המכון למחקר כלכלי בישראל
על-שם מוריס פאלק בע"מ (חל"צ)
The Maurice Falk Institute for
Economic Research in Israel Ltd.

Israel's Schizophrenic Price Policy 1996-2017

By

Reuben Gronau

The Hebrew University of Jerusalem

Discussion Paper No. 23.01

February 2023

בנין פרץ נפתלי, קמפוס האוניברסיטה העברית, הר הצופים, ירושלים 9190501
The Hebrew University Campus, MT. Scopus, 9190501 Jerusalem, Israel
www.falk.huji.ac.il

Israel's Schizophrenic Price Policy 1996 – 2017

(Paper in Process)

A. Introduction.

Recent months witnessed the rekindling of the controversy concerning Israel's high cost of living and the acceleration of the inflation process. Israel's high price level has been the center of debate for over a decade. It was the focus of the largest mass demonstration Israel has ever witnessed, forcing the government to establish an enquiry committee to trace the sources of the price hikes, and following its recommendations, to undertake a series of steps to open the market to increased competition, to lower the prices of regulated infrastructure services (water and electricity), to funnel "excess tax revenues to lower the cost of living, and most recently, to establish a program to "lower the cost of living". Surprisingly, the only public institute that seems to hardly disturbed by the public outcry was the institute charged by law to tackle price inflation – the Bank of Israel. The Bank resonated the public outcry in its academic publications, but stuck to its traditional policy, a policy outlined in a different economic era, two decades ago, to raise prices at an annual rate of 2 percent as "as its goal".[1]

In his policy the Bank drew a distinction between the high price level and the rate of price inflation. Though it recognized the high price level as an impediment to the equalization of Israel's standard of living to that of the advanced economies, it regarded the slow increase in prices in the period 2014-2020 a failure of its monetary policy, and adopted an expansionary policy in order for the price rise to hit its target. It explained the high price level as an outcome of the sharp appreciation of the Israeli currency (the NIS) which made Israeli goods and services look expensive in dollar and Euro terms. The expansionary policy was intended to create a "wealth effect" to increase demand and the supply of foreign currency. The Bank was aware of the effect of its low interest rates on the mortgage market and the demand for housing, but explained the sharp increase in housing prices as an outcome of supply restrictions.

The definition of "the high price level" that led to the mass demonstrations in the Summer of 2011 was wide and unfocused. It was incited by the high cost of real estate and rentals, the high burden carried by young couples who had to pay for nursery schools,[2] and the prices of goods whose prices were substantially higher than comparable goods abroad ("the cottage cheese boycott"- Hendel, Lach, Spiegel, 2017). Similarly, the government committee which was set up to check these grievances ("the Trachtenberg Committee") checked the changes in the composition of the consumption basket and the change in its prices. It analyzed the institutional failures the resulted in the high price level, but did not undertake a systematic comparison of the prices of the Israeli consumption basket with that abroad.

A more systematic approach to the subject of Israel's price level, relative to that abroad, calls for the use of the Purchasing Power Parity (PPP) data. Israeli data are collected as of 1996 by the Israeli Central Bureau of Statistics (ICBS) and the OECD results allow the comparison of the Israeli prices with those abroad to detect the "weak spots" in the Israeli price scheme.

This article examinees the changes in the PPP index over time. The index is computed by the OECD in 3 years intervals, and our examination relates to the period 2002 – 2017, a period for which there exists a detailed breakdown of the data. The analysis distinguishes between tradeable goods – goods

[1] The definition of 2% as "price stability" is based on the government decision of 16.8.2000 (Decision No. 2183).

[2] The law establishing that nursery schools should be free was passed in 1984, but never enacted.

that are imported and exported, and non-tradeable goods and services. We examine to what extent was the index of tradeable goods affected by the rate of exchange and to what extent were prices affected by trade barriers, Similarly, we examine to what extent is the increase in the price of non-tradeables connected to wage hikes, or is it connected to an increase in market concentration, increased profitability, and the dual structure of the labor market. Finally, since the CPI and PPP data are calculated using different methods of aggregation and different data bases, the paper examines whether the two series are consistent, or whether the two bodies in charge of the Israeli economy navigate following different lights.

The paper opens with a literature survey, followed by a discussion of the data, focusing on the construction of the PPP data, and the differences between the changes of the PPP index and the CPI over time. In the next section we analyze the price change of tradeables and non-tradeables trying to enlighten the factors that contribute to their differential growth. The paper closes with policy recommendations.

B. Survey of Literature

The topic of Price Levels is not a stranger to economic literature, but went through different transformations over time. The price level is measured naturally in terms of the local currency. The comparison of price levels of different countries requires, therefore, the use of the rate of exchange in order to translate the different prices into the same currency. A natural question in this context is whether the ratio of price levels equals the rate of exchange, or alternatively: whether the ratio of price levels corrected by the rate of exchange is unitary? Theory recognized the possibility that there can exist random deviations of the ratio of price levels from the rate of exchange, and that the real rate of exchange deviates from one, but many studies tried to check whether this deviation is random or systematic.[3] In a survey article (1996) Rogoff argues that given the slow speed of convergence to equilibrium one will need extremely long-term time series to test the convergence hypothesis. But even those researchers who report that they detected the convergence process (Frenkel, 1986, 1990) have to admit that the process is quite slow. Since the large volatility in exchange rates is explained by short-term monetary and financial fluctuations, the slow rate of convergence seems enigmatic. Rogoff regarded the slow pace as a puzzle - "The purchasing power parity puzzle then is this: How can one reconcile the enormous short-term volatility of real exchange rates with the extremely slow rate at which shocks appear to damp out?"

In a survey paper written 8 years later (Taylor-Taylor 2004) the authors are even more skeptical about the mere existence of an equilibrium that is determined by the price ratio. In their words – "If exchange rates do tend to converge to PPP, economists have—at least so far—had a hard time presenting strong evidence to support the claim." The authors cast doubt about the slow process of convergence, and relate it, at least partly, to the assumption that the process is constant over time. According to them, the process is non-linear, and the adjustment is faster the larger the discrepancy of the real rate of exchange from unitary. Given the price rigidity and the exchange rate flexibility it is not surprising that the nominal exchange rate deviates from the real rate of exchange. According to them "the law of unitary price" is not satisfied in the case of tradeable goods, not to mention non-tradeables.

The distinction between tradeables and non-tradeables has become over the years an integral part of the analysis of the Purchasing Power Parity hypothesis. Trade barriers create a wedge between the prices of the goods and services in different countries. These barriers include transport costs,[4] customs, other indirect taxes and non-monetary barriers. To these one has to add the non-tradeable component in the price of tradeable goods (marketing margins, excess profitability etc.). But even if

[3] For a survey of this literature see Froot & Rogoff in the *Handbook for International Economics* (1996).

[4] Rogoff (1996) found that the average difference between CIF and FOB prices is about 10%, but the difference varies from one country to the next.

the "law of unitary price" holds for tradeables, there is no guarantee it will hold for the non-tradeables. According to Balassa and Samuelson (1964) the differences in productivity between the developed and the non-developed economies in the production of tradeables (which are mostly goods) exceed the productivity differential in the production of non-tradeables (which are mostly services). Since rates of exchange and wages are set according to the prices of tradeables, the price of non-tradeables in the developed countries will exceed that in the non-developed, and one can expect the Purchasing Power Parity will increase with the country's income per capita. The assumption that PPP increase with income per capita has been tested and found to be true tens of times, but as Rogoff comments the results depend heavily on the difference in PPP between the developed and non-developed countries, and the results are less conclusive when the test is conducted within any one of the two groups.

Taylor & Taylor summarize their survey saying that the research over years has shown that the theory of Purchasing Power Parity does not hold over the short run, but holds in the long run, recognizing that the equilibrium rate of exchange can change over time either due to the factors mentioned by Balassa and Samuelson, or as the result of the process of capital accumulation which affects the balance of payments.

The rate of exchange plays, naturally, a central part in the Bank of Israel's research agenda. Over the last two decades Bank economists studied almost every aspect related to the topic: the change of the balance of payments and its effect on the exchange rate, the differences in the behavior of the major players in the foreign exchange market, domestic and global developments that affected the rate of exchange, factors that contribute to the rate of exchange volatility, and, naturally, the impact of the Bank's intervention in the foreign exchange market on the rate of exchange.

The Balassa-Samuelson hypothesis was the focus of an extensive examination by Rony Frisch. In his first paper (2014) he finds support to the hypothesis that there exists a positive correlation between the price level and income per capita in cross-section data. Still he could not find any major factor that has a permanent effect on the rate of exchange except for demographic factors, and restrictions on the current account deficit. Specifically, he could not find support to the hypothesis that a long run process of the rate of exchange evaluation is correlated with a the rate of growth of income per capita, that of the productivity of the tradeable sector (the Balassa hypothesis), or that of the capital stock of the economy (the Bhagwatti hypothesis). In a follow-up study, 2 years later, Frisch ascertains the Rogoff hypothesis that the correlation between the rate of change of the real exchange rate and the rate of change of income per capita is limited to the poor economies, and that the correlation between the real exchange rate and income per capita in panel surveys reflects short-term developments associated with the business cycle, but does not hold in the long run.[5]

The panel of countries that was used by Frisch included Israel, but its rate of exchange did not get any special attention.[6] Israel's real rate of exchange was the focus of the study by Eckstein & Friedman (2011), a study that examined the deviation of the Israeli real rate of exchange from its equilibrium level in the years preceding and following the Great Financial Crisis. In their study the authors use two different measures: the effective real rate of exchange (i.e., the nominal effective rate of exchange corrected for the inflation differential between Israel and its trading partners), and the Index of Purchasing Power Parity. The equilibrium rate is estimated using a logarithmic regression of the real rate of exchange on the relative income per capita, the terms of trade, the share of public consumption in GDP, the age composition of the population, direct foreign investment (FDI), and the interest differentials, and the deviations are based on the residuals from this line. The

[5] Frisch's conclusions are based on the relationship in panel data between income per capita in 1970 and the price level in the economy 40 years later.in his words, "the fact that income per capita in 1970 explains the current (i.e., 2010) price level may suggest that there exists a country-fixed-effect that does not depend on its level of productivity (income per capita). In other words, it is doubtful whether there exists a causal relationship between the income per capita and the price level".

[6] The number of countries in the Frisch samples varies from one test to the other, and changes from 21 to 123 countries. Frisch does not mention which of the tests include Israel and which not.

authors find that only the first two of these variables affect the real rate of exchange, and according to their findings the Israeli rate of exchange was over-devaluated in the years 2006 and 2009, and close to its equilibrium value in the years 2008 and 2010.[7]

Strangely missing in this agenda was the subject of Israel's Price Level. Though the change in the price level (i.e., the inflation rate) was the focus of monetary policy the Bank had never discussed the topic prior to the mass demonstrations. The 2011 Annual Report discusses the motives of the demonstrators and mentions the reduction of the government social expenditures, the cut in transfer payments, the increase in housing prices, price hikes imported from abroad (food and oil prices), and the competitive structure of the economy, but the discussion lacks any systematic attempt to compare the Israel price level with that in the other developed economies.[8]

The topic of Israel's price level is mentioned the first time in the Bank publications in the February 2012 "Recent Economic Development" Survey. In the section discussing the differential in price levels between Israel and the developed countries Yoav Friedman tries to trace the sources of this differential. His findings support the demonstrators' claims that the Israeli Price level is, given its income per capita, high compared with the OECD countries, that a major source of the discrepancy are the high food prices (a discrepancy that had widened following the 2008 crisis), but he finds even wider differentials in the prices of private vehicles and hotels and restaurants. These discrepancies cannot be explained merely by the appreciated rate of exchange, and important factors that contribute to the high cost of living are indirect taxation (the VAT and purchase taxes) and the lack of competition. Friedman cites as a counter example the prices of clothing and footwear that were cut to the international level as soon as the industry was opened to foreign competition. Thus, in the decade 2000- 2010, a decade that was characterized by wide fluctuations of the Israeli exchange rate,"in only two of the past ten years has the price level in Israel been lower than the level expected for an economy with per capita income similar to Israel's. On average, over the past decade, the price level in Israel was about 6 percent higher than what would have been expected in such an economy".[9]

The Bank of Israel economists returned to the subject in the 2014 Report. The report's first chapter details the difficulties in relating to the price level, and argues that, counter to the protestors' claims, prices in Israel given its GDP per capita are not "particularly high" in world standards, and that the impression of "high prices" is heavily affected by the comparison with the US whose private consumption prices are "especially low", and by few consumption groups whose prices are out of line by world standards (food, private vehicles, hotels and restaurants, culture and recreation).[10] The author of the chapter attributes the feeling of high prices to the appreciation of the shekel. The appreciation hardly affects the price of imported goods, and on the other hand "inflates" the general price level in terms of foreign exchange. Not less important is the share of labor in GDP. This share declined in the early years of the decade, so that even if the price level is not high relative to Israel's GDP per capita, it may be high relative to the average wage.[11]

---

[8] A Frisch memo discussing consumption prices in Israel was circulated among the participants in the monetary discussions of September 2011, but was never published. Frisch found that the price level in 2009 was 15% higher than in countries with a similar income per capita.

[9] Thus Eckstein & Friedman (2011) note that the Israeli Shekel has been evaluated over the years 2002 – 2008 by almost 40%, but they forget to mention that over one quarter of the rise was due to the differential increase in the Israeli price level relative to that in the US.

[10] However, according to the figure depicting the logarithmic regression of the prices of private consumption on the nominal GDP per capita it seems that the Israeli residual is among the largest in the sample.

[11] In 2013 the share of labor in the Israeli GDP was 55%, as compared with the average of 60% in the OECD countries.

The report returns to the topic again in chapter 7. This time discussing the real rate of exchange. It is customary to define the real rate of exchange as the relative price of goods abroad in terms of local goods.[12] It measures, therefore, the number of units of domestic goods that are required to buy a unit of goods abroad (sofer,2005; Meishar 2009, p.410)

$$e = E * (P_F/P_L), \quad (1)$$

where e denotes the real rate of exchange, E is the nominal rate, P_F denotes the foreign price level and P_L is the local price level. The authors of the chapter focus on the reciprocal of e, i.e.,

$$e' = P_L/(E * P_F),$$

namely, the purchasing power of the domestic currency, or in their words "The real exchange rate is the ratio of the price of a basket of goods in a country's domestic economy to that of an identical basket in other countries, in terms of the same currency. Real appreciation in Israel occurs when the shekel-denominated price of Israel's basket rises relative to an identical basket in foreign currency terms and translated into shekel terms on the basis of the nominal exchange rate. Real depreciation occurs when Israel's basket declines in price relative to the same basket in other countries."[13] Analyzing a large panel of developed and under -developed countries enjoying a large balance of payment surplus, the authors conclude that "Israel's real exchange rate has been stationary in the past two decades; its fluctuations during this time were attributable mainly to business cycles and transitory factors. The rapid increase in Israel's relative productivity (i.e., of its tradable sector as against that of its nontradable sector) as compared with other countries' relative productivity, and the increase in its current account surplus were indeed cardinal factors in the appreciation of the shekel. However, they were not strong enough to bring on an appreciation trend and a deviation from the (weak) law of one price." [14]

Finally, one has to mention the contribution of the researchers at the Ministry of Finance Chief Economist Office. In contrast to the macroeconomic approach of the Bank of Israel research, their approach is microeconomic. Their access to the Tax Authority data sheds additional light on the profitability of imports, and most notably the imports of food and personal care items, and private vehicles, two industries well known for their high prices.

C. The Data – The Anatomy of Indices

In a one-product economy the price of the product determines the price level and the change in its price determines the rate of inflation. In a multi-product-economy the price level equals the weighted average of the prices of the individual goods and the rate of inflation is the change in this average.[15] To the extent that there exists a difference between this estimate and the estimate of inflation computed independently (i.e., the CPI) the difference is not "conceptual" but merely

[12] As mentioned by Sofer (2005) this is the "European" definition, according to which the rate of exchange is defined as the price of a unit of foreign currency in terms of the domestic currency, and a devaluation means an increase in the rate of exchange. In the literature (and in particular in the IMF studies and data bank) the customary definition is the "British" one, which is the reciprocal of the "European", according to which an increase in the rate of exchange means an evaluation.

[13] The Bank of Israel 2014 Annual Report, ch.7, fn. 1, p.231.

[14] Their findings are consistent with those of Luca, Milesi-Ferretti and Lee (2008) in their IMF study.

[15] The assumption of a one-product economy serves as the base of the popular computation identifying the price level with price of hamburgers (i.e., Big-Macs) [Click, 1996; Pakko and Pollard, 2003].

"technical", due to difference in the composition of goods in the two indices or in their weighting schemes. Thus, one cannot understand the difference between the measurements of the price level (i.e. the PPP) and the CPI without dwelling deeper into the principles and methods applied in the construction of the two indices.

Price indices play a major role in the data collected by the Israel Central Bureau of Statistics. The Israeli Consumer Price Index (CPI) is most probably the "oldest" index computed by the ICBS, dating back to 1922. It is based on the prices of about 1350 goods and services collected at about 3800 selling points. The respondents' variety is intended to capture the price dispersion, a dispersion that exists within the same locality, not to mention the dispersion between localities that vary by their social-economic status (Eizenberg, Lach, Yiftach, 2021). Since the CPI is used as the base for indexation in a wide range of financial transactions, the indices which are published on a monthly base, are final, and are not revised even in the case where new information would have called for a revision.

The CPI is based on the Laspeyres weighting scheme – a weighted average of the various price changes, where the weights are the shares of the expenditure item in the consumption basket of the base year. To reduce biases resulting from changes in the consumption basket, these weights are updated on a bi-annual basis according to the most recent results of the Households Consumption Survey.[16] The index is used as the base for calculating the price index of private consumption in the national accounts, translating the nominal consumption data (i.e. the consumption expenditure data) into real terms (i.e. quantity terms). Hence, the differences between the CPI and the prices of private consumption series are minor. The publication of the CPI is accompanied by the publication of the prices of about 60 consumption items, a majority of which relate to food items, 6 prices relate to different types of fuel, and the rest are rent data according to apartment size and location.

The assumptions that consumption patterns and the characteristics of goods and services are constant holds, perhaps with slight reservations, for changes over time, as long as the period is not too long, but, clearly, do not apply to international comparisons. International differences in consumption patterns and in the composition of GDP, and the differences in the characteristics of goods and services are a challenge to any such comparison. It is not surprising, therefore, that the first international price comparison was undertaken by three academicians, Kravis, Summers and Heston as part of their study of international trade only about 60 years ago. The Penn World Tables (PWT) which were initiated by these economists are still ongoing as a project managed by the University of California and the University of Groningen. The project which started comparing the prices in 34 countries encompasses by now over 160 countries.[17]

Since the early 80s the OECD and Eurostat have collaborated to publish an index of the comparative purchasing power of their own. The project enjoys the support of its members' statistical offices, and focuses primarily on the advanced economies[18]. Israel joined the project in 1996, and since then the ICBS collects the PPP data in three-year intervals according to the OECD- Eurostat

[16] The bi-annual revision of the weighting scheme was introduced in 1999. Prior to that date the revision cycle lasted 5-7 years.
[17] The PWT data were used, among others, by Frisch in his studies.
[18] The number of countries included in the sample has changed over time. In 2022 it includes 49 countries, some of which were non-OECD members. Our sample which covered the years 2002 – 2017 was confined to 36 OECD countries.

instructions. The detailed PPP data used in our study start in 2002 and cover 6 rounds (2002, 2005, 2008, 2011, 2014 and 2017).[19]

The main purpose of the price collection by the Eurostat and the OECD is the comparison of the standard of living of its different countries. This aim dictates the nature of the data and the way they are processed. At its base the system consists of the prices of 2500 goods and services that are defined in a very precise way in order to ensure comparability across countries.[20] The product is defined not merely by its chemical composition, but, among other features, also by its form of packaging. In a similar fashion, to neutralize the intra-national distribution of prices, the OECD asks countries to provide nationally representative prices.

The prices of the individual products are aggregated into groups of "Basic Headings", and the "Basic Headings" are aggregated into the national PPP indices. The aggregation embodies two principles which are crucial for any international price comparison: transitivity (i.e., the price ratio of X relative to Z equals the product of the price ratios of X to Y and Y to Z) and reversibility (i.e., the price ratio of X to Y equals the reciprocal of the price ratio of Y to X).[21] Since these properties are not satisfied by the simple weighting schemes (i.e., the Laspeyres and Paache indices) the OECD applies a complex system of weighting which involves the Laspeyres, Paache, Harmonic and the EKS weighting.[22] The weights used in this calculation are based on the weight of the "basic heading", in the national accounts, and as the result the weights used to calculate the Israeli PPP depend not only on the weights in the Israeli national accounts, but also on the weights in the national accounts of all the countries involved in the comparison.

The OECD distinguishes between the Purchasing Power Parity (PPP) - the price in domestic currency of an "average" good that cost a dollar in the US, and the Price Level Index (PLI) - the "price" denominated in dollar terms (i.e., the domestic "price" in US dollars of the "average" good that costs one dollar in the US)

$$PLI = PPP/E=(1/e) = e', \tag{2}$$

where E is the nominal rate of exchange and e is the real rate of exchange. The OECD publishes the prices of the "analytical categories" and their aggregates – GDP prices, the price of household actual individual consumption (AIC), and that of private consumption (Household Final Consumption – HFC).

Formally, the Consumer Price Index is defined as a weighted average of the price changes

$$CPI_J = \sum w_{j0i}*(P_{j1i}/P_{j0i}), \tag{3}$$

[19] The OECD data covering the first 5 rounds (1996-2008) were used by Eckstein & Friedman (2011) in their study of the Israeli real exchange rate. The data on interim years are based on OECD extrapolations.

[20] A product is defined by the 2002 Methodological Manual (p.236) as "representative" if "it is sold in sufficient quantities for its price to be typical for that group of products in the national market."

[21] X, Y, and Z may denote products or countries.

[22] This complex scheme is described in detail in chapter 12 and Appendix V of the 2012 Eurostat-OECD Methodological Manual.

Where j (j=A, B) denotes the country, w_{j0i} is the weight of product i in the consumption basket in the base year, and the summation is over the n products. The relative inflation index of country B relative to A is, therefore,

$$CPI_B / CPI_A = \sum w_{B0i}*(P_{B1i}/P_{B0i})/ \sum w_{A0i}*(P_{A1i}/P_{A0i}) \quad (4)$$

On the other hand, the Purchasing Power Parity Indices (PPP and PLI) are defined in terms of an inter-country comparison. Let A be the base country (i.e. the US), then the purchasing power parity of country B in period k is, crudely,

$$PPP_k = \sum w_{ABki}*P_{Bki} / \sum w_{ABk1i}*P_{Aki} \ , \quad (5)$$

where w_{ABki} is the complex weight used un weighting the "basic headings" in the comparison of country B with country A in period k[23]. The change of PPP over time is, therefore,

$$PPP_1/PPP_0 = (\sum w_{AB1i}*P_{B1i} / \sum w_{AB1i}*P_{A1i}) / (\sum w_{AB0i}*P_{B0i} / \sum w_{AB0i}*P_{A0i}) \quad (6)$$

Similarly, the change of PLI over time is

$$PLI_1/PLI_0 = (PPP_1/PPP_0)/ (E_1/E_0), \quad (7)$$

where E_K is the rate of exchange of country B in period k. There is, however, an essential difference between the change in the CPI and the change in the PPP and the PLI indices. Whereas the change in the CPI is measured for a given set of weights (W_{j0i}), in the calculation of the changes of the PPP and PLI the weights change over time. The changes in the indices depends, therefore, not merely on the change in prices but also on the change in weights.

Figure 1 describes the change in Israel's purchasing power parity of household private consumption (HFC) since it joined the OECD project in 1996. The figure demonstrates the factors that brought the Israeli masses to the streets. The consumption basket that was worth one dollar in the US, and cost in Israel 90 cents in the years 2002-2005, cost in 2011 $1.20. The average annual rate of change of the price level dominated in US dollars (2.1%) in those years placed Israel in the 6th place among the OECD countries.

In the same fashion the figure demonstrates the crowd's short memory – the price level in dollar terms (i.e., the PLI) relative to the US in the years 2008 – 2011 did not differ from that in 1996. The PLI variability demonstrates the Bank of Israel argument that it is, mostly, a by-product of Israel's exchange rate volatility. Israel's exchange rate which was 3.19 NIS/$ (31.3 cents/NIS) was devalued over the next 6 years by almost 50% to 4.74 NIS/$ in 2002 (21.1 cents/NIS), and bumped back to 3.60 NIS/$ in 2008 (28 cents/NIS), and stayed at that level with small fluctuations for the next 3 periods. The NIS which was one of the weakest currencies in the first part of this period, turned, since 2002, to be one of the strongest.

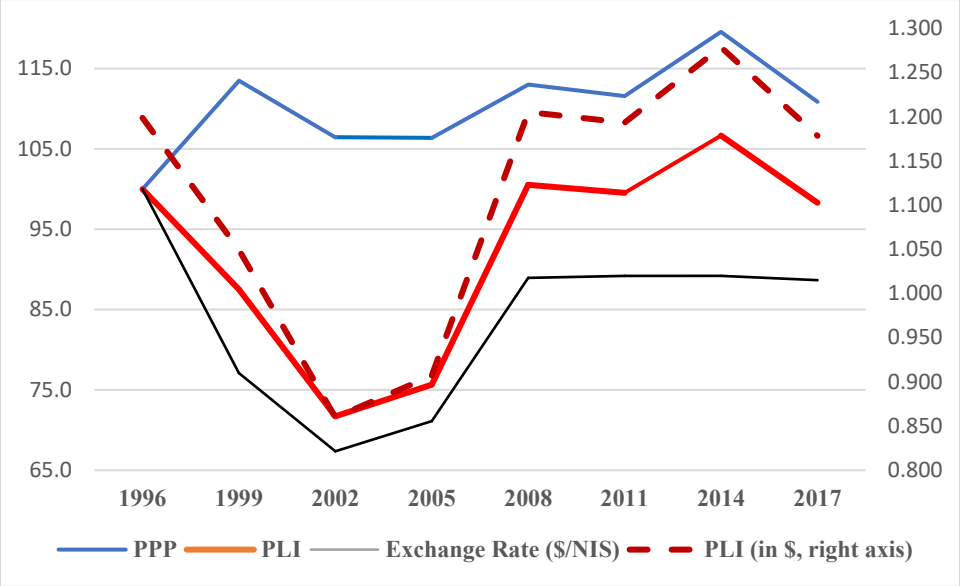
But the PLI variability makes one forget another trend – the upward "crawl" of the PPP, regardless of the changes in the rate of exchange. Israel's relative price level in local currency terms (i.e., the PPP) increased by 6.5% in the first period, and has hardly slowed down, growing, in spite of the appreciation, by an additional 4.1% in the second period. Thus, whereas the PLI shows almost no

[23] Equation (5) and (6) contain a simplified description of the PPP calculation conveying the main differences between the CPI and the PPP changes over time. The precise description is contained in the Appendix.

change between 1996 and 2017 when the price level is measured in dollar terms, the PPP shows an 11% increase relative to the US in terms of NIS.[24]

This is a quite surprising finding given Israel's inflationary history as described by its CPI record.

Figure 1: Israel's Household Private Consumption (HFC) Purchasing Power Parity Indices in NIS and Dollar Terms and its Rate of Exchange ($/NIS) 1996 - 2017 (1996=100)*



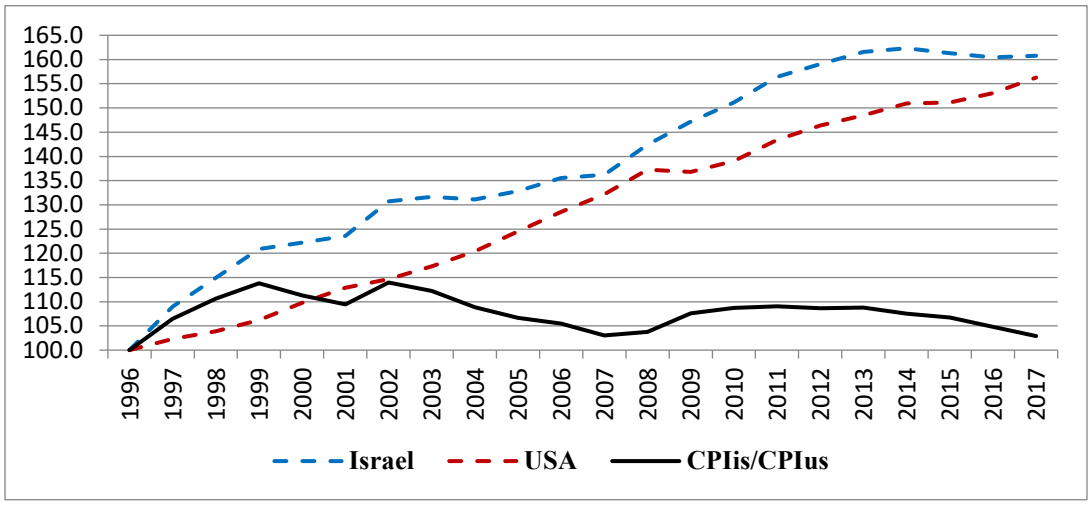
- Note: The exchange rate is defined as dollars per NIS.

The year 2002 was a turning point not merely in the development of Israel's balance of payment and the exchange rate. Equally important was the reversal of inflation. 17 years after the initiation of the "Stabilization Program", the economic 2002 crisis brought inflation to a halt.[25] The turn-around is depicted in Figure 2. Whereas in the first 3 years (1996-1999) average inflation outranked the US by 4.5% (6.5% vs. 2%), in the next 3 years inflation rates were almost equal (2.6%), and since then (with a short break associated with the Great Financial Crisis) the Israeli rate lagged behind the US. The rate during the years 2014-2017 placed Israel as one of the the slowest inflationary countries in the OECD, and the negative rates in those years and the low inflation accompanying the recovery from the 2002 crisis placed it in the 30th place for the period since 2002.

[24] According to the OECD PLI data the US was the 21th most expensive country in 1996, moving to the 9th place in 2002 and the 14th place in 2017. It is not clear why the Bank of Israel economists defined the US price level as "especially low".

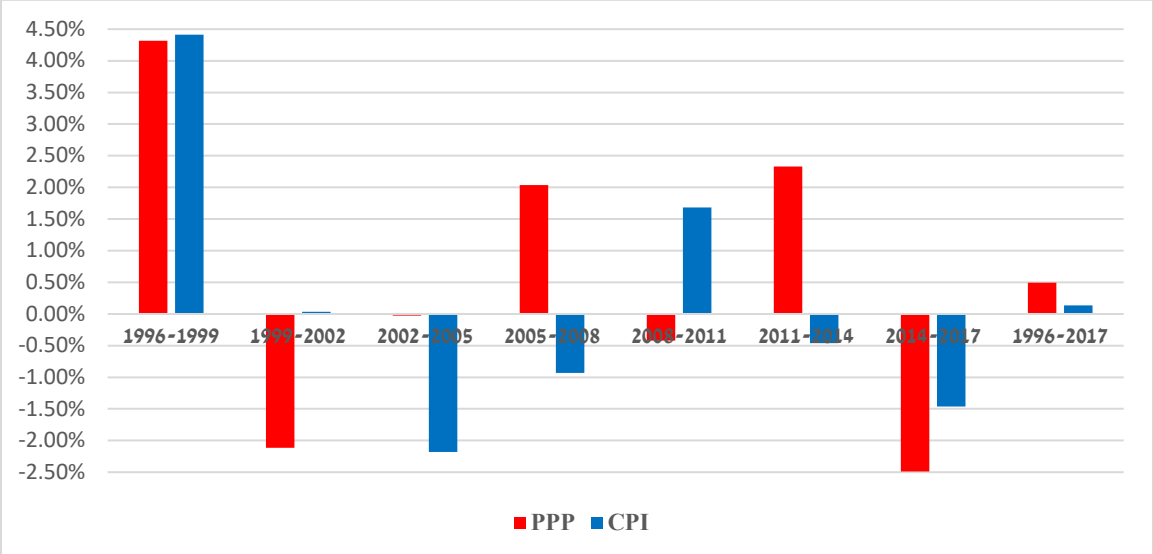
[25] The process that resulted in the turn-around of the balance of payment is analyzed in the chapter by Leiderman & Bahar in Ben Bassat, Gronau and Zussman (2021). The demise of inflation is analyzed in the book in the chapter by Ribon.

Figure 2: The Israeli and the US CPI 1996 – 2017 (1996=100)



The differences between the Israeli PPP series and its CPI (relative to that of the US) are highlighted in Figure 3. Only in the first sample period (1996-1999) the two series look alike. Since than for most periods the indices move in opposite directions. The difference for most periods adds to 2-3%, and since 2002 the annual difference is almost a whole percentage point (an annual increase of 0.27% of the PPP, vs. an annual decrease of 0.68% of the Israel-US CPI differential). Whereas according to the PPP the Israeli prices of private consumption increased over the period 2002 – 2017 by 6%, compared to the US, according to the CPI they lagged behind the US by 9%.[26]

Figure 3: The Annual Rate of Change of the Israeli PPP and the CPI* 1996 - 2017



- The PPP relates to the HFC and the CPI is relative to that of the US.

[26] The PPP index of individual consumption increased even more - by 11%.

Given the different weighting schemes and the different nature of the data it is not surprising that the two series differ. But do the differences revealed by Figure 3 "make sense"? The comparison of PPP index and the CPI for the other OECD countries shows Israel to be an extreme case. The Israeli difference (in absolute terms) is one of the 3 largest differences in 4 out of 5 sub-periods, and is the largest for the period as a whole.

Analyzing the Israeli Purchasing Power index over the last 15 years we face, therefore, a "dual puzzle"- not only does the PLI differ from unitary, but it seems to be inconsistent with the CPI.

One possible explanation is the difference between the series in their weighting schemes. As mentioned the CPI is based on the weighting of price changes employing the Laspeyres method, where the weights are the product shares in the base year consumption basket, whereas the PPP employs a complex method based on the weights of the products in the national accounts of all the countries involved in the comparison for both years. The data used in these computations, the prices of the "representative" goods, is not in the public domain, hence we cannot evaluate the effect of the weighting scheme on the comparative values of the Basic Headings. The OECD publishes, however, the values of the analytical categories, and we can compare the OECD aggregates with those computed employing the Laspeyres weighting scheme using the Israeli data.[27]

The OECD publishes the comparative prices of the 12 analytical categories: food and non-alcoholic beverages, alcoholic beverages and tobacco, clothing and footwear, housing (including water, electricity, gas and other fuels), household furnishings-equipment and maintenance, health, transport, communication, recreation and culture, education, restaurants-cafes and hotels, and miscellaneous goods and services.[28] As, table 1 shows the OECD classification of these sub-groups, a classification based on the international Classification of Individual Consumption by Purpose (COICOP) differs from the ICBS when it calculates the Israeli CPI.[29]

Still, we do not believe that the differences between the CPI and the rate of changes of the PPP can be blamed on the differences in the weighting scheme. Since the weights used in the computation of the PPP are not published, we compared the estimate of the PPP of private consumption published by the OECD with the weighted average of the consumption sub-groups weighted by their share in the Israeli private consumption (i.e., applying the equivalent of the Laspeyres weighting scheme). Figure 4 describes the two indices over the six sample periods.

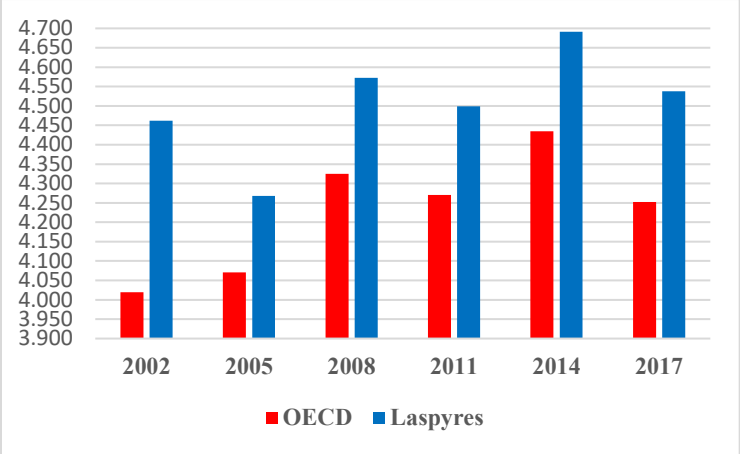
As the figure demonstrates, the index computed using as weights the Israeli consumption shares (denoted in the figure as the Laspeyres scheme) is by 5-11% higher than the PPP index, and its rate of growth is slightly lower, but the results do not affect our main finding that, in spite of the continuous evaluation, Israel's price level (in NIS terms) not only did not decline, but rose relative to the US.

[27] The OECD publishes the breakdown of the sub-groups for Individual Consumption. Figure 4 is based on the breakdown of Household Private Consumption, data prepared by the OECD Statistics and Data Directorate especially for this study.

[28] In addition, the OECD publishes also the prices of 10 food, non-alcoholic and alcoholic beverages, and the price of private vehicles.

[29] At this stage we are unable to explain the seemingly large differences between the two weighting schemes, since the weights in the national accounts which are the base of COICOP do not differ that much from the consumption shares in the Israeli Household Survey which serve as the weights in the computation of the CPI.

Figure 4: The OECD PPP Index and the Weighted Average of the Consumption Sub-Groups 2002 – 2017*



* Weighted using the Laspeyres method.

The suspicion that it is not just the different weighting scheme, but that the prices of the PPP and the CPI "behave" differently is strengthened by the comparison of the price changes of the sub-groups in the CPI and the PPP reported in Table 2 and in Figures 5a and 5b.[30] Food prices are the only sub-group for which the differential between the two series is relatively small, and the only group for which the differential of the sub-group is smaller than the average. In some of the other groups (transport, recreation and culture, education, restaurants-cafes and hotels, and miscellaneous goods) the differential is similar to the average, but for most groups the differential exceeds the average and is 25% or even more (clothing and footwear, housing and housing maintenance, household furnishings-equipment and communication). Extreme differences are reported for the two consumption groups that involve large government expenditures - education and health. In both cases the PPP shows a significant increase in Israeli prices over the 15 years, as compared with the US (55% and 117%, respectively), whereas the CPI shows Israeli prices lagging behind the US (by 37% and 25%, respectively).[31]

[30] AS the OECD does not detail the changes in the US CPI subgroups prior to 2010 we used the data of the Harmonized Index of Consumer Prices (HICP). Judging on the basis of the difference between the PCI and HICP US series after 2010, the differences between the series are small.

[31] According to the CPI data there was an increase over the period in the price of both services in both countries. But whereas in Israel the prices of both services rose by about 25%, the price of health services in the US rose by 70%, and that of education doubled. The National Accounting data show an increase in the price of individual government consumption of education services of about 35% and of health services of 25% - very similar to the CPI data. These two items constitute less than 7% of the private consumption basket, but about 20% of the individual consumption basket. The bias in the estimates of the price increase of these two items explains most of the difference between the rate of increase of the PPP of individual consumption and that of private consumption.

Fig. 5a: The Rates of Change of the Price Level in Israel compared to the USA 2002 - 2007 according to the PPP and the CPI

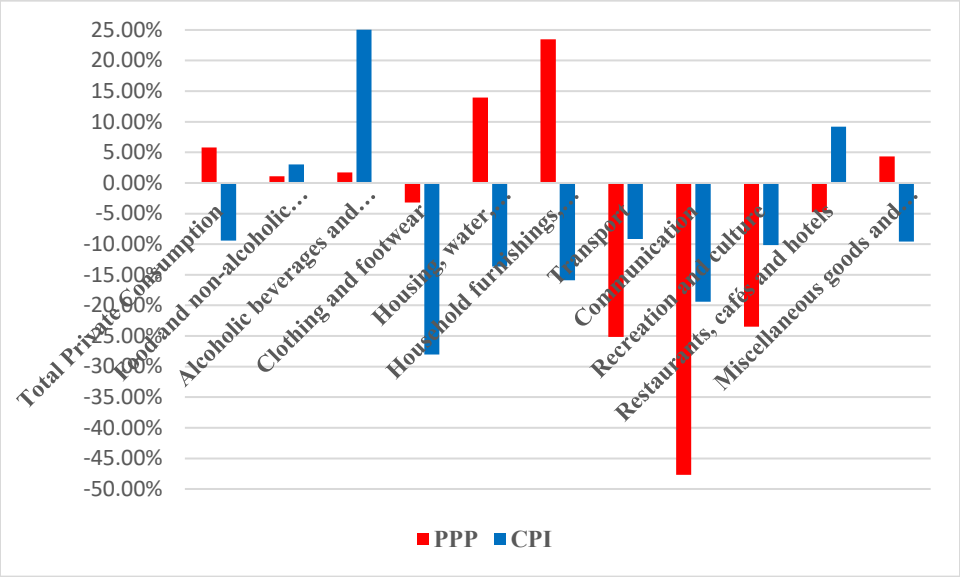
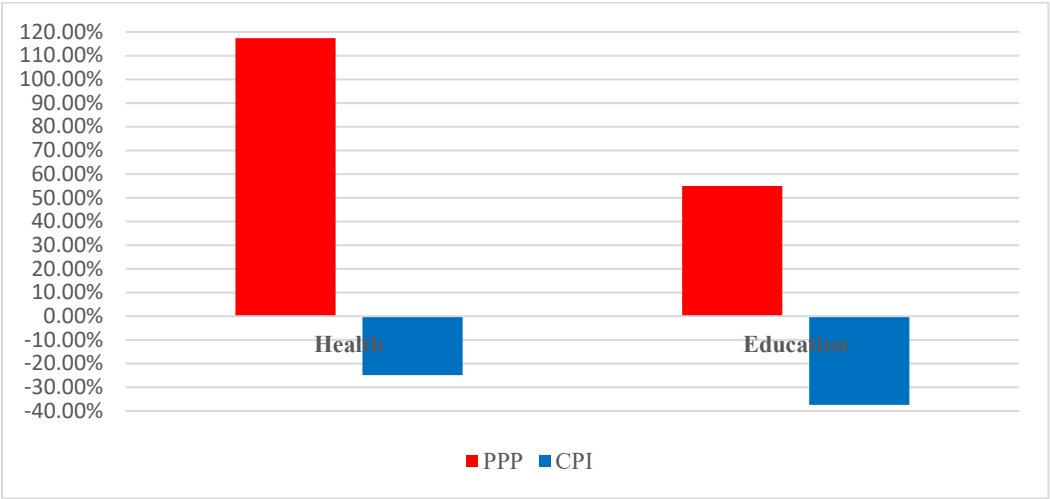


Fig. 5b: The Rates of Change of the Price Level of Social Services in Israel compared to the USA 2002 - 2007 according to the PPP and the CPI

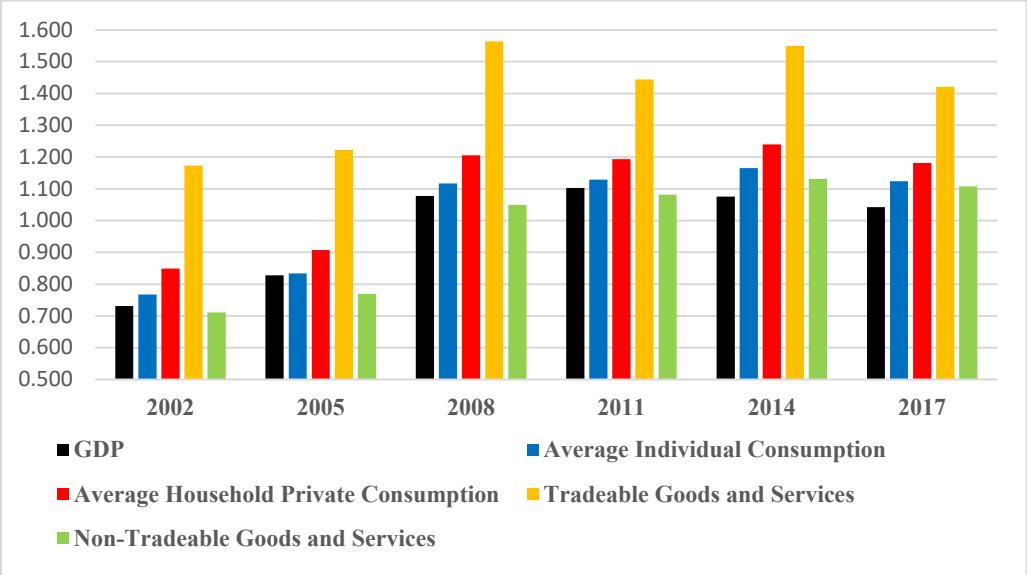


D. The Israeli Price Level – The Prices of Tradeables and Non-tradeables:[32]

"The Law of Unitary Price" and the change in the exchange rate can explain the increase in the Israeli price level (relative to the US) in the years 1996 – 2002, but the same logic would have led to a decline of that level in the years 2002 – 2017. It is, therefore, of interest to check to what extent has the price of tradeables been affected by the rate of exchange evaluation, and to what extent has the increase in the overall price level been affected by the non-tradeables. Figure 6 compares the purchasing power parity indices of total output (GDP) , individual consumption (AIC), and private consumption (HFC), and describes the different underlying trends of the price of tradeables and non-tradeables over the period 2002 - 2017. Figure 6A describes the change in the PLI index in dollar terms, and figure 6B describes the change in the PPP in NIS terms.

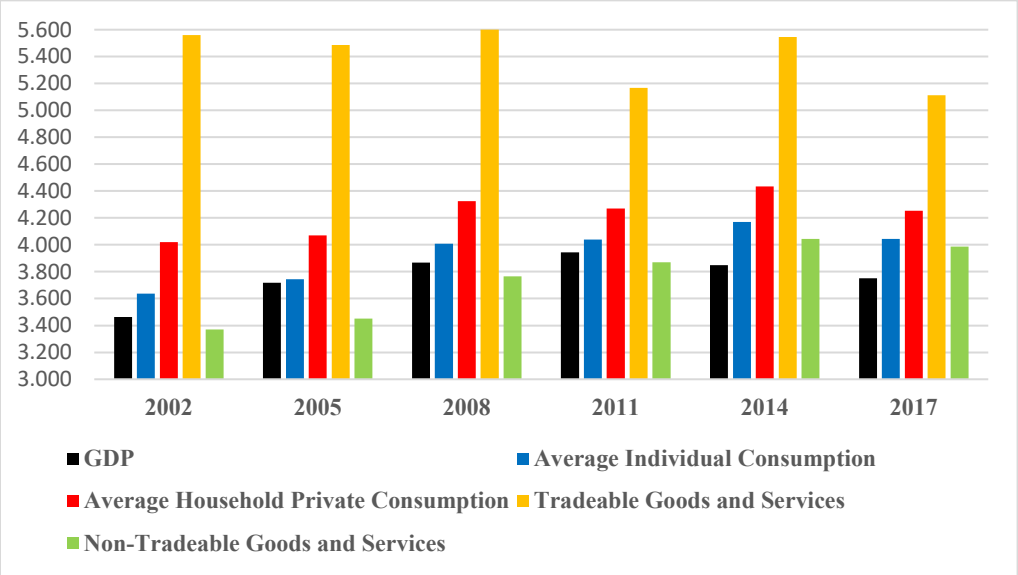
According to figure 6A the cost of the average Israeli private consumption basket has increased in terms of dollars over the years 2002-2017 by 40% relative to the US. Whereas in 2002 its cost was about 15% cheaper than the American one, at the end of the period it was 18% more expensive. True, most of the increase is due to the evaluation, but this effect was reinforced by the local increase in prices which added 6% to the differential. The differential stabilized in 2008, and since then the cost of living increased at the same rate in both countries. But as figure 6B indicates, whereas the cost differential should be blamed on the cost of tradeables, it is the cost of non-tradeables which is responsible for its increase.

Figure 6A: **The Purchasing Price Level Indices (PLI) 2002 -2017 (in terms of dollars)**



[32] The findings in this section are based on a special calculation made for us by the researchers at the OECD statistical office. The distribution of Basic Headings between tradeables and non-tradeables is not available online and follows that of the Bank of Israel. The distribution does not exist for the period prior to 2002. As is well known the price of tradeables contains a non-tradeable component (e.g., the retail markup). Also, a good being defined as tradeable does not imply that it is traded between Israel and the US.

Figure 6B: The Purchasing Power Parity Indices (PPP) 2002 -2017 (in terms of NIS)



Source: OECD data.

Tradeable goods constitute about one-third of household private consumption, a share that has hardly changed over the period. In 2002 the average price of these goods (in dollar terms) was 17% higher than the price of their counterparts in the US. In the years 2002 – 2008 the average price in domestic terms hardly changed, in spite of the sharp evaluation, and as a result, the dollar price rose by almost the full extent of the evaluation, and the average dollar price of tradeables exceeded that in the US by more than one-half, setting the average differential for the years 2008-2017. Prima facie, it looks as if the price of tradeables was hardly affected by the evaluation, but a more thorough look at the changes in the composition of these goods shows this conclusion to be slightly immature.

The group of tradeable goods consists of three sub-groups: food and beverages, transport and other goods. The conclusion that the evaluation hardly affected domestic prices is true for the first and third group but is not true for the price of transport goods.

The group of tradeable food items consists of food, alcoholic and non-alcoholic beverages and tobacco. In 2002 this sub-group constituted about 40% of all tradeable goods, and its prices which were 25% higher than their US counterparts played an important role in the fact that Israel's (dollar) prices of tradeable goods were higher than those of many of the other developed world countries. The evaluation had only a minor effect on the NIS food prices which declined, as shown by figure 7A, by only 10%.[33]

Similar to the "food" sub-group, the share of the "other" group was also 40% at the beginning of the period, but the decline in its prices was even more modest, the NIS prices hardly changing over the period. Thus, according to the PPP data, and in contrast to popular belief and the CPI data, the NIS prices of clothing and footwear and the prices of household furnishings and equipment hardly declined, and to judge by these data the competition from digital channels and shopping abroad

[33] As the figure indicates the evaluation had an opposite effect on alcoholic and non-alcoholic beverages. Whereas the price of non-alcoholic beverages, which were (in dollar terms) 40% higher than those in the US, declined by the full extent of the evaluation, the price of alcoholic beverages which at the beginning of the period equaled the American one, hardly changed in NIS terms.

hardly affected prices, and resulted merely in a diversion of shopping channels and the decline of the share of the output of these goods in GDP.[34]

Figure 7A: The PPP of Tradeable Goods, Israel 2002 - 2017 (in NIS)

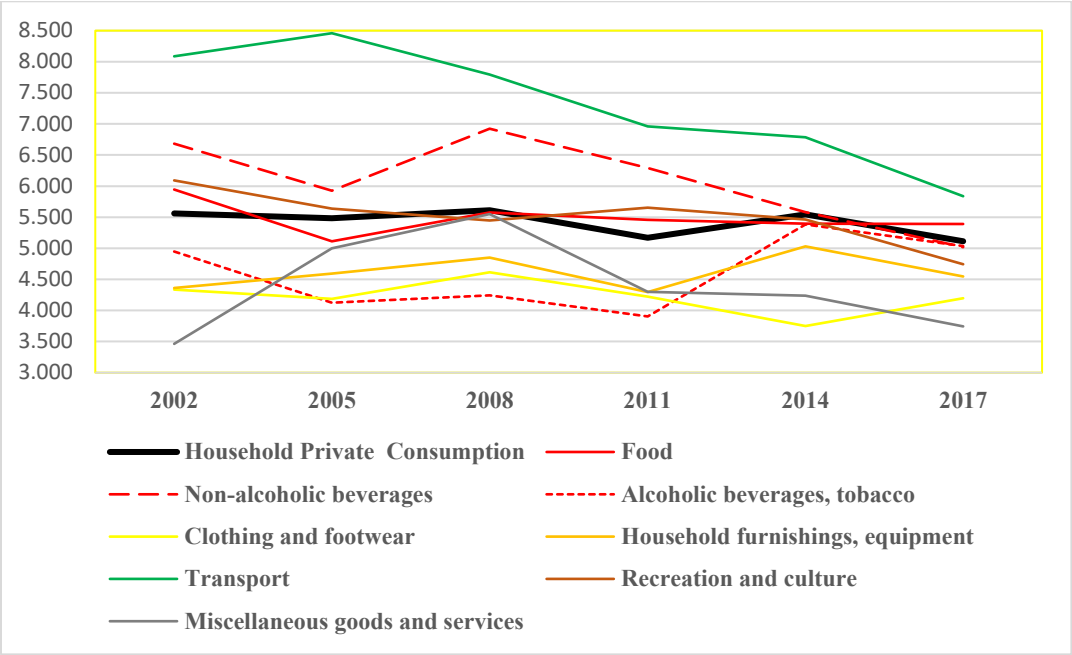
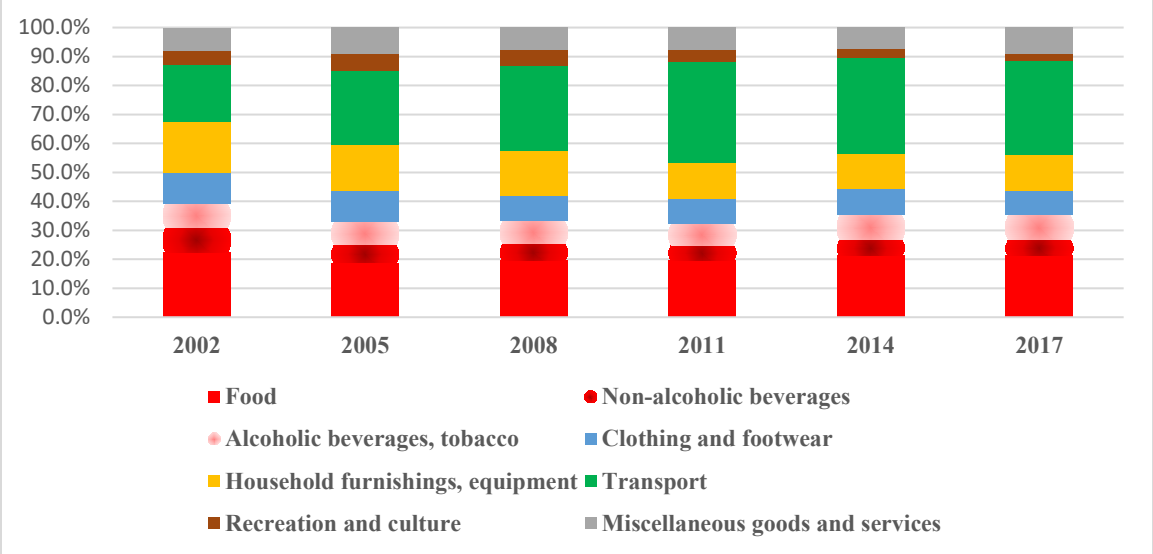


Figure 7B: The Composition of Expenditures on Tradeable Goods and Services, Israel 2002 – 2017



Source: OECD calculations based on the prices and expenditure weights provided by the countries participating in the Eurostat-OECD PPP Program.

[34] According to the OECD data the share of these goods declined from 28% of tradeables to 20%.

The sub-group that had the greatest effect on the price of tradeable goods was the third group – the group of transport goods. The taxation of private vehicles had been a source of the of Israel's inflated price level since the establishment of the state. The price of the group (a large fraction of which are private cars) was in 2002 70% higher than in the US, and contributed, perhaps more than any other sub-group, to the price differential between Israel and the developed world. A shift in import sources and government policy encouraging fuel-efficient vehicles contributed to the decline of average vehicle prices (in NIS terms) by the full extent of the appreciation.[35] However, the increase in the level of motorization over the last two decades, which increased transport expenses from one-fifth to one-third of the expense on tradeable goods,[36] and the high price of these goods (even after the reductions) are the factors that are responsible more than any other group for the finding that the price differential of tradeable goods between Israel and the US hardly declined.

In sharp contrast to the tradeable goods whose prices (in dollar terms) exceeded their American counterparts already in the early 2000, the price at the time of non-tradeables was lower by more than a third. Since this group constitutes about ⅔ of private consumption it was this group of non-tradeable goods and services that set the average Israeli prices at a level 25% lower than that in the US. The increase of the average price of this group by 18% (an increase of over one-half in dollar terms) contributed, perhaps, not less than the evaluation, to the public feeling that Israel has turned to become such an expensive country.

A major contributor to this feeling was the prices of housing which more than doubled over the period 2008 – 2017.[37] However, the PPP prices, similar to the CPI, are not based on the price of housing but rather on the average rent, which increased according to the ICBS data by only 40%.[38] The PPP data which show an increase in the of housing of only 14% seem, therefore, at first glance to suffer from under estimation, but then we have to remember that the PPP data measure "relative prices", and as the data shows, the rental increases in Israel were not an outlier. Table 2 and Figure 5A show that the Israeli CPI of housing lagged behind the US, and the PPP data show that the Israeli housing index is not very different from that of many West-European countries (e.g., France, Italy, Spain, the Netherlands and Austria), and lags considerably behind the indices of the emerging East European countries (i.e., the Czech and the Slovak Republics).[39] The PPP of electricity, gas, water and house maintenance has risen at the same rate as rents, and the "combined" housing expense constituted about 40% of the PPP of the non-tradeable goods and services (Figure 8B).

The public criticism of the high food prices was not merely confined to the tradeable food items. Whereas the price of the tradeable food items declined by 10%, the price of non-tradeable items, led by Bread and Cereals and Eggs and Milk Products, increased in domestic terms by a quarter (and by more than 60% in dollar terms). As a result, non-tradeable food prices which were in 2002 (in dollar terms) 20% cheaper than their US counterparts, were in 2017 25% more expensive. The sharp increase in their price constituted one-eighth of the increase in the price of non-tradeables.

---

[35] According to the Ministry of Finance economists, the effective purchase tax on private cars declined over the years 2006 – 2015 from 83% to 64%. Purchase taxes (and VAT) which constituted in 2002 about 80% of the value of imported vehicle, were in 2017 only about one-half. Over the years Israelis shifted from West-European to Japanese, Korean and Czech cars which were cheaper.

[36] In the years 2002 – 2017 the number of private vehicles increased by 90%, and the average motorization rate (i.e., the number of private cars per household) increased by 40% (from 0.81 to 1.14).

[37] In the years 2002 – 2007 the index declined by 7%, but already by 2008 it returned to its 2002 level.

[38] The increase relates to the imputed rent of owner-occupied dwellings, since, as shown by Raz-Dror (2019) and Gronau (2019) the data relating to rented apartment suffers from a serious bias, a bias which escaped owner-occupied apartments.

[39] Similar results are obtained when one compares the Israeli CPI with that of the European countries.

Figure 8A: The PPP of Non- Tradeable Goods, Israel 2002 - 2017 (in NIS)

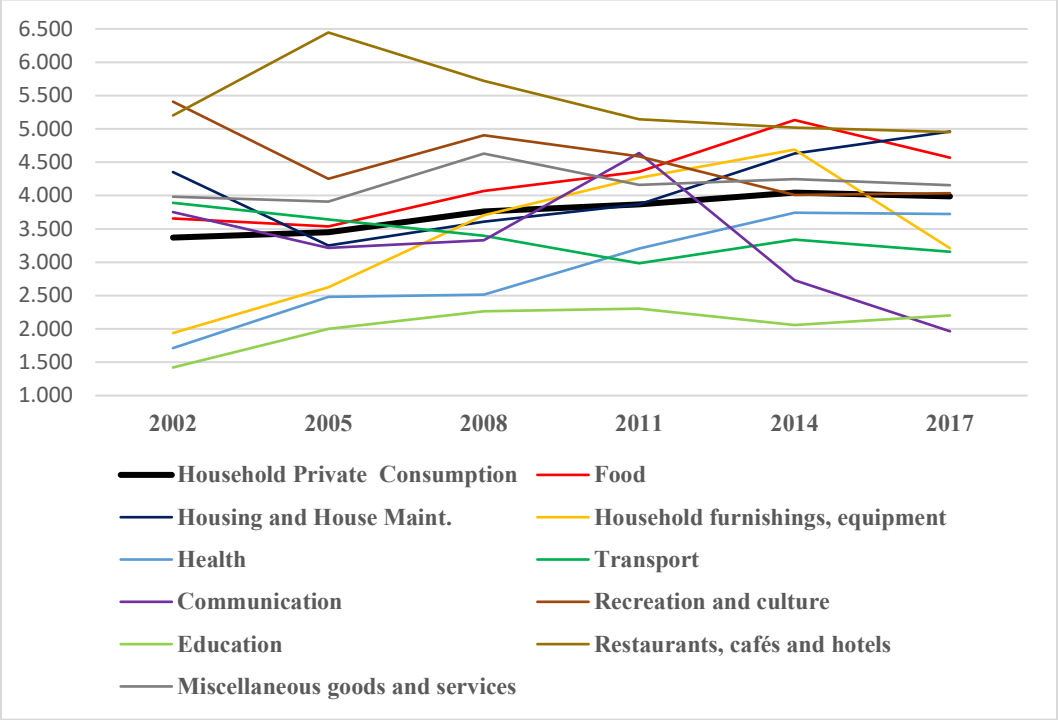
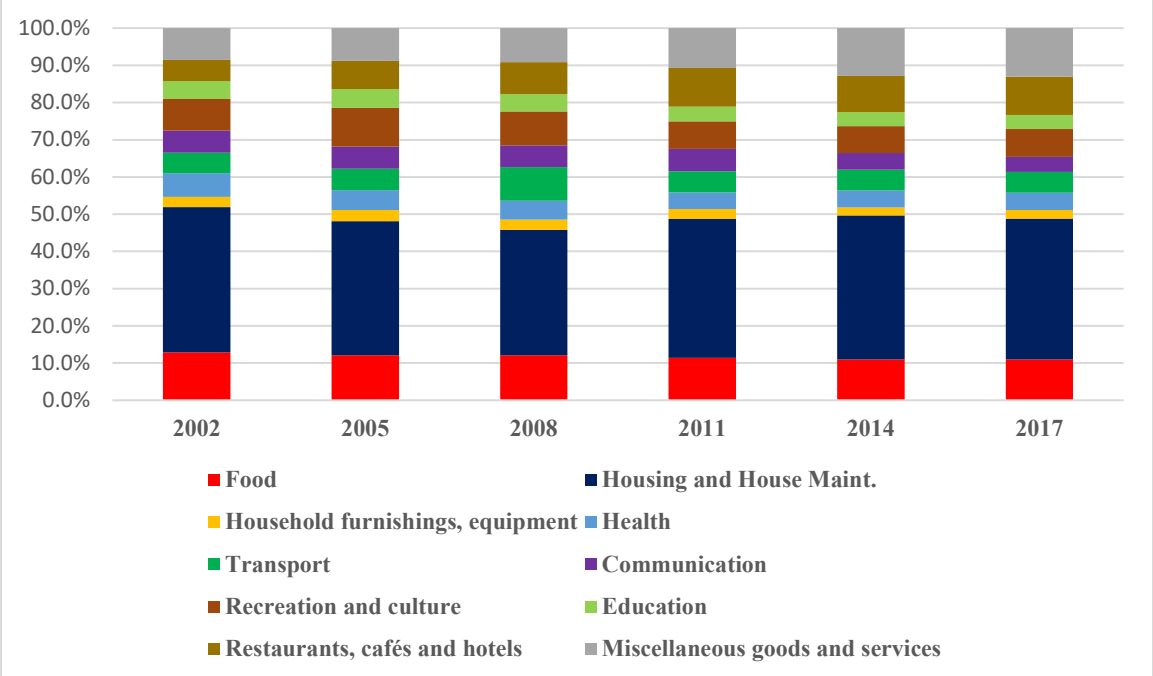


Figure 8B: The Composition of Expenditures on Non- Tradeable Goods and Services, Israel 2002 – 2017



Source: OECD calculations based on the prices and expenditure weights provided by the countries participating in the Eurostat-OECD PPP Program.

Another sub-group that was the focus of public criticism is that of "Restaurants, cafés and hotels". The Israeli tourist services are well known for their expensive pricing, and the PPP data confirm public feeling. As shown by figure 8A for most of the period the relative prices of this group were higher than any other group of non-tradeables. The prices of this group exceeded the US ones already at the beginning of the period, and grew by 45% (10% in NIS terms) over the next 6 years.[40] The year 2008 signifies the peak in the dollar prices of this industry, followed by a price decline. The price decline in domestic terms started even earlier (in 2002). It was driven by competition – the appreciation of the NIS relative to the dollar accompanied by the dollar-devaluation of the Euro made Israel an "expensive" tourist target relative to Europe, and the "Open Sky" policy adopted by the government in 2013, which allowed Low-Cost carrier to land in Israel airports, made tourism abroad the most popular form of vacation. The resulting increase in the demand of tourism from abroad, and the increase in the local demand for restaurants made "Restaurants, cafés and hotels" the fastest growing sub-group among the non-tradeables, increasing from 6% to 10% (Figure 8B), and as a result, one of the more important items that shaped the increase in PPP of the non-tradeables.

Two expenditure items that contributed to the sharp increase in the non-tradeable component of the PPP are, according to the PPP data, the social expenditure items - health and education. As Figure 8A indicates, the two items contributed to the low level of the price at the beginning of the period and to their steep increase later on. Given their low share in private consumption (about 10%) their impact may have been limited, but their steep increase explains the differential between the increase of the PPP index of Household Private Consumption and that of Individual Consumption.

Finally, one has to mention the only outlier that slowed that process – the price of communication services. The price of these services reflects the changes in internal composition, changes in the regulation and the reform that swept the industry. Whereas at the beginning of the period the main part of expenditure was spent on fixed telephony, whose prices were regulated, by 2008 the main expenditure items were mobile telephony and internet services which were not bound by regulation. The fast rise in prices in the years 2008 - 2011 (over 40% in 3 years) resulted in government intervention and the reform that opened the industry to new competitors, and a price reduction of 60% over the next 6 years.

E. The Accused

It is easy to explain the problem of the rise in the cost of living in Israel as a by-product of the process of evaluation accompanying the transition process of the Israeli balance of payments since 2002,[41] but the changes in the rate of exchange do not explain the sharp increase in the price of non-tradeables and the modest decline in the price of tradeables. It is customary to blame for the high cost of living the import barriers, the rise in wage and the low productivity of Israeli workers. This section will examine how much have these factors contributed to the price rise over the last two decades.

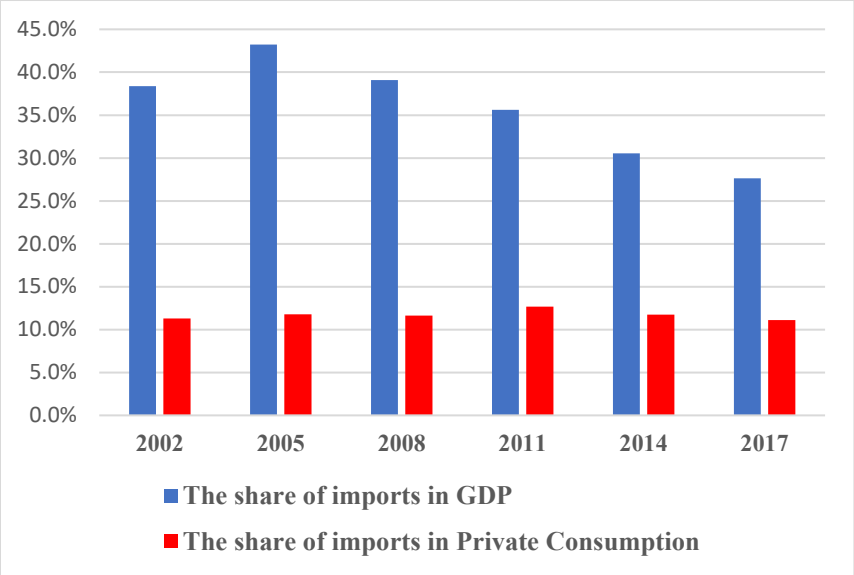
The years 2002-2017 witnessed a considerable decline in the import component of the Israeli GDP.

[40] The PLI of "Restaurants, cafés and hotels" was 1.10 in 2002 and reached almost 1.6 in 2008.

[41] The switch of the NIS from depreciation to appreciation differed from one currency to the other. It happened 2002 vs. the dollar, 2004 vs. the Euro, and 2005 vs. the "currency basket".

Imports which in 2002 constituted 38% of GDP have shrunk to 28% by 2017 (Figure 9). Part of this decline can be explained by the decline of the import intensive diamond industry, and part by the decline of oil imports following the start of the operation of the Israel's Mediterranean oil fields, but even if we deduct the impact of these two factors (whose share in imports declined from one-third to one-fifth) we find that the share of the rest of the imports declined from 20% to 16%. Still, as the figure shows, the share of imports in private consumption hardly changed (16%-18%).

Figure 9: The Share of Imports in GDP and Private Consumption



The import component in GDP in the second part of the period (the years 2010- 2016) was the subject of examination of the Bank of Israel 2018 Annual Report. According to the Report's findings, whereas Israel's GDP level, and the positive relationship between GDP and imports should have placed it among the upper quartile of the advanced economies, its actual import places it in the lower quartile. A gravity model based on OECD countries shows Israeli actual imports to fall short by one-third of the predicted result. This shortfall cannot be blamed on transport costs, customs or the limited trade relationships with its neighbors, but rather on non-trade barriers, which the government is trying to lift.[42]

The report did not examine the effect of non-duty taxes – purchase taxes and other obligatory payments though their rate was over the period 6-8 times higher than the average custom rate.[43] Furthermore, whereas the custom rates in every of the import groups (consumption goods, production inputs, and investment goods) are almost uniform, there is a large dispersion in the rates of the other levies. Whereas production inputs were free of additional payments, the average rate on investment goods was 13%, and it was almost twice as large (26%) where consumption goods were concerned. The differences were even lager when intra-group differentiation is concerned. The imports of investment goods were free of charge, with the exception of transport vehicles, and similarly consumption goods were not liable to additional payment, with exception of food items

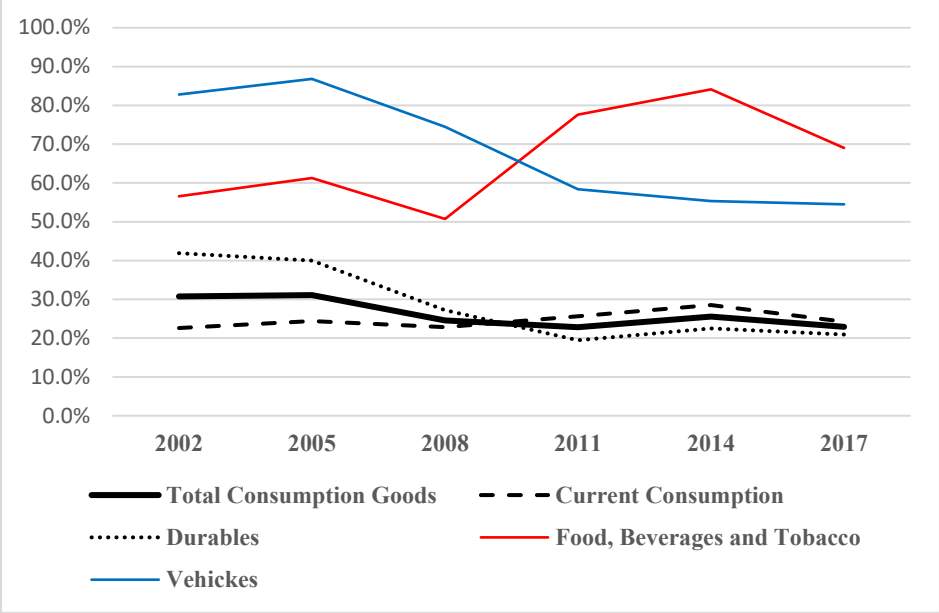
[42] The BOI economists ignore in their analysis the prohibitive effect of the fixed customs. The impact of these customs on the imports of meat and fish are discussed in the monthly Ministry of Finance report of December 2017 and December 2018. Similarly, this analysis ignores the discriminatory nature of customs, distinguishing between "official" importers and "non-official" importers (e.g., in the importation of private cars).

[43] We focus on the import of goods, since the import of services (i.e., travel and outgoing tourism), which constituted about a tenth of good imports was duty-free.

and private cars which were liable to a purchase tax whose rate averaged over the period almost ⅔. The change in the rates of these taxes was one of the factors that shaped the price of tradeables over the period.

The differential effect of the non-custom levies on the price of imports is described by Figure 10. The average "effective custom rate" (i.e., custom plus other obligatory import taxes) on consumption goods declined over the period from 31% to 23%. The figure demonstrates the different trends applying to consumption goods and durables. Whereas the rate on current consumption goods hardly changed, remaining at a level of 24%, the rate imposed on durables was cut in half, from 42% to 21%. A more detailed examination shows that the changes originate in two groups – food (and primarily, alcoholic beverages and tobacco) and motor vehicles, two groups that constitute about 90% of these taxes. Whereas government emphasized the reduction in private car taxation, it hardly reported the increase in taxes on food importation. Thus, whereas the taxes on the imports of private cars was reduced from 83% to 55%, the average rate on food imports rose over the years 2008 – 2014 from 57% to 69%.[44] Over the years 2002-2014 the NIS appreciated by 25%. The increase in food charges reduced the potential reduction in prices to 11%.

Figure 10: The "Effective Custom Rate" on the Imports of Consumption Goods 2002 – 2017*

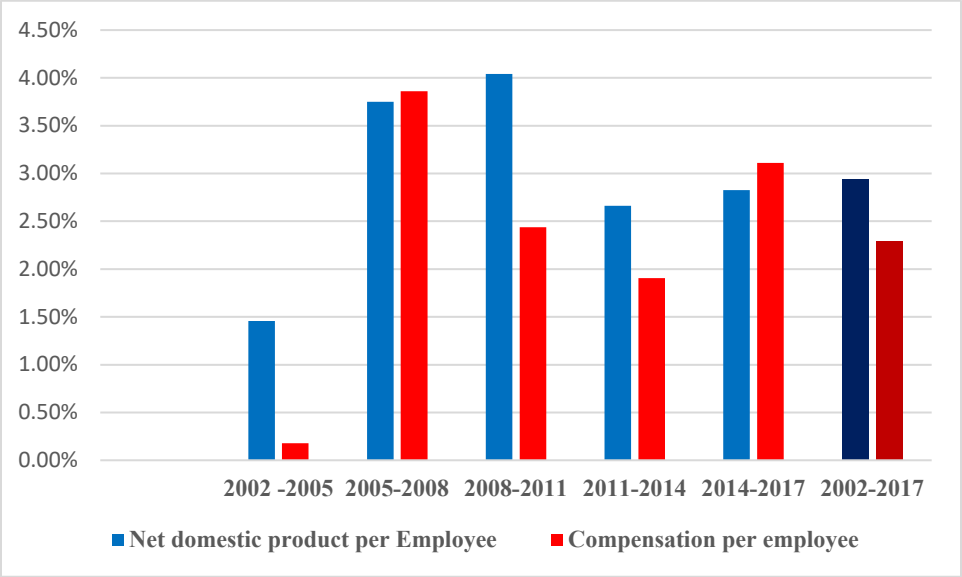


- Excluding VAT.

[44] ⅔ of the private cars that are defined by the ICBS as investment goods are imported by leasing companies and are used by households for their private use as part of their wage package. After few years (and sometimes just after their importation) these cars are sold to the household sector. The figure depicts the average rate imposed on the importation of private cars defined as consumption durables and those defined as investment goods. A detailed discussion of the taxation of private cars is contained in the Tax Authority survey https://www.gov.il/BlobFolder/reports/tax-reviewvehicle/he/Publications_VehicleReview_vehicle2018.pdf

A second natural "suspect" is the rise of wages. This suspicion is, however, undermined by the comparison of the rates of growth of net income and the compensation of employees (Figure 11). The 2002 crisis slowed considerably the growth rate of GDP, but at the same time unemployment led to the erosion of wage growth. Similarly, though the 2008 World Crisis which hardly affected Israeli output, led to a slowdown in wages, a slowdown that lasted for the next 6 years. As a result, the increase in wage per employee lagged behind the increase in net domestic output per employee at an annual average rate of 0.66%.

Figure 11: The Rates of Growth of Net Domestic Income and the Compensation per Employee 2002 - 2017 (%) *

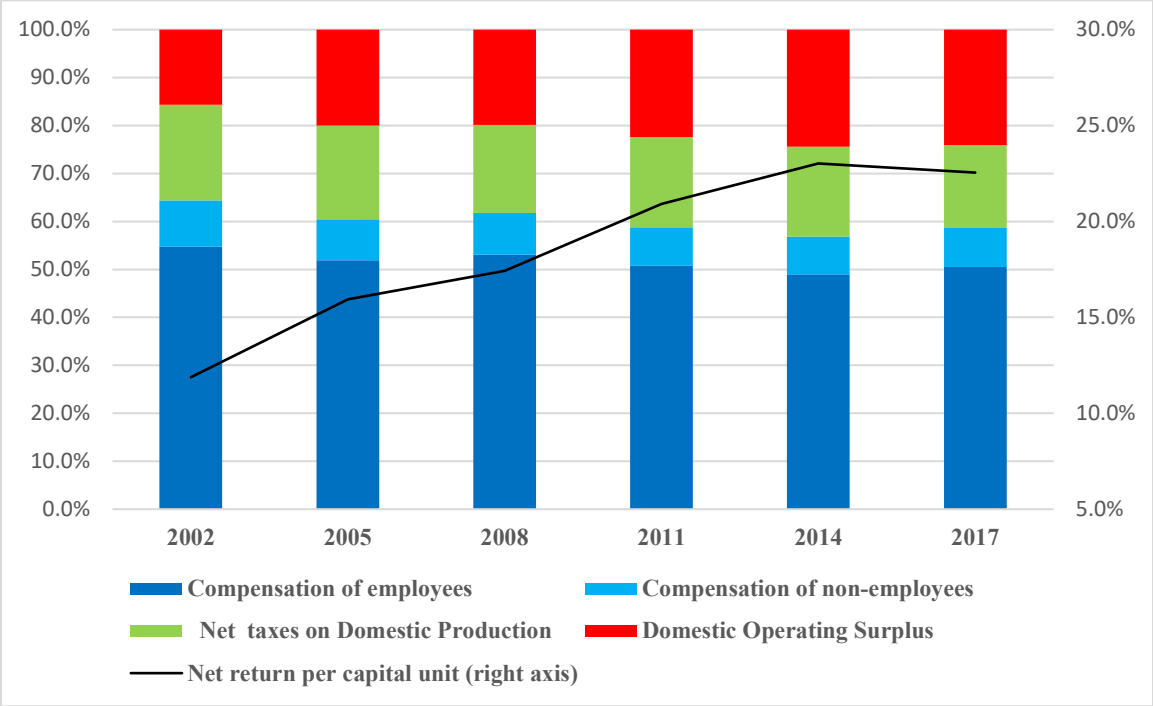


*In current prices.

Source: ICBS, *Productivity, the Compensation of Employees and the Return to Capital 2010- 2018* (2020).

The picture gets even sharper once we focus on the business sector. Figure 12 describes the distribution of the business sector NDP components between the returns to labor and to capital. The period 2002- 2017 witnessed the increase of the business sector at the expense of the public sector (Ben-Bassat, Gronau and Zussman, 2020), and a decline in the share of labor, the share of employees in NDP declining from 64% in 2002 to 58% in 2017. The main beneficiary of the decline in taxation and in the decline of labor was capital (the "Operating Surplus"), whose NDP share grew by a half (from 16% to 24%). The picture is even more dramatic when one examines the return to capital, which almost doubled – growing from 12% in 2002 to 23% in 2017.

Figure 12: The Share of Compensation of Employees and the Return to Capital in the Net Domestic Product of the Business Sector 2002 – 2017*



- In market prices.

These findings are supported by the international comparison. According to the OECD the growth in the Israeli hourly wage lagged behind the US. Whereas the hourly wage in the US grew over the 15 years at an average rate of 2.8%, the Israeli hourly wage grew only by 2.3%, whereas the Israeli hourly output growth outranked the US – Israel growing at an average rate of 1.6% and the US growing only at a rate of 1.3%. In contrast to the US, Israeli wages hardly recovered from the 2002 crisis, and as a result Israel lagged in its labor compensation behind the US throughout the period. It is, therefore, difficult to blame the PPP differential on wages. True, the increase in the compensation per employee has grown faster than the PPP of household consumption, but the rate of increase of this variable corrected for the increase in PPP was the slowest in a sample of 15 OECD countries.[45]

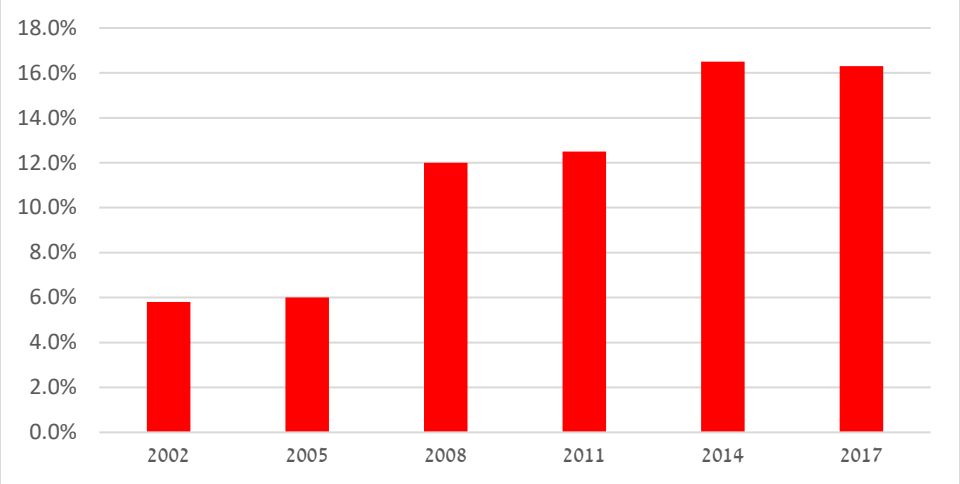
The relationship between the price level and the return to capital has been the subject of a series of studies of the Ministry of Finance economists studying the food & personal care and the car import industries.[46] Both industries are dominated by a small number of large private importers who have gained exclusivity in the imports of their brands. In both cases the evaluation resulted in an increase

[45] This sample consists of Austria, Belgium, Denmark, Sweden, Italy, Spain, Germany, France, the UK, Korea, Canada, Australia and the US.

[46] The profitability of food and personal care imports was discussed in several of the Ministry of Finance Chief Economist's report. A summarizing survey is included in the March 2022 report. The profitability of car imports is discussed in the March 2017 monthly report.

in profitability. Thus, as shown by Figure 13, the profit rates (before tax) of the ten largest importers of food & personal care items grew between grew by 2.75, from an average of 6% to an average of 16%. According to these reports the profit rate of the smaller importers was more modest, but also seemed to be on the rise.[47] The rate of profit of the dozen largest car importers seems to grow significantly less (from 7.8% to 9.3%), but they were compensated for the "modest" increase of the rate of profit by the substantial increase in sales, so that their total profits (in real terms) doubled.[48] The increase in the profit rate slowed the reduction in prices due to the appreciation and the decline in the purchase tax.

Figure 13: The Average Annual Profit Rate (Before Tax) of the Ten Largest Importers of Food and Personal Care Items 2002 – 2017



Source: Figure 4, "The Profitability of Food and Personal Care Items Importers and the Cost of Living", the Ministry of Finance Chief Economist's report, 3.2.2022

It seems that the different approach of the Ministry of Finance and the Bank of Israel with respect to the price rises affected also their research agenda. Thus, whereas the Ministry of Finance economists blamed the price rise on increased concentration and the increased profitability price, the Bank of Israel regards the increase in competition and the reduction of profits as one of the sources of the low inflation after 2014 (Nir, 2021). Nir studied the financial records of public companies in the food, personal care, clothing, recreation and communication and finds a negative relationship between the increase in competition and the industry inflation rate.[49]

[47] These reports are consistent with the findings of the 2015 reports (2.8.2015 and 18.10.2015) that show an increase in the profitability of the food importers in the previous decade. The report of 3.4. 2016 highlights the high concentration of the personal care imports, where the largest ten companies are responsible for almost ⅔ of the imports. It seems, however, that the level of concentration of food imports is significantly lower.

[48] According to the Ministry of Finance economists since 2003 -2006 real profits grew by 72% whereas purchase tax revenues increased only by 16%.

[49] Nir measures the intensity of competition using the Lerner Index (i.e., the rate of operating profit) and the share of sales and marketing expenses in revenue. Her findings are inconsistent with the slow inflation rate in 2014, a year that witnessed a comeback in profitability in most of the industries.

The last in the list of suspects is the low productivity of the Israeli labor force. The productivity differential between Israel and the other OECD countries was the focus of a recent study by Hazan and Tsur (2021). The authors try to explain why Israel has not been able over the last two decades to close its GDP per capita gap with the advanced European countries, and argue that the main explanatory variable is the low productivity of the average Israeli worker. Another aspect of the skill distribution, i.e., its dispersion was the focus of a study by Brand and Regev (2015) who studied the increased polarization of the Israeli Economy. According to their findings "The Israeli economy is characterized by a severe duality. At one end are the advanced high-tech industries, with high and quickly rising labor productivity. At the other end are industries characterized by low productivity and minimal growth." The authors find a direct tie between the productivity and their tradability in world markets, where the tradeable sector enjoys high productivity, while the non-tradeable sector lags behind. This low productivity can explain our finding of the high price of non-tradeables, it cannot, however, explain the sharp rise of their prices, a rise, that according to our finding explains the rise in PPP over the last two decades. Still, a careful reading of the Regev-Brand findings, provides the clue for this trend.

The Brand-Regev model consists of two groups of labor, skilled and non-skilled each producing two kinds of goods and services – tradeables and non-tradeables. The rates of annual change of the wage and productivity of the two groups are depicted in Figure 14A. According to the paper there were hardly any differences in the rates of growth of the wage per employee of the two groups within each sector (an annual growth of 0.5% in the non-tradeable sector, and a growth of 1.5% in the tradeable). In a similar fashion, the differential growth in productivity is almost the same in the two sectors (a differential of 2.2%), but whereas the productivity of the non-skilled in the non-tradeable sector declined at an annual rate of 0.7%, their productivity in the tradeable sector increased by 0.9%, while the productivity of the skilled workers grew at an annual rate of 1.6% and 3.1%, respectively.[50]

As a result, as shown by Figure 14B, the wage per unit of output of the non-skilled workers increased in both sectors, while that of the skilled declined. However, while the non-skilled constitute the majority of workers in the non-tradeable sector (about 90%) they are only one-third of the workers in the tradeable sector. Thus, whereas the wage per unit of output in the non-tradeable sector increased at an annual rate of about a percent, the wage per unit of output in the tradeable sector declined by 0.8%. Though the Brand-Regev data apply to the period 1995-2010, it is safe to assume that a similar explanation holds for our period 2002 – 2017.

[50] These figures are based on Figures 3 and 6B of the Brand-Regev paper, and refer to the wage and productivity per employee. The results for the hourly wage an hourly productivity are very similar.

Figure 14A: The Annual Rate of Growth of Wages and Productivity in the Tradeable and Non-Tradeable Sectors 1995 - 2010

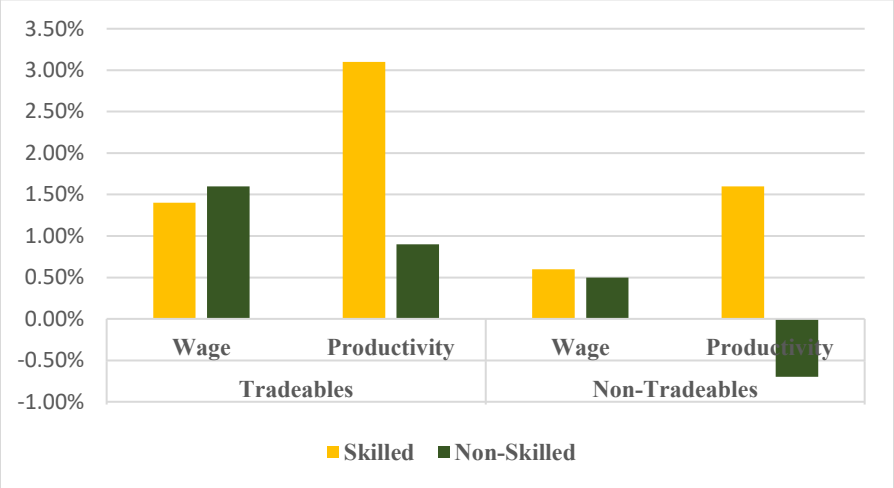
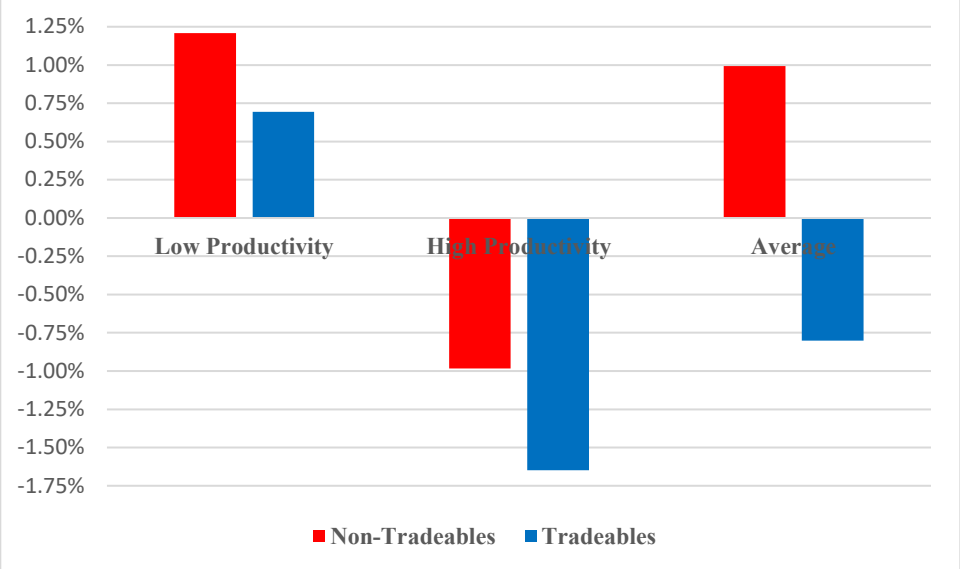


Figure 14B: The Annual Growth of the Wage per Unit of Output in the Tradeable and Non-tradeable Sectors 1995 – 2010



F. Inflation and the Inequality in the Distribution of Income

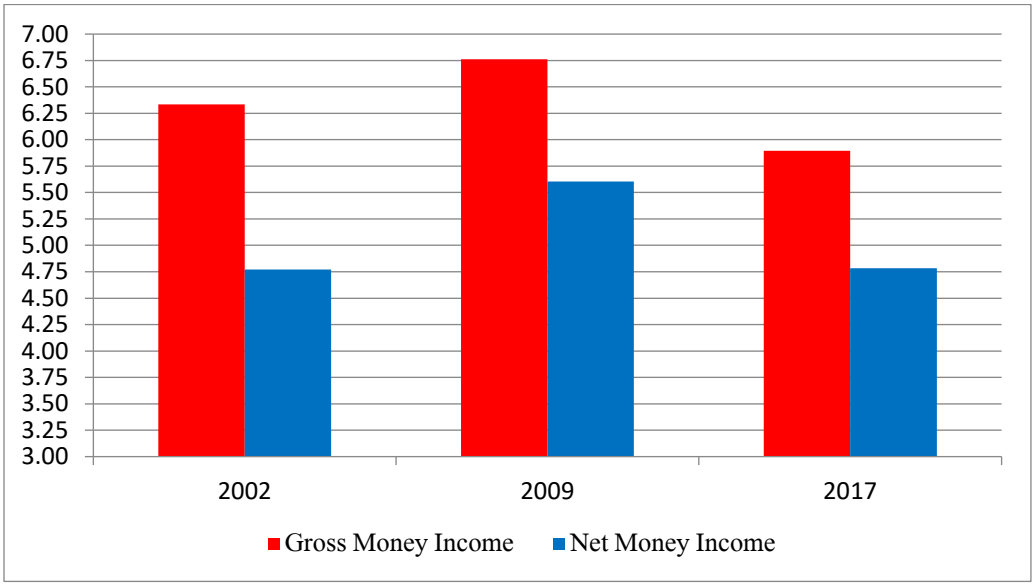
The turning point in 2002 of the Israeli balance of payment and the process of inflation are associated with the turning point in Israel's growth and employment. The 2002 crisis was definitely one of the most severe crises in Israel's economic history. A combination of political unrest (i.e.,

the Second Intifada), the burst of the Dot-Com bubble and a sharp cut in government expenditures brought the economy to a halt, and resulted in an immediate jump in unemployment to the unprecedented level of 10.3%. It took two years for demand to recover, and for unemployment to decline. This decline continued uninterruptedly till 2017 (with the exception of the two years of the GFC), when unemployment hit a historic low of 4.2%. At the same time participation rate of the age group 15 years or older increased by almost 10 percent (from 54.1% to 64%). The strong labor market reflects the fast growth of the economy. Average annual growth hit 3.76%, exceeding for most of the period its "potential growth" (3.5%).

Given this record of stable growth and a strong labor market, one has to reexamine the justification for the Bank of Israel's expansionary monetary policy, a policy adapted in 2014 in the face of falling inflation. Given the limited effect the policy had on inflation, it is worth examining a slightly forgotten angle of this policy, the effect the policy had on the inequality of the distribution of resources.

The fiscal policy adopted in 2002 to escape the crisis was based on the principle of strengthening the private sector at the expense of the public one by cutting transfer payments and reducing taxation. The policy resulted in an increase in dispersion of both gross personal income and net income, and it took 7 years before when growth and increased participation started reducing reduced the two (Figure 15).

Figure 15: The Distribution of Gross and Net Income (the Ratio of the Average Wages of the Upper Quintile to the Lower Quintile) 2002, 2009, 2017



A topic that got less attention was the effect of the change in prices on welfare. The national accounting data show that over the period 2002 – 2017 Israel enjoyed an increase in its GDP per capita (in constant prices) of 1.85%. However, once these data are corrected by the PPP this rate is cut in half. Not less important is the effect of the price rise on the distribution of welfare. The PPP

data is not sufficiently detailed to trace the effect of the price rise on the different income classes, so we have to rely on the data relating to the impact of the changes of the CPI on the different income quantiles. According to the ICBS the annual rate of inflation facing the lowest quantile was over the period 0.2% faster than that facing the top quantile.

But the official measure is misleading. An important component of the price rise (20-25%) is the rise in housing costs. The increase in rental prices affects solely the rentiers, but does not affect the welfare of those who live in their own apartments. According to the ICBS methods rents of owner-occupied housing are imputed according to the housing characteristics, and added to the imputed expenditures and imputed income. The rent increase does not affect, therefore, the welfare of this group. Since home ownership is closely related with income (it is less than one-half of households in the lowest quantile, and over 80% of the top quantile), this method of imputation biases the effect of a price increase on the relative welfare of the households in the economy. A "corrected" measure of the differential price increase shows annual inflation facing the lowest quantile rising at a rate 0.35% faster than the one facing the top quantile. The differential price increase has offset the improvement in the distribution of nominal income.

But perhaps more important than the effect of inflation on the distribution of welfare was the effect of the monetary policy that tried to encourage inflation on the distribution of welfare. Since 2014 inflation rose at a rate of less than 1%, the rate declared by the government decision of the year 2000 as the "lower bound" of annual inflation growth. As a reaction the Bank of Israel set the monetary interest rate at its lowest rate ever – 0.1%. The low interest rate, accompanied by fast growth and a strong employment market, had an immediate effect on asset pricing – the real estate and the financial markets. It seems that the developments in these markets had in the long run an impact on welfare distribution that were much more important than the short run effects of the change in prices.

According to the Surveys of Household Expenditures, households in the lowest two quintiles spend almost all their income on consumption. According to these data only households who belong to the middle quintile or higher enjoy positive savings, where the upper quintile saves 30-40% of its money income, contributing 60-70% of national household savings. Thus, while inflation affects immediately the welfare of the lowest quintile, its impact on the welfare of the upper quintile is limited, and the impact monetary policy has on the balance of assets of this quintile far outweighs the impact of inflation on his consumption.

The public asset portfolio consists of real estate and financial assets. Over the period 2002 – 2017 the value of financial assets increased three-fold, and so did the real estate assets.[51] According to the Bank of Israel data, the value of the public's financial portfolio at the end of 2002 summed up to 1.2 trillion NIS – 2.2 times the GDP, and by 2017 it reached 3.6 trillion – 2.8 times the GDP. A

[51] The data relating to financial assets are based on the Bank of Israel data ("The Public's Financial Assets Portfolio"). The estimate for the real estate market is based on the product of the increase in the price of housing (which doubled over the period) and the increase in the number of households (which grew by a third). According to the *Global Wealth Databook,* published by Credit Suisse, Israeli public wealth increased by 3.66 over the period 2002 - 2017. According to the estimates of Milgrom and Bar-Levav (2019) the value of real-estate held by the public exceeded their financial wealth by more than twice.

similar increase is observed in the value of the real estate assets that increased from 1.4 trillion to 4.1 trillion NIS. The balance of debts of the household sector to financial institutions and the government increased from 200 to 530 billion, which are about ⅔ of housing loans. According to this calculation, total wealth at the end of 2017 reached the level of 7.2 trillion NIS.[52] According to the Milgrom-Bar-Levav estimate public wealth in 2013 added up to 5.2 trillion NIS, ⅔ of which were held by households in the upper quintile – a share equal to their share in households' savings. One cannot quantify the impact of monetary policy on the growth of wealth, but the low interest rates had clearly an important contributing effect.[53] Paradoxically, since the marginal propensity to consume of the upper income households is lower than that of the lower income, the increase in inequality has reduced the effectiveness of monetary policy (Carstens, 2021).

G. End of Story

Its customary to close a paper with a chapter named "Summary and Conclusions". To our embarrassment this paper has no conclusions. The paper deals with a dichotomy. We intended it to be a paper dealing with the contradictory policies of the Israeli Ministry of Finance and Israel's central bank with respect to price rises. Whereas the Ministry of Finance regards the high price level and price rises a challenge it has to cope with, the Bank of Israel economists make a distinction between the price level and inflation, and regard as their main challenge the low inflation rate that has predominated up to quite recently.

But it seems that not only do the two bodies responsible for Israeli economic policy have opposite targets, the data they act on are inconsistent. Thus, whereas the ministry of Finance relies in its policy on the Purchasing Power Index (the PPP and the PLI), the Bank of Israel bases its policy on the CPI. Surprisingly, whereas the PPP shows over the period 2002 – 2017 an increase in Israeli prices relative to the western world, the CPI shows Israel's price rises lagging behind the Western world. Israel is not an outlier where the increase in PPP is concerned. In half of the 38 OECD countries the PPP data show an increase in the price level relative to the US. Similarly, Israel cannot claim to have the fastest increase in PPP, since a third of the sample had a faster growth over the period. But only 3 countries in the sample show an increase in their PPP while their CPI lags behind the US, and in none of these countries is the differential almost 1% a year (13.8% for the period).[54]

Examining the differentials of the various consumption groups shows the largest differential between the PPP changes and the CPI to lie in the social expenditure groups (health and education), but differentials of the order of magnitude of 25% or more exist between the two data sources relating to the price changes of housing and house maintenance, furniture and home equipment, and clothing and footwear. On the other hand, there are also consumption groups where the PPP shows a price decline which is much faster than indicated by the CPI. In either case, the differentials seem to be too large to be explained by the different weighting system used by the two indices.

---

[52] Our estimate is substantially higher than the *Global Wealth Databook* estimate, according to which public wealth added up only to 1.05 trillion.

[53] Israel is not unique in this position. The fear that the expansionary monetary policy has contributed to the increase in the inequality of income distribution is common to many western economies (Carstens, 2021).

[54] Similar results are observed when one compares the Israeli CPI with the price level changes reported by the PWT.

Originally this paper aimed at tracing the source of increase in Israel's PPP – the tradeable or non-tradeable goods and services. Admittedly, the PPP-CPI differential affects the credibility of our results.

According the PPP data the average Israeli household final consumption basket increased in the years 2002-2017 relative to the US by almost 40%, in dollar terms, while that of actual individual consumption increased by 45%. The main contributor to this increase was the appreciation of the NIS, but partly it is explained by the increase in domestic prices relative to those in the US. The appreciation eroded the price of tradeables by less than 10%, so that their dollar prices increased by almost 20%, but the main price increase originated in the non-tradeable sector whose prices increased by almost 20% in NIS terms and by more than 50% in dollar terms. The non-tradeables constitute almost ⅔ of private consumption, so even if part of this price increase is a result of statistical error, the battle strategy for a lower price level have to focus on this arena.

Our list of those guilty for the high price level does not contain any new figures. On the face of it the factor most responsible for Israel's unique position is its large dispersion of labor force skills. Whereas the average skills place Israel in the lower half of the OECD, the skills dispersion is among the largest in the Western world. The difference in the level of skills between the tradeable and the non-tradeable sectors explains the flourishing of the skill intensive export industries and the large appreciation, on one hand, and the increase in the price of the non-tradeables, on the other. The factor responsible for this increase was not the increase in wage, but rather, the decline in productivity, and as a result the benefactor of this price increase was not labor but rather capital. The ICBS data show an increase in the rate of return to capital of the business sector from 12% in 2002 to 23% in 2017, and an increase in the share of capital from 16% to 24%. The ICBS data are resonated in the profit reports of the companies in the building sector, public transport monopolies, food producers and marketing companies, and the communication companies (prior to the 2011 reform).

The clue to the "PPP mystery" with respect to the high prices of the Israeli tradeable goods are trade barriers. Its customary in this respect to mention the variety of the Israeli non-trade barriers, but the discussion of non-trade barriers sometimes overshadows the monetary trade barriers. The list of monetary barriers is headed by the purchase taxes, and most prominently by the purchase taxes on food and motor vehicles imports (including fuels), two items that constitute almost 40% of the of the tradeables. The PPP data highlight two contradictory patterns: whereas the reduction in the tax on private cars was the main contributor to the decline in the PPP prices of tradeables, the preservation of tax on food and personal care items is responsible for the limited effect the appreciation had on these prices. Similar to the non-tradeable sector importers in this sector were able to translate the appreciation into increased profits, and according to the Tax Authority data the increase in the profitability of food, personal care items and motor vehicle importers doubled over the period.

In the absence of reliable detailed data on the development of individual prices one cannot allocate more precisely the contribution of each of these factors on the cost of living, in particular since the detailed PPP data refer only to 6 periods, and the data for the other 10 periods is obtained through extrapolation.

IMF economists have warned quite recently the that the increase in market power of the large firms in the developed countries may weaken monetary policy once the central banks decide to shift to a contractive policy (IMF, 2021). Israel was one of the countries in the IMF sample, and the profitability data concerning its business sector raise the concern that the IMF warning is relevant also for this country. But even more serious is the differential effect of the price rise, and in particular, the expansionary monetary policy intended to encourage inflation, on the distribution of welfare in the economy. The increase in food and housing prices hits primarily the lower quintiles of the income distribution, and according to our calculation has offset the improvement in the distribution of money income. In a similar fashion the increase in real estate prices and the increase in the public's financial portfolio (and in particular, the riskier part of this portfolio) have benefitted the households in the top quintile.

Though the paper lacks a summary, this does not hold for the section concerning conclusions. The first conclusion relates naturally to the data. A reliable foundation of data is a prerequisite for a credible decision structure. The price level is an essential ingredient in the measurement of the country's welfare. Unclarity in the measurement of this variable casts doubts about the economy's attainments in the realm of growth and welfare (Ben-Bassat-Gronau-Zussman, 2021; Bed David-Kimhi, 2022), but is even more critical for sound decision making. An important element of the monetary policy in the last decade was the exchange rate policy. In an attempt to mediate "excess deviations from the equilibrium exchange rate" the Bank of Israel purchased since the end of 2010 140 billion dollars (about 30% of the GDP).[55] But a prerequisite for a reliable estimate the deviations from the equilibrium exchange rate is a reliable data structure. In the period 2002- 2017 the NIS appreciated vs. the dollar by 24%. During that period the Israeli CPI lagged behind the US by 9%. Hence, according to the ICBS data, the real appreciation was 16%. On the other hand, were we to use the PPP data, prices in Israel did not decline relative to the US but rather increased, and the real appreciation added up to over 30%. The Bank's economists used in their studies alternatively estimates based on the nominal exchange rate deflated by the CPI and estimates based on the PPP. Our first conclusion is, therefore, that it is time for the Bank of Israel to join forces with the ICBS to settle the contradiction between the two bodies of data.

The second conclusion deals also with cooperation – this time the cooperation between the Bank of Israel and the Ministry of Finance economists. The period of low inflation seems to be behind us. The seven years during which inflation stayed below the "inflation boundaries" ended with the post-covid inflationary blast. What made the period 2014 – 2019 unique was that the low inflation was not the outcome of low demand. The growth rate during the period touched the "potential" growth rate, and unemployment prior to the epidemic outburst was at its historic low. Still, though the Bank was aware of the effect of the price rise on the distribution of welfare, it clung in his role as the guardian of price stability and to the interpretation that "stability" implies a 2% annual growth (and not less than 1%). Throughout the period the Bank's policy stood in contrast to the Ministry of Finance policy that given the high price level cut public utilities rates, and encouraged competition in order to lower prices. Whether for this reason or other ones, the Bank's expansionary policy failed.[56] The almost-zero interest rate and the massive purchase of foreign reserves have not rekindled the inflationary process, but their effect on the price of housing and the distribution of income is still with us. The definition of "price stability" as 1%-3% was set by the government in the year 2000, and was affected by the severe damage the economy suffered during 8 years of unharnessed inflation followed by 14

[55] My reservations to the estimation procedure which was employed to estimate the equilibrium rate are contained in the paper "The Estimation of the Equilibrium Rate of Exchange and its Annexes". The paper constitutes a section the policy paper "Some Thoughts in the Time of Covid" presented at the Bank's Research Department seminar in July 2020.

[56] The failure of the Bank's inflation policy in the years 2014-2019 is the topic of my paper 'The God that Failed: The Decline of Inflation – a Micro-Economic Analysis", which was part of the policy paper "Some Thoughts in the Time of Covid".

additional years were inflation rates stayed at an average of 15%. It is doubtful whether any of the decision makers at that time could conceive a state where inflation is less than 1% and the economy is flourishing. The experience of the years 2014- 2020 teaches that a more flexible definition of "price stability" is required, a definition that will allow the central bank not to act when the inflation rate is below its target, as long the Bank's other targets in the fields of growth and employment are attained.[57] The "increase in the cost of living" and "inflation" are synonymous terms and require a uniform policy of combat.

References

The Bank of Israel Annual Report 2011, Ch. 1, Section 5, "The Social Protest: Background and Policy Response", pp. 26-33.

The Bank of Israel Annual Report 2014, Ch. 1, Section 4,"Israel's Cost of Living by International Comparison", pp. 20 – 28.

The Bank of Israel Annual Report 2014, Ch. 7, Section B. "The real Exchange Rate", pp. 231-243.

The Bank of Israel Annual Report 2018, Ch. 7. "Balance of Payments Issue: Openness to International Trade in Israel and around the World" pp. 201 -218.

Ben-Bassat A. and R. Gronau, A. Zussman, "Lights and Shadows in the Market Economy", in Ben-Bassat A. and R. Gronau, A. Zussman (eds.), *The Israeli Economy 1995 -2017*, Cambridge Un. Press, Cambridge (2021), pp. 1-38

Ben-David D. and A. Kimhi, "High Prices in Israel? Caveat Emptor Beware of International Comparisons ", *Shoresh Resarch Paper,* Oct. 2021.

Brand G. and e. Regev, "The Dual Labor Market: Trends in Productivity, Wages and Human Capital in the Economy", Taub Center for Social Policy Studies in Israel, *State of the Nation Report 2015*, pp. 1-46.

Carstens, A.C., "Central Banks and Inequality", (2021)

Click R. W., "Contrarian MacParity", *Economics Letters*, 53 (1996), pp. 209-212

Credit Suisse Research Institute, *Global Wealth Databook*, (2017).

Cukierman, A and V.A. Muscatelli, "Non-Linear Taylor Rules and Asymmetric Preferences in Central Banking", *The B.E. Jour. Of Macroeconomics*, 8:1 (2008), Art 7.

Dahan, M.," Income Inequality in Israel: A Distinctive Evolution", in Ben-Bassat A. and R. Gronau, A. Zussman (eds.), *The Israeli Economy 1995 -2017*, Cambridge Un. Press, Cambridge (2021), pp. 362-398.

[57] Cukierman and Muscatelli (2008) denote this policy as an asymmetric, tracing it to a non-linear Taylor Rule. According to their paper the policy was adopted both by the US Fed and by the BOI in several periods when the circumstances so required.

Duval R. and D. Furceri, R. Lee, M.M. Tavares, "Market Power and Monetary Policy Transmission", *IMF WP* (June 2021)

Eckstein Z. and A. Friedman, "The Equilibrium Real Exchange Rate for Israel", *BIS Papers* no. 57 92011), pp. 202-214

Eizenberg, A. and S. Lach, M. Oren-Yiftach, "Retail Prices in a City". *AEJ: Econ. Policy*, 13:2, (2021), pp. 175-206.

Eurostat-OECD, *Methodological Manual on Purchasing Power Parities* (2012).

Friedman Y., "Price gaps between Israel and developed countries", in *Recent Economic Developments 132*, (September- December 2011), pp. 33-38.

, "The Price Level of Israel According to the PPP Data" (2017)

Frish R.," The Real Exchange Rate in the Long Term", *The Bank of Israel Discussion Paper* 2016.03 (Feb. 2016)

, "The Fundamentals of the Real Exchange Rate" [in Hebrew]

Frish R.and Y. Polak, "The Effect of Terms of Trade Shocks on GDP and the Real Exchange Rate" *Bank of Israel Discussion Paper 2018.09* [in Hebrew].

Froot A.G., and K. Rogoff, "Perspectives on PPP and Long Run Real Exchange Rates", in *Handbook of International Economics*, 3: 1647-88.

Gronau, R., "Some Thoughts on the Housing Component of the Consumer Price Index", *IsER*, 17:1 (2019), pp. 117-131.

, "Some Thoughts in the Time of Covid", Policy paper. May. 2020 (in Hebrew)

, "The God that Failed: The Decline of Inflation – a Micro-Economic Analysis", Policy paper. Jan. 2020 (in Hebrew).

Hazan M. and S. Tsur, "Why Is Labor Productivity in Israel So Low?", in Ben-Bassat A. and R. Gronau, A. Zussman (eds.), *The Israeli Economy 1995 -2017*, Cambridge Un. Press, Cambridge (2021), pp. 329-361.

Hendel I., and S. Lach, Y. Spiegel, "Consumer Activism: The Cottage Cheese Boycott", *RAND Jour. of Economics*, 48: 4, (2017), pp. 972–1003.

Leiderman L. and V. Bahar, "From Deficits to Surpluses: Israel's Current Account Reversal" in Ben-Bassat A. and R. Gronau, A. Zussman (eds.), *The Israeli Economy 1995 -2017*, Cambridge Un. Press, Cambridge (2021), pp. 138-167.

Luca R.A., G.M. Milesi-Ferretti and J. Lee, "Real Exchange Rates and Fundamentals: A Cross-Country Perspective", IMF WP 08/13 (2008).

Mayshar Y., *The Macro-Economics of Israel ,*Pardes Publication (2009).[in Hebrew]

Milgrom, M. and Bar-Levav G., "Wealth Inequality in Israel", *The Economic Quarterly*, 63;1 (March/June 2019), pp. 7 – 52 [in Hebrew].

Nir S., “Competition in the Israeli Economy and its Effect on Prices: a Sector-Based Phillips Curve Analysis” Bank of Israel DP 2021-01 (2021).

Obstfeld M, and K. Rogoff, “The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?”, *NBER Macroeconomics Annual 2000*, vol. 15. MIT Press, pp. 339–390.

Pakko M. R. and Pollard P. S., “Burgernomics: A Big Mac™ Guide to Purchasing Power Parity”, The Federal Reserve Bank of St. Louis (2003).

Raz-Dror O.,“The Changes in Rent in Israel During the Years of the Housing Crisis 2008-2015”, *IsER*, 17:1 (2019), pp. 73-116.

Ribon S., “Inflation and Monetary Policy,” in Ben-Bassat A. and R. Gronau, A. Zussman (eds.), *The Israeli Economy 1995 -2017*, Cambridge Un. Press, Cambridge (2021), pp. 103-137.

Rogoff K., “The Purchasing Power Parity Puzzle”, JEL, 46, (1996). pp 647-668.

Shorroks, A. and J. Davies, R. Lluberas, *Global Wealth Databook,* Credit Suisse 2017.

Taylor, A. M. and M. P. Taylor, “The Purchasing Power Parity Debate”, *Journal of Economic Perspectives*, 18: 4 (2004), pp. 135–158.

Trajtenberg Report: Creating a More Just Israeli Society (2011) [in Hebrew]

Zussman A., “The Limits of Arbitrage: Trading Frictions and Deviations from Purchasing Power Parity”, *SIEPR Discussion Paper No. 02-12* (Dec. 2002)

Table 1: The Weights of the Consumption Groups in the CPI and the PPP 2002 – 2017

	2002			2005			2008			2011			2014			2017		
	CPI		PPP	CPI		PPP	CPI		PPP	CPI		PPP	CPI		PPP	CPI		PPP
	CBS	OECD	OECD	CBS	OECD	OECD	CBS	OECD	OECD	CBS	OECD	OECD	CBS	OECD	OECD	CBS	OECD	OECD
Total	1000.0	1000.0	999.9	1000.0	1000.0	1007.1	1000.0	1000.0	1011.3	1000.0	1000.0	1014.6	1000.0	1000.0	1012.6	1000.0	1000.0	1005.4
Food and non-alcoholic beverages	153.0	153.0	186.3	147.0	147.0	164.1	143.3	143.3	165.9	140.3	140.3	163.4	135.9	135.9	164.1	127.8	127.8	160.7
Alcoholic beverages, tobacco and narcotics	12.6	12.6	26.3	14.3	14.3	26.0	13.2	13.2	26.0	12.7	12.7	25.8	13.2	13.2	29.2	23.4	23.4	27.8
Clothing and footwear	33.8	33.8	34.0	29.9	29.9	35.5	34.2	34.2	28.7	31.3	31.3	29.9	30.5	30.5	29.9	32.4	32.4	27.4
Housing, water, electricity, gas and other fuels	302.8	271.7	266.3	320.0	290.1	244.4	315.6	284.7	230.2	338.9	307.4	247.0	348.9	317.1	261.6	343.3	306.8	258.8
Household furnishings, equipment and maintenance	53.6	53.6	74.6	42.6	42.6	73.1	38.3	38.3	70.2	35.5	35.5	62.2	37.4	37.4	55.3	36.9	36.9	55.0
Transport	175.3	109.8	99.8	172.1	107.2	122.3	170.9	110.5	157.3	161.7	106.4	159.9	166.8	106.9	149.5	168.7	103.1	143.7
Communication	35.8	35.8	40.9	39.8	39.8	40.2	40.1	40.1	39.9	43.0	43.0	39.9	39.4	39.4	30.5	24.8	24.8	27.5
Health	42.8	32.8	43.4	50.6	38.5	36.1	51.8	38.4	34.7	52.2	36.9	29.5	52.2	33.9	30.4	58.3	36.5	31.3
Education	50.6	50.6	32.9	50.5	50.5	34.4	53.3	53.3	31.8	55.7	55.7	26.4	54.4	54.4	26.0	59.8	59.8	26.3
Recreation and culture	85.3	123.9	73.3	78.1	114.4	90.1	76.1	110.1	79.6	69.5	99.6	64.3	62.4	99.3	58.5	58.9	100.1	58.1
Restaurants, cafés and hotels	20.9	20.9	38.4	22.5	22.5	51.8	24.7	24.7	58.8	25.2	25.2	68.7	26.5	26.5	65.2	32.3	32.3	70.3
Miscellaneous goods and services	33.5	101.5	83.7	32.6	103.2	89.2	38.5	109.2	88.3	34.1	106.2	97.6	32.4	105.5	112.4	33.5	116.1	118.5

Table 2: The Rates of Change of the PPP and the the CPI (relative to the US) 2002 – 2017

	2002-2005		2005-2008		2008-2011		2011-2014		2014-2017		2002-2017	
	CPI	PPP	CPI	PPP	CPI	PPP	CPI	PPP	CPI	PPP	CPI	PPP
Total Household Private Consumption	**-6.93%**	**1.27%**	**-3.07%**	**6.24%**	**3.91%**	**-1.26%**	**-0.99%**	**3.84%**	**-2.37%**	**-4.10%**	**-9.39%**	**5.78%**
Food and non-alcoholic beverages	-4.11%	-10.58%	8.61%	13.32%	1.19%	1.13%	-1.49%	4.89%	-0.77%	-5.93%	3.02%	1.11%
Alcoholic beverages, tobacco and narcotics	4.99%	-16.71%	-6.65%	2.87%	-0.10%	-7.95%	30.48%	37.89%	-1.86%	-6.45%	25.38%	1.74%
Clothing and footwear	-12.76%	-3.47%	-4.32%	10.21%	-1.83%	-8.48%	-8.67%	-11.20%	-3.84%	11.98%	-28.03%	-3.18%
Housing, water, electricity, gas and other fuels	-17.87%	-25.30%	-11.19%	11.06%	18.92%	7.10%	2.70%	19.70%	-3.08%	7.16%	-13.66%	13.98%
Household furnishings, equipment and maintenance	-2.01%	21.01%	-1.83%	10.85%	-3.02%	-9.81%	-5.00%	18.71%	-5.09%	-14.03%	-15.88%	23.48%
Transport	-3.96%	3.81%	-7.17%	-10.09%	-1.58%	-8.09%	0.19%	-0.82%	3.35%	-12.01%	-9.15%	-25.14%
Communication	-3.06%	-14.32%	-2.07%	3.45%	10.35%	39.37%	-17.40%	-41.12%	-6.87%	-28.07%	-19.42%	-47.67%
Health	-5.22%	44.98%	-5.66%	1.22%	-6.29%	27.54%	-3.52%	16.80%	-7.09%	-0.57%	-24.90%	117.36%
Education	-15.89%	40.76%	-8.98%	13.24%	-5.70%	1.70%	-9.93%	-10.75%	-3.71%	7.12%	-37.39%	54.98%
Recreation and culture	-2.77%	-18.28%	0.67%	10.09%	0.69%	-3.37%	-3.22%	-9.94%	-5.79%	-2.23%	-10.15%	-23.46%
Restaurants, cafés and hotels	0.95%	23.93%	6.07%	-11.28%	2.37%	-10.03%	1.84%	-2.45%	-2.17%	-1.33%	9.20%	-4.78%
Miscellaneous goods and services	-2.90%	7.92%	-1.13%	16.30%	1.82%	-12.42%	0.77%	0.99%	-8.19%	-6.01%	-9.57%	4.34%
Total Individual Consumption		2.95%		7.04%		0.78%		3.27%		-3.03%		11.21%

Table 3: The Purchasing Power Parity of the Household Private Consumption and its Components in NIS and $ Terms (US = 1.000)

	PPP (in NIS terms)						PLI (in $ terms)					
	2002	2005	2008	2011	2014	2017	2002	2005	2008	2011	2014	2017
Total Household Private Consumption	4.020	4.071	4.325	4.270	4.434	4.252	0.848	0.907	1.205	1.193	1.239	1.181
Food and non-alcoholic beverages	4.931	4.409	4.997	5.053	5.300	4.986	1.041	0.983	1.393	1.412	1.481	1.385
Alcoholic beverages, tobacco and narcotics	4.950	4.123	4.242	3.904	5.383	5.036	1.045	0.919	1.182	1.091	1.505	1.399
Clothing and footwear	4.337	4.187	4.614	4.223	3.750	4.199	0.915	0.933	1.286	1.180	1.048	1.166
Housing, water, electricity, gas and other fuels	4.352	3.251	3.611	3.867	4.629	4.960	0.919	0.724	1.006	1.081	1.294	1.378
Household furnishings, equipment and maintenance	3.480	4.212	4.669	4.211	4.998	4.297	0.735	0.938	1.301	1.177	1.397	1.194
Transport	6.388	6.631	5.962	5.480	5.435	4.782	1.348	1.478	1.662	1.532	1.519	1.328
Communication	3.755	3.217	3.328	4.638	2.731	1.965	0.792	0.717	0.928	1.296	0.763	0.546
Health	1.712	2.482	2.513	3.205	3.743	3.722	0.361	0.553	0.700	0.896	1.046	1.034
Education	1.421	2.001	2.266	2.304	2.056	2.203	0.300	0.446	0.631	0.644	0.575	0.612
Recreation and culture	5.687	4.647	5.116	4.943	4.452	4.353	1.200	1.035	1.426	1.381	1.244	1.209
Restaurants, cafés and hotels	5.202	6.446	5.719	5.145	5.020	4.953	1.098	1.436	1.594	1.438	1.403	1.376
Miscellaneous goods and services	3.793	4.093	4.761	4.169	4.211	3.958	0.801	0.912	1.327	1.165	1.177	1.099
Individual Consumption Total	3.636	3.744	4.007	4.038	4.17	4.044	0.768	0.834	1.117	1.129	1.166	1.123
Rate of Exchange (NIS/$) The	0.211	0.223	0.279	0.279	0.279	0.278						

Table 3A: The Purchasing Power Parity of the Tradeable Components of the Household Private Consumption in NIS and $ Terms (US = 1.000)

	PPP (in NIS terms)						PLI (in $ terms)					
	2002	2005	2008	2011	2014	2017	2002	2005	2008	2011	2014	2017
Total Household Private Consumption	5.560	5.485	5.612	5.168	5.547	5.113	1.174	1.222	1.564	1.444	1.550	1.420
Food (including fruit and vegetables)	5.945	5.112	5.577	5.457	5.394	5.390	1.255	1.139	1.554	1.525	1.508	1.497
Non-alcoholic beverages	6.681	5.926	6.923	6.294	5.582	5.019	1.410	1.320	1.930	1.759	1.560	1.394
Alcoholic beverages, tobacco and narcotics	4.950	4.123	4.242	3.904	5.383	5.036	1.045	0.919	1.182	1.091	1.505	1.399
Clothing and footwear	4.337	4.187	4.614	4.223	3.750	4.199	0.915	0.933	1.286	1.180	1.048	1.166
Household furnishings, equipment and maintenance	4.364	4.593	4.853	4.296	5.031	4.547	0.921	1.023	1.353	1.201	1.406	1.263
Transport	8.086	8.459	7.793	6.959	6.784	5.837	1.707	1.885	2.172	1.945	1.896	1.622
Recreation and culture	6.092	5.637	5.449	5.653	5.462	4.743	1.286	1.256	1.519	1.580	1.526	1.318
Miscellaneous goods and services	3.463	4.999	5.550	4.298	4.240	3.742	0.731	1.114	1.547	1.201	1.185	1.039
Individual Consumption Total	5.492	5.428	5.540	5.112	5.547	5.113	1.159	1.209	1.544	1.429	1.550	1.420

Table 3B: The Purchasing Power Parity of the Non-Tradeable Components of the Household Private Consumption in NIS and $ Terms (US= 1.000)

	PPP (in NIS terms)						PLI (in $ terms)					
	2002	2005	2008	2011	2014	2017	2002	2005	2008	2011	2014	2017
Total Household Private Consumption	3.370	3.451	3.764	3.869	4.044	3.987	0.711	0.769	1.049	1.081	1.130	1.108
Food and non-alcoholic beverages	3.656	3.537	4.070	4.359	5.133	4.570	0.772	0.788	1.135	1.218	1.435	1.269
Housing, water, electricity, gas and other fuels	4.352	3.251	3.611	3.867	4.629	4.960	0.919	0.724	1.006	1.081	1.294	1.378
Household furnishings, equipment and maintenance	1.938	2.626	3.703	4.265	4.689	3.208	0.409	0.585	1.032	1.192	1.311	0.891
Transport	3.892	3.643	3.396	2.985	3.340	3.155	0.821	0.812	0.946	0.834	0.933	0.877
Communication	3.755	3.217	3.328	4.638	2.731	1.965	0.792	0.717	0.928	1.296	0.763	0.546
Health	1.712	2.482	2.513	3.205	3.743	3.722	0.361	0.553	0.700	0.896	1.046	1.034
Education	1.421	2.001	2.266	2.304	2.056	2.203	0.300	0.446	0.631	0.644	0.575	0.612
Recreation and culture	5.409	4.250	4.906	4.587	4.009	4.034	1.142	0.947	1.367	1.282	1.121	1.120
Restaurants, cafés and hotels	5.202	6.446	5.719	5.145	5.020	4.953	1.098	1.436	1.594	1.438	1.403	1.376
Miscellaneous goods and services	3.981	3.909	4.630	4.159	4.249	4.158	0.840	0.871	1.290	1.162	1.188	1.155
Consumption Total Individual	3.047	3.160	3.494	3.657	3.795	3.773	0.643	0.704	0.974	1.022	1.061	1.048

Table 4: The PPP Indices of Tradeable and Non-Tradeable Private Consumption Goods (2002 = 100)

	Total						Tradeables						Non-Tradeables					
	2002	2005	2008	2011	2014	2017	2002	2005	2008	2011	2014	2017	2002	2005	2008	2011	2014	2017
Total Household Private Consumption	100.0	101.3	107.6	106.2	110.3	105.8	100.0	98.7	100.9	92.9	99.8	92.0	100.0	102.4	111.7	114.8	120.0	118.3
Food and non-alcoholic beverages	100.0	89.4	101.3	102.5	107.5	101.1	100.0	86.0	93.8	91.8	90.7	90.7	100.0	96.8	111.3	119.2	140.4	125.0
Alcoholic beverages, tobacco and narcotics	100.0	83.3	85.7	78.9	108.8	101.7	100.0	83.3	85.7	78.9	108.8	101.7						
Clothing and footwear	100.0	96.5	106.4	97.4	86.5	96.8	100.0	96.5	106.4	97.4	86.5	96.8						
Housing, water, electricity, gas and other fuels	100.0	74.7	83.0	88.9	106.4	114.0							100.0	74.7	83.0	88.9	106.4	114.0
Household furnishings, equipment and maintenance	100.0	121.0	134.1	121.0	143.6	123.5	100.0	105.2	111.2	98.4	115.3	104.2	100.0	135.5	191.1	220.1	242.0	165.6
Transport	100.0	103.8	93.3	85.8	85.1	74.9	100.0	104.6	96.4	86.1	83.9	72.2	100.0	93.6	87.3	76.7	85.8	81.1
Communication	100.0	85.7	88.6	123.5	72.7	52.3							100.0	85.7	88.6	123.5	72.7	52.3
Health	100.0	145.0	146.8	187.2	218.6	217.4							100.0	145.0	146.8	187.2	218.6	217.4
Education	100.0	140.8	159.4	162.1	144.7	155.0							100.0	140.8	159.4	162.1	144.7	155.0
Recreation and culture	100.0	81.7	90.0	86.9	78.3	76.5	100.0	92.5	89.5	92.8	89.7	77.9	100.0	78.6	90.7	84.8	74.1	74.6
Restaurants, cafés and hotels	100.0	123.9	109.9	98.9	96.5	95.2							100.0	123.9	109.9	98.9	96.5	95.2
Miscellaneous goods and services	100.0	107.9	125.5	109.9	111.0	104.3	100.0	144.3	160.3	124.1	122.4	108.0	100.0	98.2	116.3	104.5	106.7	104.4
Total Individual Consumption	100.0	103.0	110.2	111.1	114.7	111.2	100.0	98.8	100.9	93.1	101.0	93.1	100.0	103.7	114.7	120.0	124.6	123.8
The Rate of Exchange) NIS($/	100.0	105.7	132.2	132.2	132.2	131.8												