Israel Economic Review Vol. 21, No. 1 (2023), 143-152

BOOK REVIEW OF "MONETARY POLICY IN A PERIOD OF PRICE STABILITY", EDITED BY AMIR YARON AND MICHEL STRAWCZYNSKI

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This book contains papers and proceedings presented at a conference that took place at the Bank of Israel (BOI) in July 2022, and a Governors' Panel held in July 2021. The focus is on inflation, inflation targeting, and various macro and micro aspects of the Israeli economy, along with international comparisons mainly with the US and the Euro area. The book contains thirteen papers, ten of which are in Hebrew and the remaining three in English.

The Hebrew language papers reflect many of the Israeli economy's issues investigated over the years at the BOI Research Department. Those papers contain many informative graphs backed by econometric work, and are very detailed and generally well documented. They all contain a multitude of robustness tests, at the price of some repetitiveness. The three English language papers present and discuss the new July 2021 monetary policy strategy of the ECB, a comparison of fiscal policy and the risks of excessive national debt in Israel and the US, and the proceedings of a four central bank (CB) Governors' panel on inflation targeting (IT) in their respective countries.

It is convenient to divide the papers in the book into the following four groups:

1. **Papers on inflation and inflation targeting.** This group includes:
    a. A general introduction by Amir Yaron, Sigal Ribon, and Michel Strawczynski
    b. A four Governors' panel on the lessons learned from the implementation of IT in their respective countries[2]
    c. A review and analysis of the ECB's new monetary policy strategy enacted in July 2021, by Christophe Kamps and Frank Smets
    d. A paper on inflation risks in Israel, by Osnat Zohar and Michael Gurkov
    e. A paper on monetary policy communication, by Jonathan Benchimol, Yoav Soffer, and Yossi Saadon.

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[2] The four Governors' panel included Stefan Ingves from the Riksbank, Thomas Jordan from the Swiss National Bank, Jiri Rusnok from the Czech National Bank, and Amir Yaron from the Bank of Israel.

2. **Papers anchored on the BOI DSGE model (MOISE).** This group includes:
   a. An intuitive discussion of the insights provided by MOISE about the exogenous real origins and their transmission to Israeli inflation, by Alon Binyamini
   b. A paper that utilizes MOISE to investigate the desirability of GNP targeting, by Jonathan Benchimol.

3. **Macro oriented papers.** This group includes:
   a. A paper on the flattening of the Israeli Phillips curve, by Sigal Ribon and Itamar Caspi
   b. An estimation of the impact of policy conducted during the pandemic on the Israeli short term natural rate of interest, by Alex Ilek and Guy Segal
   c. A comparison of national debt and the risks to its sustainability in Israel and the US, by Martin Eichenbaum and Federico Puglisi.

4. **Papers on particular sectors of the Israeli economy.** This group includes:
   a. An analysis of the formation of inflation expectations of business firms utilizing an internal survey collected and maintained at the BOI, by Yuriy Gorodnichenko, Rafi Melnick, and Ari Kutai
   b. Description and analysis of the evolution of wages in the Israeli public sector and its linkages with the evolution of wages in the private sector, by Yuval Mazar
   c. A model of the impact of trading by various sectors in the foreign exchange market and the BOI on the exchange rate, by Zvi Hercowitz and Amit Friedman
   d. A model of the Israeli real estate market in the long and short runs, by Yossi Yakhin and Inon Gamrasani

   I turn now to a more detailed description of individual papers arranged by their order of appearance above.

Papers on inflation and inflation targeting

a. The general introduction contains a detailed discussion of the Israeli inflation process during the last twenty to thirty years. Several notable results of the analysis are that since 2006, following the firming of a long run IT regime at 2 percent, inflation, its variability, and inflation expectations decreased substantially. Furthermore, the importance of a common factor in the inflation process decreased substantially in comparison to the nineties while that of shocks to individual sectors became dominant.[3] This is followed by a historical description of the process of adoption of IT in advanced economies and a discussion of the relative advantages and possible disadvantages of variations in the implementation of IT such as a point target versus a band, specification of the length of time required to return to the target, symmetric versus asymmetric bands, and presentation of the system to the public. The emergence of an effective lower bound during the global financial crisis prompted some

[3] In terms of Lucas's "islands model" this means that the importance of economy wide shocks decreased in comparison to relative price shocks (Lucas (1973), Cukierman (1979)).

economists to consider raising the inflation target. The paper discusses the pros and cons of such proposals. This is followed by a brief discussion of the papers in the volume. The chapter is well documented and informative.

b. The four Governors' panel contains a description of the detailed implementation of IT in their respective countries along with some judgement about the most appropriate institutional design. All four Governors are from small open economies. The broad consensus that emerges from their experiences is that a flexible target with a visible commitment to return to the target band within a reasonable time is preferable to a rigidly fixed target. They all note that their CBs enjoy high credibility. Specification of a target in terms of the general CPI is preferable to an adjusted CPI that excludes the prices of energy and food since it is better understood by the public and therefore commands more credibility. Due to the safe-haven role of the Swiss currency and the strong ties of Switzerland to the Euro area, the Swiss National Bank has utilized substantially negative interest rates. So did the Riksbank, albeit to a lesser extent. The other two central banks maintained their policy rates above or at the zero lower bound (ZLB). In spite of the fact that the frequency of a binding ZLB increased during the global financial crisis (GFC) the Governors believe there is no need to raise the widely used 2 percent target.

c. Following a thorough review of its monetary policy strategy, dating back to 2003, the ECB announced on July 8, 2021 a reform of this strategy. This paper reports the main changes and discusses their rationale. A main change was the replacement of an inflation rate of "below, but close to 2 percent" by a simpler and explicitly symmetric 2 percent inflation target to be achieved over the medium term. In doing that, the ECB joined many other CBs that had a symmetric target from the start.

   Four main reasons are given for having a small inflation buffer above zero. First, the target level of 2 percent provides an adequate safety margin to guard against the risk of deflation due to the ZLB. Second, an inflation buffer greases the wheels of the labor market and reduces the risk of macroeconomic downturns due to the presence of downward nominal wage rigidities. Third, an inflation buffer allows for a smoother adjustment of macroeconomic imbalances across Euro area countries, avoiding inflation in individual countries falling into negative territory. Finally, such a buffer allows for the presence of upward measurement bias in the HICP due to technical progress. The review concludes that the headline HICP remains the appropriate index for the price stability objective.

   The Treaty requires the ECB, without prejudice to price stability, to support the general economic policies of the European Union with a view of contributing to the achievement of balanced growth, full employment, financial stability and environmental sustainability. The paper discuses the interaction of those additional objectives with the price stability objective and notes that in many cases there are complementarities in their achievement. In addition, other institutional changes such as the establishment of the European System Risk Board in 2010 and the Single Supervisory Mechanism in 2014 enacted macroprudential policy, along with microprudential supervision, as first lines of defense against the build-up of financial imbalances.

d. This article attempts to measure the evolution of inflation risks in Israel before and after the IT system became effective. It utilizes an Inflation at Risk (IaR) measure that is derived from a quintile regression in which CPI inflation excluding fruits vegetables and real estate during the previous twelve months is regressed on long term inflation expectations from the capital market, the output gap and the monthly changes in the dollar price of oil and the exchange rate. Based on this regression, inflation uncertainty is measured by the interquartile range of the distribution and skewness by the quartile skewness. A main result is that since 2014, inflation uncertainty as characterized by the model decreased and that downward risks to inflation emerged. The paper partly attributes this result to the ZLB that was effective during that period. According to the IaR measure the decrease in long term inflation expectations and changes in the price of oil were important originators of this result while the roles of the exchange rate and the output gap were marginal.

   The paper contains a large number of illustrative graphs and some sensitivity analysis including the replacement of capital market expectations by those of professional forecasters.

e. This paper studies the monetary policy communication and finds that there is an increase in transparency along time, and an improvement in text clarity after inflation reduction toward price stability.

Papers anchored on the BOI DSGE model (MOISE)

a. This paper presents an interpretation of the long-term real factors that contributed to the persistent decrease of Israeli inflation during the decade that preceded the pandemic. Although informal, the analysis presented relies on general equilibrium considerations reflected in the more technically oriented MOISE model. The paper attributes the decrease in inflation mainly to interrelated structural changes in the balance of payments (BP) and the labor market along with staggered nominal price adjustments.

   The permanent deficit in the Current Account of the BP turned into a surplus already during the first decade of the twenty-first century and established itself as a permanent phenomenon during the second decade. Discovery of gas and reduction in the price of oil along with structural increases in the share of high-tech exports with lower imported inputs at the expense of traditional exports contributed to this process. In parallel, labor force participation and the share of high income individuals increased, reducing the economy wide propensity to consume, raising savings, and freeing resources for larger exports without necessitating price increases. In the presence of a BP surplus, the interaction of nominal price stickiness along with a nominal flexible exchange rate led to a real appreciation encouraging capital inflows. This led to further appreciations and low inflation. In addition, by preventing the policy rate from dipping below the ZLB during the GFC, inflation was lower than what it would have been, had the interest rate been allowed to dip into the negative range.

The paper provides an interesting analysis of the long term real structural developments that contributed to low inflation and is clearly written.

b. This paper simulates the MOISE model to rank the desirability of alternative policy rules for the BOI during various periods between 1992 and 2019. The paper contains two main results. The first is that over the GFC, a policy rule that targets the nominal GDP (NGDP) is more consistent with the actual policy rule followed by the BOI than a conventional rule based on minimization of a linear combination of the quadratic costs of the inflation and output gaps.

   Based on a large number of simulations and taking the conventional objective function as a yardstick for welfare, the second result establishes that NGDP targeting is preferable to an expanded conventional policy rule after the GFC and in the presence of partial information about the future. This conclusion is based on an extensive sensitivity analysis with respect to the weight of the output gap in the welfare criterion. An exchange rate rule is the worst.

   The final conclusion of the paper is somewhat murky. It leans toward NGDP targeting but stops short of recommending it as a substitute for existing conventional IT rules. Instead it implies that it should be kept in mind as an alternative or hybrid rule. There is little recognition of the fact that NGDP targeting is less transparent to the general public than existing conventional rules.

Macro oriented papers

a. Using a variety of methodologies, this paper estimates the response of inflation to an exogenous change in aggregate demand in Israel between 1996 and 2019. Over the entire period this parameter of the Phillips curve is estimated to be between 1 and 2. Up to the beginning of the twenty-first century this parameter is significant, but with the establishment of a permanent 2 percent IT and the decrease in inflation and its variability, the impact of aggregate demand on inflation goes down and becomes insignificant.

   Two complementary reasons are offered to explain this structural change. One is that the reduction in the variability of inflation makes it more difficult to identify the slope of the Phillips curve. The other is that the introduction of anticyclical policy associated with the establishment of a firm inflation targeting regime reduced the impact of exogenous shocks to aggregate demand. In order to avoid missing variable biases, it is important to recognize that inflation is also affected by additional factors such as supply shocks, inflation expectations, regulatory changes, and increased flexibility of the labor market. The econometric specifications presented control for those factors and experiment with alternative indicators of the variables needed for the analysis.

The paper is competently done and its results are convincing and well explained.

b. This paper estimates the impact of the pandemic and the associated policy reaction to it on the short run natural rate of interest. The natural rate of interest is defined as a weighted average of the expected short run rates of real growth in Israel, the US, and the Euro area. It is then estimated by running a regression of the policy rate on this variable, controlling for the deviations of inflation and of expectations from the 2 percent target, the difference between the actual and the equilibrium exchange rate, and a one period lag of the policy rate. As the authors recognize, this method obtains the natural rate as perceived by policymakers at the BOI. At the conceptual level the paper presents a three-way split of the economy: a sector such as tourism and restaurants that was largely immobilized during the pandemic, a sector that continued its activity, and an intermediate sector. The main result is that during the pandemic, the natural rate dipped into the negative range even more than during the GFC. It remained in the negative range for some time after the gradual lifting of lockdowns and was pushed up by expansionary fiscal packages deployed during the COVID-19 crisis.

   The paper features a large number of informative graphs, comparisons with other advanced economies and many illustrative simulations.

c. This paper presents the evolution of several indicators for fiscal sustainability in Israel and the US, with particular focus on the increase in the debt/GDP ratio and the decrease in average maturity of government debt due to large fiscal packages deployed by both countries during the pandemic. The paper considers this development as a challenge to Israeli fiscal sustainability in the aftermath of the pandemic. Two other risks are associated with potential decreases in the rate of growth below the pre-pandemic rates of growth and tail events due to geopolitical and other risks. A basic determinant of the dynamic behavior of the debt/GDP ratio is the relation between the average real rate on government debt (r) and the real GDP growth (g). When the difference between those two rates is persistently positive the debt is on an unsustainable path. In the opposite case the debt is sustainable. The percentages of past periods in which $(r - g) > 0$ in Israel and the US were 34.4 and 28.1, respectively. In comparison to the US, the Israeli distribution of the ratio is skewed to the right reflecting the fact that Israel is more exposed to geopolitical events like the second Intifada.

   The paper presents a large number of simulations under different assumptions about the future behavior of $r – g$. Figure 6.1 displays an informative "fiscal-alarm frontier" diagram in the r-g plane – debt/GDP for both Israel and the US. It argues that a way to insure against being in the unsustainable range is to resume the prepandemic policy of raising the maturity of government debt. I should add that since the paper was written, the Israeli debt/GDP ratio has decreased, due to vigorous growth in both GDP and government revenues.

The paper is easily read and particularly timely in view of renewed (January 2023) concerns about potential downgrading of Israeli debt due to the new right wing government's planned weakening of the judicial system.

Papers on particular sectors of the Israeli economy

a. This paper uses data from a BOI internal quarterly survey on the formation of inflation expectations of business firms to investigate the response of those expectations to changes in inflation and the policy rate. The survey was started in 1983 and the number of respondents increased gradually over time. Two main findings are that a one-percent increase in unanticipated inflation raises the one year ahead average expectation of business firms by half a percent, and that a one percent unanticipated increase in the policy rate is followed by a 0.3 percent reduction in these expectations. By contrast, the impact on one quarter expectations is weaker suggesting that those changes are viewed as persistent by firms. Comparison of the standard deviation of the cross-sectional distribution of business firms' forecasts with those of professional forecasters, capital market expectations, and the general public reveals that it is higher than the cross-sectional variability of the first two groups but lower than that of the general public. The empirical analysis also reveals that reaction of expectations in different industries and of similar sizes are similar. The econometric analysis distinguishes between three groups of responses. The first group includes responses provided prior to the publication of the CPI during the second month of each quarter, the second includes responses received after the publication of this figure but before the publication of the following CPI figure, and the third group includes responses received after its publication. The bulk of responses belongs to the second group.
   Since data on the formation of business expectations is scant, this is a welcome addition to the literature on the formation of inflation expectations.

b. Using several data sets this paper documents and examines the evolution of Israeli wages in the public and private sectors of the Israeli economy and their interrelationship since 1990.[4] In particular, the paper utilizes data on sectoral wages from social security as well as from a yearly survey of individual income produced by the Central Bureau of Statistics (CBS). Wage increases in the public sector are determined by "crawling of individual wages" as well as by periodic labor contracts while salaries in the private sector respond mainly to the state of the business cycle. Major contracts that raise public sector wages are more frequent in the presence of budgetary surpluses. In spite of different adjustment mechanisms in the two sectors, their wages are co-integrated and move in tandem in the long run. This feature is reinforced by short term movements in the wages of both sectors. Causality tests reveal that causality operates in both directions. But there are indications that during the nineties, causality running from the public to the private sector was stronger, while

[4] Part of the data starts in 1980.

following the relative growth of the private sector since the advent of the twenty first century, wage developments in the private sector led public sector wages as is the case in many developed economies.[5]

The paper contains many informative graphs, statistical tests and simulations, and constitutes an authoritative account of the determinants of wage movements and of their interaction between the public and private sectors of the Israeli economy.

c. This paper examines the impact of foreign exchange (forex) transactions of nine sectors on the USD/ILS exchange rate (ER) between 2011 and 2021—a period that was characterized by a persistent trend of USD sales against the domestic currency mainly by foreign financial investors and Israeli thrift institutions. During that period, the BOI periodically intervened in the forex market in order to moderate the resulting appreciation of the ILS cumulating in the process substantial forex reserves. In order to distinguish between "active" and "passive" responses of a sector to a change in the ER the paper classifies a response as active (passive) if it buys (sells) USD when the ILS appreciates. It then classifies active responses as exogenous and passive responses as endogenous, presumably because in the first case, the sector moves against the daily market trend whereas in the second it joins the market trend.[6] The exogenous response of a sector should be larger than the total response since the transactions of the sector are also partially influenced by the underlying long run trend.[7]

The ultimate goal of the paper is to estimate a model of ER determination that takes into consideration the forex transactions of each of the nine sectors along with the impact of the BOI intervention. The net demand for forex of a sector is specified as a function of the ratio between the rate of ILS depreciation normalized by an expected future rate, and the exogenous shock controlling for sector specific and common sectoral factors. Those equations are then combined with BOI forex purchases, an interest rate parity condition, and a risk premium under an imperfect substitutability assumption to obtain a final ER determination equation. It is found that: (i) the most active sectors are foreign investors and thrift institutions, (ii) exogenous shocks to sectoral demands are responsible for over 20 percent of the daily ER change and 41 percent of its intensity, (iii) on average, one billion USD purchases by the BOI lead to a 0.4 percent depreciation of the ILS.

[5] During the nineties cost of living automatic adjustments were still responsible for some wage adjustments in the public sector.

[6] The motivation for this asymmetric identification strategy is not totally transparent and could benefit from further elaboration. It is likely that the authors chose to define purchases of USD as exogenous rather than endogenous because of the underlying trend of USD sales during the sample period. In the presence of persistent purchases of USD this logic would imply that the definitions of exogenous and endogenous movements would be interchanged.

[7] To correct for this, the paper uses elasticities estimates using only data from days with passive responses of a sector.

The paper sheds new light on the forex market by presenting a tight conceptual framework and implementing it empirically.

d. Using yearly data between 1980 and 2019, this paper presents and estimates a model of the Israeli real estate market in the long and short runs. The model includes the following components: (i) a market for housing services, (ii) a pricing of real estate equation, (iii) supply of new dwelling construction services, and (iv) a stock-flow equation that relates the periodic volume of construction to the stock of housing. The model's endogenous variables are rents, housing prices, new construction volume and the stock of housing prices.

   The long run block of the model is based on three estimated equations and operates as follows: Given that the stock of housing rents is determined by exogenous demand factors such as personal income and population. Given rent prices are determined by returns in the capital market and construction volume is determined by housing prices and construction costs. The short run block focuses on estimating similar equations for the residuals of the long run equations. In addition to the regressors that appear in the long equations, the short-run equations feature, since 1997, two additional variables; the change in the USD ER adjusted by the CPI excluding housing prices and the change in the short run interest rate.

   It is found that in the long run, both supply and demand for housing are inelastic, implying that adjustments to imbalances occur mainly through price rather than quantity adjustments. Short run imbalances produce extended cycles and gradually affect the long run equilibrium. Estimation of the model reveals that in the long run, population growth is a more important determinant of housing prices than income growth. Following the wave of Russian immigration during the first part of the nineties, prices soared. This process came to an end in 1997 and was followed by a long period of price decreases ultimately triggering a rebound during 2008–11.[8] The model implies that prior to this rebound prices of housing were lower than their long run equilibrium value by 13.7 percent. Since 2012 persistent supply constraints along with individual income growth contributed to a steady rise in prices.

   The paper contains a large number of illustrative graphs, unit root tests on variables used, and dynamic simulations for responses of endogenous variables to changes in exogenous variables. It is competently done and provides readers with a timely and well-structured account of the Israeli housing market.

[8] Between 1997 and 2007 prices decreased by about 2.5 percent per year.

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