rate was also translated into a depreciation of the real effective exchange rate (see figure 10).

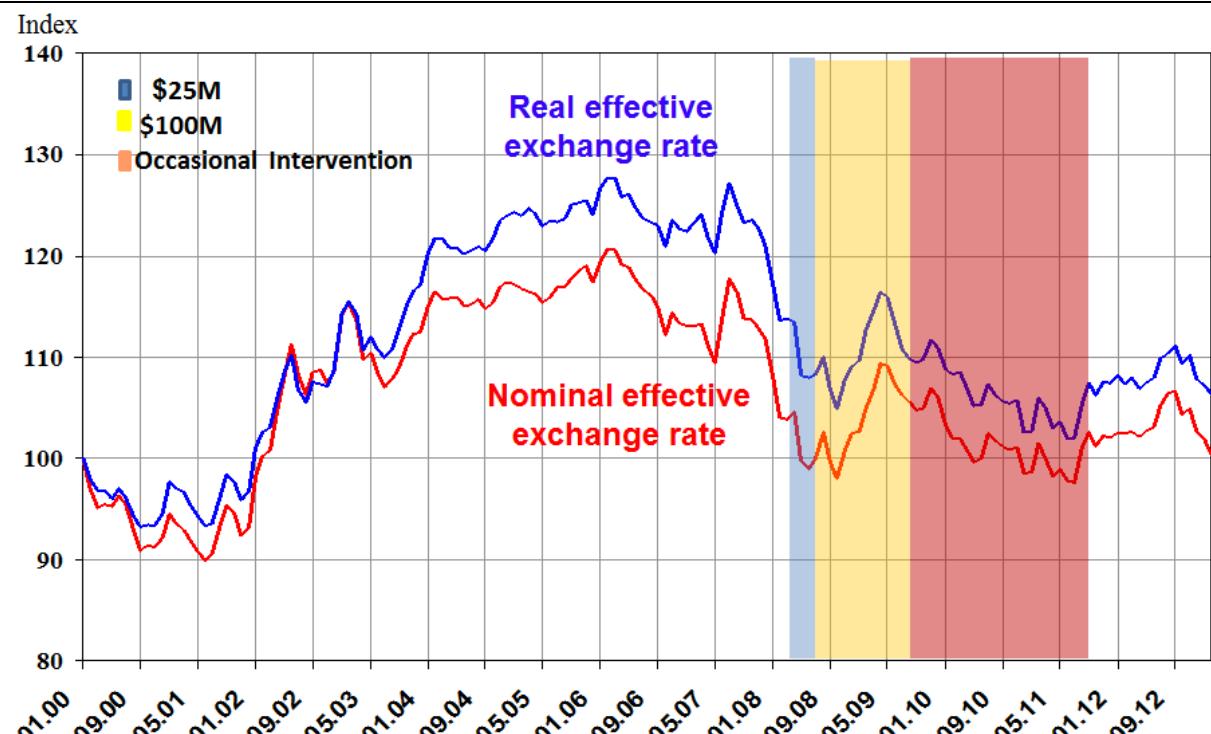
Under this assumption, it is possible to quantify the contribution of the intervention to growth. Estimates based on a macroeconomic model for the Israeli economy suggest that the elasticity of exports to the real effective exchange rate (REER) is about 0.2, and that GDP elasticity to the REER is about 0.1.¹⁶ This is somewhat lower than estimates obtained by Rodrik (2008).¹⁷ His estimates for developing countries suggest that undervaluation of 20 percent boosts annual growth by 0.4 percentage points.

On the basis of these elasticities, a rough estimate of the magnitude of the contribution of the foreign exchange purchases made by the BOI during the Great Recession to growth in Israel was 0.7%. This is two thirds of the estimated overall contribution of the expansionary policies to growth during the Great Recession in 2008–09.¹⁸

Real and nominal effective exchange rate*

(Monthly, 2000-2013)

Figure 10



* Trade-weighted

**01/2000= 100

¹⁶ Jacob Lavi and Amit Friedman, "The Real Exchange rate and the External Trade in Israel", Bank of Israel Survey, December 2006, pp.37–86, (in Hebrew).

¹⁷ Dani Rodrik, "The Real Exchange Rate and Economic Growth", *Brookings Papers on Economic Activity* (revised 2008), pp. 366 and pp. 404–405.

¹⁸ Kobi Braude and Karnit Flug, "The Interaction between Monetary and Fiscal Policy: Insights from Two Business Cycles in Israel", *BIS Papers*, vol. 67 (April 2012).

6. Concluding remarks

Israel's experience suggests that it is possible to intervene successfully in the foreign exchange market over an extended period of time on a large scale with the goal of mitigating the appreciation of the exchange rate, through the purchase of foreign exchange. (In the case of mitigating depreciation, the feasibility of continually selling foreign currency is, of course limited by the size of reserves).

Our analysis suggests that the intervention moderated the over-appreciation of the shekel during part of the period and thus helped mitigate the negative effects of the global crisis on Israeli exports and growth. The experience of Israel and other economies also supports an upward revision of the level of reserves that is considered adequate. This is the result of markets' becoming increasingly open to capital flows, and financial institutions' becoming increasingly exposed to foreign currency risk. Thus the build-up of reserves that started even before the intensification of the global crisis after the collapse of Lehman Brothers enhanced the resilience of the economy in the face of the crisis.

There are a number of issues regarding foreign exchange market intervention that merit further analysis: (1) What is the relationship between, and what would be the optimal sequencing of, intervention in the foreign exchange market and using CFMs? (2) What are the effects of sterilization? How does the need to sterilize intervention interact with interest rate policy undertaken in parallel with intervention in the foreign exchange market? (3) What are the quasi-fiscal costs of sterilized intervention? (4) From an international perspective, what are the implications of a few, or many, large or small countries' pursuing intervention?

These issues should be part of a comprehensive discussion of intervention in the foreign exchange market, but are beyond the scope of this paper.

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