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THE PRIVATE CONSUMPTION FUNCTION IN ISRAEL

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Abstract

The objective of this study is to identify and quantify the factors affecting private consumption in Israel. For that purpose, an aggregate private consumption function in Israel was estimated for the years 1995 to 2015, using a standard error correction model that uses quarterly data, giving it the advantage of being able to identify short-term effects. In order to specify the long-term link independent of the stationarity of the variables, we estimate an ARDL (Autoregressive Distributed Lag) econometric model, and carry out a bounds test.

The main findings are that in the long term, private consumption is determined mainly by income from labor and by financial assets, and that home values and global trade (beyond its effect through income) are also important. The elasticity of consumption in the long term is estimated at about 0.3 relative to income from labor and about 0.2 relative to the net financial assets portfolio. In contrast, in the short term, private consumption is positively affected mainly by changes in financial assets, and its elasticity relative to them is estimated at about 0.15. Current income has an effect primarily through transfer payments (elasticity of about 0.1), while the coefficient of income from labor in the short term is not significantly different from zero. Finally, the interest rate has a direct effect on consumption after one year (although not within the quarter), and surprisingly, we did not find evidence of the security situation having an effect.

1. FOREWORD

Private consumption[1] is the largest component of GDP, accounting for about 55–60 percent of total GDP over the past 20 years. Private consumption therefore plays an important role in macroeconomic forecasts and analyses. To strengthen the foundation for economics

[1] Private consumption, as defined in the National Accounts, consists mainly of consumption by Israeli households, plus the consumption of non-profits and of Israelis abroad, less consumption by nonresidents in Israel. In 2015, 85 percent of Israeli household consumption was classified as current consumption (services, food and fuel), 10 percent as the consumption of durable goods (cars, electrical appliances and furniture), and 5 percent as consumption of semi-durable goods (clothing and footwear).

studies such as this one, this present paper attempts to identify and quantify the factors that affect aggregate private consumption.

Figure 1 illustrates the changes in total private consumption for the sample period (1995–2015) and shows that despite quarterly fluctuations, private consumption has grown steadily for prolonged periods, contrasted by other periods in which it shrinks. This paper attempts to describe the key factors driving these changes, and the importance of each factor in the different periods. To do so, we will use both economic theory and empirical research, which show that household income and wealth are the principal factors determining private consumption. At the same time, we will emphasize that although economic theory and intuition guided us in choosing the model and variables and in interpreting the findings, the focus of this study is empirical. In the final outcome, the results presented do not correspond precisely with any specific theoretical model; the results were dictated by the data, which were found to be significant and robust to a broad range of sensitivity tests. In other words, we did not focus on testing the permanent income hypothesis, but tried to find the best forecast model for private consumption in Israel.

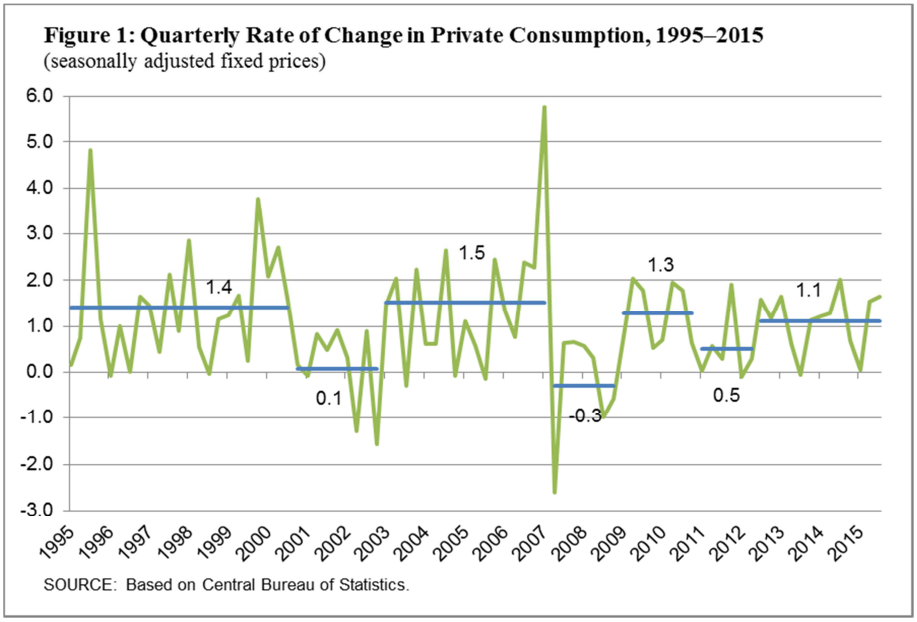

Figure 1: Quarterly Rate of Change in Private Consumption, 1995–2015
(seasonally adjusted fixed prices)

SOURCE: Based on Central Bureau of Statistics.

This study is based on an estimation of the aggregate private consumption function in Israel for the period 1995–2015, using a standard model with error correction, similar to the work of Lavi (1998) and the Bank of Israel[2] (2015). However, there are some important

[2] Tzlil Kovacs analyzed the issue of "Private Consumption and Financial Factors" in the "Recent Economic Developments", number 140.

differences between the present study and previous studies, both in the choice of database and in the estimation method.

First, to properly define the development of private consumption in Israel over time, we disaggregated the income and wealth variables into subcomponents, following the example of Jaramillo and Chailloux (2015).[3] This is because the marginal propensity to consume (MPC) from labor income is expected to differ from the MPC from transfer payments, and the MPC from financial assets and from real assets may also differ. This study also examines the effects of other variables that were not addressed in previous studies, primarily the effect of tourist arrivals in Israel, which serves as an index of the security situation.[4]

Second, for the first time we present quarterly results based on the National Accounts, available from 1995. These figures are more useful for identifying short-term effects. The use of higher-frequency data also allows us to increase the number of observations over a given period, so that a review over a relatively short period is sufficient. The advantage of a shorter sample period, beginning in 1995, is that the starting point is after some important structural changes in the economy: the economic stabilization plan (1985), the wave of immigration from the Former Soviet Union (FSU) (1989), the exposure to imports plan (1991), and the shift to inflation targets (1992).[5]

Third, regarding the methodology, we carried out a bounds test to examine whether there is a long-term link (co-integration) between the variables, independent of the question of whether they are stationary or have a unit root (Pesaran, Shin and Smith, 2001). After finding that a long-term link exists, an ARDL econometric model was prepared, allowing us to legitimately test the assumptions even when the variables have a unit root, demonstrating the importance of the significance of the coefficients in the long-term equation (Pesaran and Shin, 1999).[6]

In the following chapters, we will see that according to the bounds test, there is in fact a long-term link between private consumption and the explanatory variables, and by using the ARDL model we managed to establish the aggregate long-term private consumption function empirically. This function consists, first and foremost, of income from labor, as well as the wealth effects of financial and real assets and the level of global trade.

We will find that the use of quarterly and current data, making a distinction between different types of income, leads to the conclusion that in the short term, private consumption is not affected by changes in current income from labor, but it is affected by

[3] Hereinafter: J&C.

[4] Other variables were examined, but are not presented in this paper because they were not found to be significant in explaining private consumption: the unemployment rate, the Gini index, dependency ratio, public consumption, the government deficit, the real exchange rate, and terms of trade.

[5] Except for the economic stabilization plan, these were gradual measures, the most important of which ended during the 1990s. Consequently, for most of the years in the sample, there is no reason to believe that they might cause a structural break.

[6] This last point was also addressed by the Bank of Israel (2015), which used a Fully Modified OLS model (FMOLS), but an ARDL model is generally preferable when the samples are small (Pesaran & Shin).

transfer payments. Our result differs from those of Lavi and the Bank of Israel, who report a coefficient of 0.5 for current income from wages. We attribute the different findings both to an easing of the liquidity constraint as a result increase in sophistication of the capital market in the sample years and to the different duration of the reaction of consumption (quarterly rather than annual) due to the frequency of the data. The use of quarterly data also allows us to identify differences between a relatively weak, immediate response by consumption to interest rate changes, and a stronger response after one year—something that could not be distinguished in previous studies.

The rest of the paper takes the following format: Chapter 2 reviews the relevant literature that discusses the wealth and income effects on private consumption. Chapter 3 discusses the methodology and includes a brief explanation of the error correction model, followed by a discussion of various aspects relating to the use of an ARDL model. Chapter 4 details the database, Chapter 5 presents the key results of the estimation, and Chapter 6 presents several robustness tests relating to the results. Chapter 7 shows how each component contributes to explaining fluctuations in private consumption, and Chapter 8 concludes.

2. REVIEW OF THE LITERATURE

Keynes was the first economist who, in 1936, formulated the aggregate private consumption function as part of his absolute income theory. According to Keynes, consumption depends on disposable income (the lower the individual income the lower the MPC), with the MPC, on average, close to 1. In response, Duesenberry (1949) developed an alternative theory—the relative income hypothesis, which states that private consumption depends more on the individual's income relative to others than on his/her absolute level of income.

Later criticism centered on the income coefficient in the consumption function, and argued that it was considerably lower than 1. These approaches were based on the lifecycle hypothesis of Modigliani and Brumberg (1954) and on Friedman's (1957) permanent income hypothesis, whereby households aim to smooth their consumption over time, so that the consumption of a representative (typical) household depends on its average (expected) income over time, and not on its current income, which is subject to transitory shocks.

Following criticism levelled by Lucas (1976) that this model failed to address the method of determining expectations, Hall (1978) added the element of rational expectations to the permanent income hypothesis. The result obtained was that uncertainty does not affect the decisions of individuals relating to consumption and that changes in consumption cannot be forecast.

However, these theories could not be reconciled with a range of empirical studies that found a clear link between changes in current income and changes in consumption. Today, the accepted approach, based on empirical results, is that the permanent income hypothesis

clearly describes the development of consumption of households of average or greater wealth. For other households, mainly lower income families, consumption is based on current income, so that their MPC is higher than that of higher income households.[7]

Jappelli and Pistaferri (2010) provide a comprehensive review of the literature discussing the link between consumption and income, and explain that although consumption reacts less strongly to transitory shocks than to permanent shocks, the reaction still exceeds the predictions of models based on consumption smoothing. These results are generally attributed to liquidity constraints that prevent individuals from borrowing against future income, and to precautionary saving, that motivates similar behavior by individuals who might be able to borrow but choose not to do so for fear of a negative shock to their income.

In the wake of Hall's study and other studies conducted in the 1970s and 80s, Carroll (2001) describes that the accepted interpretation in the period of the permanent income hypothesis was that MPC from current income was not expected to exceed 5 per cent. However, these models were based on stringent assumptions, whereas the development of mathematical tools and calculations enabled Carroll to build a model based on more realistic assumptions. He received a concave consumption function which is characterized by an MPC that declines with household income, and on average is approximately 1/3. Carroll argues that this result is consistent with most of the empirical findings in the literature, which show MPC[8] in the range of 0.2–0.6 (Carroll et al., 2015). This result is also similar to Friedman's interpretation, which held that this is the expected result when taking into account not only liquidity constraints and precautionary saving, but also the limited planning horizon of households. It should be noted that the aforementioned results are based on studies that use microdata, and as Attanasio and Weber (1993) have already shown, they may be extremely different from the results obtained from analyzing macro series, mainly due to an absence of linearity[9] and omitted demographic variables that are not usually observed in aggregate data.

Other studies examined the effect of wealth, beyond the effect of income, on consumption. Thorough reviews of the studies that focused on advanced economies can be found in Davis (2010) and Kerdrian (2011), who present a broad range of results pertaining to the MPC from financial assets and real estate. Most of the results confirm that a one-shekel increase in the wealth variables generates an increase of 2–8 agorot in consumption in the long term. They also found that wealth effect of financial assets is generally greater than the wealth effect of real estate. Kerdrian examined the wealth effect in the Eurozone,

[7] In a famous study, Mankiw & Campbell (1989) found that in the USA, 50% of the population determines its consumption on the basis of its current income. Lavi (1998) applied their test to Israel and obtained similar results.

[8] The authors note that MPC refers to the growth of consumption within the year following a transitory shock to income.

[9] The logarithm of the average obtained in aggregate data does not equal the average of the logarithms in separate data.

USA and Japan and argued that the average MPC from financial assets is 5–6 percent, and the average MPC from real estate is 1–1.5 percent. In contrast, he did not find any significant income effect from all sources.

A new study by two researchers from the International Monetary Fund (J&C) uses aggregate data on a quarterly basis (1998–2003) and examines the different income and wealth effects in 14 advanced economies. The researchers break down disposable income into income from labor and fiscal variables such as transfer payments to the public and direct taxes. Wealth variables of households are divided into financial assets, homes and debt. We will follow their example and examine the function of these sub-components in the aggregate private consumption function in Israel.

In the past, Lavi (1998) estimated the private consumption function in Israel using a model with error correction and annual data for the period 1963–1993. He found that changes in current income and the yield on stocks help explain changes in private consumption. A Bank of Israel study (2015) repeated this estimate with revised data through 2014, emphasizing the importance of the financial variables in explaining private consumption. The paper separated the wealth of households into financial and real components and added them to a consumption equation together with the terms of credit, based on a study by Muelbauer (2010). This study found that MPC from labor income (wages) is greater than 0.5 and that financial assets and the terms of credit have a positive effect in the long term. The study also found that the impact of real estate values only became significant from 2003, a result which corresponds with the findings of Kahan and Ribon (2013), who used microdata from the Expenditure Surveys for 2003–2011 and found that home and rental prices had a positive effect.[10]

3. METHODOLOGY

a. Error correction model

Based on the theory and economic literature reviewed above, we will specify the relationship between consumption and the income and wealth variables in Israel. For that purpose, we will adopt an error correction model for the aggregate consumption function, as first proposed by Davidson et al. (1978), and as has been applied in many other studies

[10] Other studies in Israel focused on the effects of fiscal policy on private consumption. Lavi & Strawczynski (2003) analyzed the substitution effect between private and public consumption in 1960–2000. They found that the substitution effect was limited and is estimated at 20%, and that the financing of public expenditure from direct taxation negatively affected private consumption. Mazar (2010) used quarterly data from 1995 through 2012:Q1, and used a VAR technique to test the short-term response (up to three years) of private consumption to shocks in public consumption and taxes. He reports that private consumption responds favorably to an increase in public consumption, in contrast with a negative response to an increase in direct and indirect taxes.

since then. This model describes the link between the level of consumption and the explanatory variables, and it will be treated as a long-term relationship. In the short term, there may be a deviation from the long-term trend, and this will gradually be corrected until equilibrium is restored. We must therefore estimate the following two equations:

$$(1)\quad c_t = \beta_0 + \beta_1' Y_t + \beta_2' W_t + \beta_3' X_t + \varepsilon_t$$

$$(2)\quad \Delta c_t = \gamma_1' \Delta Y_t + \gamma_2' \Delta W_t + \gamma_3' \Delta X_t + \delta * \varepsilon_{t-1} + v_t$$

where c_t is consumption, Y_t includes the income components, W_t includes the wealth variables, X_t is a group of other variables, and ε_{t-1} is the residual (with a lag), which is estimated from the long-term Equation (1). The error-correction model should be used only when co-integration is present, namely when there is a long-term relationship between the dependent variable and the explanatory variables. To examine this assumption, Pesaran, Shin and Smith (2001) developed the bounds test, which examines co-integration between the variables, independent of whether they are stationary or have a unit root.[11] A positive answer to this question confirms the importance of the error correction component in the short-term Equation (2), expressed as $\delta < 0$, implying that the change in consumption depends not only on changes in the income and wealth variables, but also on the extent to which the level of consumption deviates from those variables.

b. Estimation

A possible lack of stationarity in the time series raises the concern that estimation using the ordinary least squares (OLS) method will make it impossible to perform a valid assumptions test of Equation (1). This problem can be overcome by using an Autoregressive Distributed Lag (ARDL) model, as demonstrated by Pesaran and Shin (1999). In practice, they suggest estimating a single equation in which the level and changes of the variables are aggregated. We will estimate an ARDL (1,1,1) model in which the maximum lag is 1 so that the equation for the estimate is:

$$(3)\quad \Delta c_t = \sum_{i=0}^{1} (\gamma_1' \Delta Y_{t-i} + \gamma_2' \Delta W_{t-i} + \gamma_3' \Delta X_{t-i}) + \delta(c_{t-1} - \beta_0 - \beta_1' Y_{t-1} - \beta_2' W_{t-1} - \beta_3' X_{t-1}) + v_t$$

In fact, this is an expansion of the error-correction model, in which we simultaneously estimate both equations without limiting the coefficients in Equation (1) and while estimating the coefficients in Equation (2). We will estimate Equation (3) using the OLS method given that it consists of differences in the variables and the residual of Equation (1), and it is therefore reasonable that all the components in this equation are stationary.

[11] This method helps avoid the problem discussed by Cavanaugh et al. (1995) regarding the use of preliminary tests to examine the stationarity of the variables.

In this study, we chose to estimate the short-term equation separately, using an error-correction component which is based on the long-term estimates from the ARDL model. Assuming that none of the variables have a degree of stationarity higher than I(1), there is no problem of a lack of stationarity in Equation (2), and it can therefore be estimated separately, as in the error-correction model. It is therefore not clear that the short-term estimates obtained from a simultaneous estimation of the short and long-term equations should be preferred, as in Equation (3), the purpose of which is to resolve the problem of estimating the long-term coefficients. We preferred the separate estimation of the short-term equation, since it enables the effects of variables with a lag to be tested simply, without changing the long-term equation. Although at equilibrium there should not be any difference between the effect of a variable in the current period and its delayed effect, given that we are discussing a final (and short) sample, the long-term results are in fact influenced by the choice of timing of the variables.

The ARDL model is used to facilitate testing legitimate assumptions even when there is no certainty as to the stationarity of the variables. However, to ensure that the model's desired properties are in place at least from the asymptotic perspective, several conditions must be satisfied. These conditions and their importance are detailed by Giles (2013), based on the two studies cited above (Pesaran and Shin, 1999; Pesaran, Shin and Smith, 2001). We will now briefly address the main points:

1. We assume that all the variables are stationary I(0) or have a unit root I(1).
2. We will examine three generally accepted options for determining the time lags in the model, and we will see that the long-term coefficients are not sensitive to the choice of the lag structure. These options include the Akaike Information Criterion (AIC), Schwarz's Bayesian criterion (BIC), and one fixed lag for each variable. Finally, we prefer the last model—ARDL (1,1,1), since this best corresponds with Pesaran and Shin's expansion model, which is designed for cases in which there is a concern of endogeneity.
3. With respect to each of the aforementioned options, we reject the option of a serial correlation and ensure that the model is dynamically stable as necessary, namely that all the relevant roots are within the unit circle.

Finally, it should be noted that in general, choosing a single equation of this type, rather than a set of equations (such as VAR), provides a clear advantage but at a price: it provides a clear interpretation of the results, but requires us to establish the structure of the link between the variables. We therefore relied on the economic theory that describes the dependence of consumption on income and wealth variables, as detailed in the review of the literature.

4. THE VARIABLES

The dependent variable in the estimation equation is private consumption at fixed 2010 prices, adjusted for seasonality, in terms of per capita log (as accepted in the literature). According to generally accepted economic theory, consumption is determined on the basis of all sources of permanent income. Given that this data is not readily available, current income from all sources is generally used, assuming that over time it provides a good approximation of permanent income. However, this limited formula is probably inadequate, for several reasons. First, the permanent income model predicts a fixed rate of savings over time — which is not necessarily the real-world situation[12]. Second, there may be differences between the MPC from income from labor and the MPC from income from transfer payments or income from capital, as well as differences between the MPC from financial assets and that from real assets. The consumption equation in this study therefore includes several explanatory variables, similar to the formula presented by J&C, which include income and wealth variables and interest rate variables. We also addressed two factors of particular importance in Israel—the security situation and global trade (due to the weight of Israel's exports in GDP and their sensitivity to fluctuations in global trade). The following are details of the key variables:

1. Income variables (*Y*)
   A. The income from labor—the income from labor of salaried employees throughout the economy.
   B. Direct taxes—taxes withheld from wages for income tax, health tax and National Insurance deductions.[13]
   C. Transfer payments—net transfer payments to the public.

Based on the theory and widespread empirical findings, the assumption is that an increase in household income will positively affect private consumption in the long term, and to a lesser degree also in the short term. Since transfer payments focus on poorer population groups with greater liquidity constraints, we would expect that in the short term, private consumption will react more strongly to changes in income from transfer payments than to changes in income from labor. Similarly, a reduction of direct taxes generally benefits higher-income earners so that a change in the tax rates will affect private consumption to a lesser degree.

[12] The saving rate might be positive because of precaution or if people want to leave inheritance.

[13] Changes in indirect taxes might affect the quantitative change in private consumption through price changes. The model reflects this in that the explanatory variables are deflated at private consumption prices.

2. Wealth variables (*W*)
   A. Net financial assets—the public's financial assets portfolio[14] minus household debt.
   B. Home values[15] (estimate)—the price index of owner-occupied dwellings, multiplied by the inventory of residential homes. The inventory of homes over time was calculated using the addition of finished housing construction to the inventory of residential housing in 1995, as found in the population census.

These variables are expected to have a positive effect on private consumption due to the wealth effect: households increase their rate of consumption from their disposable income, because the value of the assets that they own serves as a substitute for savings. By and large, the wealth effect from real variables is less than from financial variables, due to the difficulty in realizing real assets.

3. Other variables (*X*)
   A. Global trade—an index of global trade in goods and services.
      An increase in the global trade index reflects an exogenous improvement in the economic environment of households in Israel and could lead to higher consumption through an increase in the households' optimism. Although the public generally does not follow the development of global trade, it could be affected by it indirectly through the forecasts and analyses of different entities and media publications.
   B. Tourist arrivals—the number of foreign passport holders who arrived and stayed in Israel for at least one night. The number of tourist arrivals serves as an estimate of the security situation in Israel, correlating with it negatively. A positive coefficient should be expected, given that an unstable security situation deters households from going out to shopping malls, thus affecting private consumption.
   C. Yield curve slope—deviation of the short-term interest rate from the long-term interest rate. The short-term interest rate is represented by the real one-year yield, and the long-term interest rate by the real 10-year yield.[16]

This slope should reflect the actual deviation of the interest rate from the "natural" interest rate and would be expected to negatively affect private consumption due to the substitution effect of the interest rate on households.

With the exception of the yield curve slope, which is in percentage points, the variables are deflated by private consumption prices, adjusted for seasonality, and in terms of per capita log. The exception is the global trade index, which was received from the source in real terms and was not divided by the size of the population.

[14] The public's financial assets portfolio, which also includes assets of the non-financial business sector, serves as an estimate of the financial assets held by households. We do not have quarterly data for the financial assets portfolio that would allow us to separate households from the business sector.

[15] We do not have any available information on a quarterly basis for the value of real estate held by the public. We therefore used an estimate.

[16] In the section that presents the results, it appears that empirically there is no difference between the positioning of the yield curve slope and the positioning of the annual interest rate.

We assume that all the variables are stationary I(0) or have a unit root I(1). Support for this assumption can be found in Table A3, which presents results supporting the assumption that, according to accepted tests, there are no variables with a higher degree of stationarity. However, these tests are of doubtful quality (for example, as shown by Reed and Smith, 2016), and the presence of this condition should be treated as an assumption that cannot be tested with adequate certainty. Naturally, had we known the degree of stationarity of the variables with any certainty, it is doubtful whether, from the outset, we would have preferred the ARDL model over a standard error correction model.

5. RESULTS OF THE ESTIMATION

The results of the bounds test lead us to conclude that there is a long-term relationship between the level of consumption and the wealth and income variables (Table 1). The most important variable in this link is net financial assets, as confirmed by the large difference between the test statistics in the first column and those in the second column. In Column 1, a run of the income variables only produces an insignificant result (0.329), whereas in Column 2, which includes net financial assets, the value of the test statistics jumps (8.341)[17], implying a long-term link with a significance level of one per cent, even if all the variables in the regression have a unit root.[18] Table A4 shows that the results in Table 1 are not sensitive to the choice of lag structure and that there is no concern of a serial correlation (according to the Breusch-Godfrey test).[19]

[17] When the net financial assets portfolio is the sole explanatory variable, the value of the bounds test is 7.503, so that there is a long-term link with a significance level of 2.5%.

[18] The results of the bounds test should be interpreted using the critical values shown in Table A2.

[19] For each of the options, we verified that the model was dynamically stable.

Table 1: Private consumption equation - various specifications

	(1)	(2)	(3)	(4)	(5)	(6)
Long-range coefficients						
Income from labor	1.155*	0.289***	0.166*	0.218***	0.302***	0.306***
	(0.680)	(0.077)	(0.093)	(0.080)	(0.075)	(0.078)
Direct taxes	-0.367	-0.158***	-0.066	-0.041	-0.088**	-0.090**
	(0.437)	(0.030)	(0.049)	(0.040)	(0.037)	(0.043)
Transfer payments	0.320	0.202***	0.127**	0.117**	0.054	0.058
	(0.772)	(0.051)	(0.062)	(0.049)	(0.049)	(0.052)
Net financial assets		0.260***	0.288***	0.145***	0.183***	0.182***
		(0.016)	(0.021)	(0.047)	(0.042)	(0.044)
Home values			0.050*	0.036*	0.053***	0.050**
			(0.026)	(0.020)	(0.018)	(0.020)
Global trade				0.133***	0.095**	0.095**
				(0.041)	(0.038)	(0.039)
Tourist arrivals					-0.027***	-0.026**
					(0.010)	(0.010)
Slope of the curve						0.000
						(0.003)
Bounds test	0.329	8.341	7.665	6.456	6.802	5.787
Significance level when all variables are I(0)	No co-integration	***	***	***	***	***
Significance level when all variables are I(1)	No co-integration	***	***	***	***	***
Short-term coefficients						
Income from labor	0.172**	0.109	0.097	0.089	0.103	0.106
	(0.081)	(0.074)	(0.074)	(0.077)	(0.078)	(0.081)
Direct taxes	0.059	0.032	0.042	0.035	0.034	0.034
	(0.045)	(0.033)	(0.033)	(0.031)	(0.031)	(0.032)
Transfer payments	0.092**	0.117***	0.111***	0.117***	0.112***	0.113***
	(0.041)	(0.035)	(0.035)	(0.033)	(0.033)	(0.034)
Net financial assets (t-1)		0.166***	0.155***	0.147***	0.147***	0.146***
		(0.038)	(0.037)	(0.035)	(0.035)	(0.035)
Home values			0.081	0.104*	0.105**	0.105*
			(0.052)	(0.052)	(0.053)	(0.053)
Global trade (t-1)				0.064**	0.063**	0.064**
				(0.031)	(0.031)	(0.031)
Tourist arrivals					-0.003	-0.003
					(0.006)	(0.006)
Slope of the curve (t-1)						-0.001
						(0.001)
Error correction component	-0.098	-0.479***	-0.475***	-0.571***	-0.653***	-0.647***
	(0.158)	(0.140)	(0.148)	(0.139)	(0.131)	(0.132)
Number of observations	82	82	82	82	82	82
R^2	0.203	0.462	0.471	0.508	0.532	0.530
R^2-Adjusted	0.161	0.427	0.429	0.461	0.481	0.472

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

a. The wealth and income effects

Among the income variables, **the income from labor** has the strongest long-term effect, with a coefficient of 0.3.[20] This coefficient represents the elasticity of consumption to income from labor, and the MPC derived from it is about 35 agorot from each shekel.[21] This is lower than the results of Lavi and the Bank of Israel for Israel, and of J&C's results for advanced economies—studies that reported MPC in the range of 0.5–0.7.[22] The MPC we obtained is certainly lower than the MPC expected from the permanent income model, and a significant part of this difference can be attributed to the control in the regression on financial assets and home values. Therefore, the MPC means that households consume 35 agorot of every shekel given that the other variable remain constant, but since the value of assets increases over time, households actually consume more.[23] It is possible that households do not consider an increase in income from labor without a corresponding increase in wealth to be a sustainable increase. This hypothesis is reinforced by the results shown in Table A5: When the wealth variables are removed or replaced with variables representing the surplus yield from them—financial assets as a percentage of GDP and the value of homes net of GDP growth—we find that the elasticity of consumption to income from labor is about 0.5. Nevertheless, eventually we found that the elasticity of the consumption to disposable income from all sources is lower than 1 (under the assumption that the wealth variables properly represent nonlabor income).

In the short term, although the coefficient of the income from labor is not significant, its value (0.1) is similar to that found by J&C, who report an MPC of approximately 0.15. In contrast, this MPC is lower than the results of Lavi and the Bank of Israel, which are approximately 0.5. This discrepancy is probably attributable to two factors: First, our present study describes the response of consumption to a change in income within a quarter (as in J&C), whereas the results of previous studies reflect the response of consumption over the course of a year; and second, in previous studies conducted in Israel, the sample period included data from before 1995, so that the difference in elasticity might reflect a more sophisticated capital market in which a smaller percentage of the population suffers from liquidity constraints.

[20] Use of the variable "net income from labor" (the difference between the income from labor and direct taxes) instead of positioning each of the variables separately, produced a similar outcome with respect to MPC. We chose to present the variables separately so that we could compare the results with those obtained by J&C for other countries.

[21] MPC from the variable y for elasticity β (size of the coefficient) is obtained by multiplying elasticity by the ratio between the value of the variable and the value of consumption (the average value over the sample). This result is obtained by means of the following calculation:

$$\beta = \frac{\partial lnc}{\partial lny} = \frac{\partial c}{\partial y} * \frac{y}{c} \rightarrow \frac{\partial c}{\partial y} = \beta \frac{c}{y}$$

[22] However, the MPC we found is within the range of the results of studies based on micro data.

[23] Households also consume on account of income from other sources, particularly income from capital. This variable does not appear in the regression since there are no data on households' income from capital. However, it is expected to be correlated with the value of assets.

Direct taxes have a significant negative effect in the long term, and the elasticity estimated with respect to direct taxes is 0.1, similar to the results reported by J&C. Nevertheless, the MPC from them is 0.6, significantly higher (in absolute values) than J&C, who report a negative MPC of approximately 0.2. This difference originates in the lower level of direct taxes in Israel as compared with other advanced economies, as a result of which the ratio between private consumption and this component is twice as high, if not more, than in those economies. The similarity between the coefficients implies that the elasticity of consumption to tax changes does not depend on the level of tax.

In contrast, we did not find that **transfer payments** had any significant long-term effect, although we did find a short term-effect. It follows that an increase in transfer payments financed by an increase in income tax leads to an increase in consumption in the short term, but to a decline in consumption in the long term. These results also confirm that consumption reacts differently to changes in income from labor than to changes in direct taxes or transfer payments. We can therefore reasonably assume that the differences in the intensity of the reactions are attributable to the fact that direct taxes affect higher income earners more, whereas transfer payments focus on population groups that suffer more from liquidity constraints.

The long-term elasticity of consumption relative to **net financial assets** is 0.2, meaning that a one-shekel increase in the assets portfolio[24] generates an increase of 1.2 agorot in consumption. This is approximately the lower limit of the estimates recognized in the literature. The short-term coefficient of the financial assets is positive and significant, and it is more powerful than that of all the other variables. Private consumption also responds favorably to **home values** but the significance is not as strong as its response to financial assets, particularly in the short term. This is consistent with the direction of influence obtained in previous studies in Israel (Kahn and Ribon, 2013; Bank of Israel, 2015), and it also corresponds with the fact that by and large, real variables affect wealth less than financial variables due to the difficulty in disposing of such assets.

Global trade also has a positive effect on private consumption in Israel, over and above its indirect impact through the income and wealth variables.

The **pace of convergence** in the return to long-term equilibrium differs substantially from J&C's result and from other studies in different parts of the world, which indicate a scale of up to 0.1 (Kim, Kerdrian, 2011; Estrada et al., 2014; Setterfield and Mei, 2014). In contrast, the coefficient of the error-correction component in the present study is 0.6, similar to that of the Bank of Israel (2015).[25] The pace of convergence is therefore high relative to the rest of the world, which appears to be a unique feature of Israel.

[24] The calculation is based on the information in footnote 19. Notably, in this case, use of the term MPC could be confusing given that here it means an increase in the flow of consumption attributable to an increase in the stock of wealth (asset portfolio), whereas it generally refers to the propensity to consume from an increase in the flow of income.

[25] Obviously, interpretation of the coefficient is different due to the frequency of the data: This study reports a closure of 60% of the deviation from the long-term trend within a quarter, whereas according to

As J&C argue, it is reasonable that the long-term relationships among advanced economies would be similar, and at the same time it is conceivable that the short-term dynamics are unique to each country. Accordingly, we will see that by and large, in the long term the income and wealth variables that determine private consumption in Israel are similar to those that seem to affect other countries. In contrast, in the short term, the similarity between the findings is limited mainly to the importance of financial assets. [26] The above-mentioned findings are similar to the findings of other studies also with respect to the difference in the elasticity of income and wealth variables between the short term and long term (Case, Estrada, et al., 2014; Kim, Setterfield and Mei, 2014; Quigley and Shiller, 2013).

b. The interest rate effect

It is generally accepted that at the aggregate level, the interest rate has an inverse effect on consumption, which is consistent with economic theory. While interest rates affect typical individuals who have savings in opposing directions—income and substitution—so that for individuals, the direction of influence to be expected is unclear, at the aggregate level, we would expect the link between interest rates and consumption to be negative, for two reasons. Some households are net borrowers, so that the income and substitution effects of the interest rate work in the same direction.[27] Furthermore, those households that are borrowers (net) are generally also relatively poor, and therefore have a higher MPC so that their consumption will react more sharply to changes in the interest rate.

The coefficient that we obtained for the interest rate is in fact negative, although generally not statistically significant. Furthermore, the coefficient is low, meaning that a one percentage point increase in the interest rate will result in a drop of just 0.1 percent in private consumption in the subsequent quarter. In this case, endogeneity is cause for concern, since although the interest rate in the regression lags, it is affected by forward-looking policy and expectations. In this situation, the coefficient that we obtained may lean towards zero, given that it is difficult to separate the negative effect of the interest rate increase originating in the substitution effect and the positive effect of such an increase as reflecting optimism regarding the future economic situation. A partial solution to this problem can be seen in the stability of the results in Table 2 columns 1–4, even when we included an interest-rate shock[28] or the interest rate in the USA in the regression. Notably,

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the Bank of Israel the correction is only expected to occur within a year. Nevertheless, in both instances, the pace of convergence is quite fast.

[26] We found a positive effect of income from transfer payments and the value of homes in the short term, whereas J&C emphasized the importance of income from labor and the unemployment rate (the latter was tested in this paper and not found to be significant).

[27] The income effect is not entirely offset, since households also lend money to the government, the business sector and abroad.

[28] An interest rate shock is represented by the residual to the interest rate equation from the Bank of Israel's DSGE model.

this coefficient reflects the direct effect of the interest rate on consumption and does not include possible indirect effects, such as through changes in the asset portfolio and home values.

Table 2: The short term - Various definitions of the interest rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Short-term coefficients								
Income from labor	0.106 (0.081)	0.107 (0.081)	0.095 (0.083)	0.146* (0.081)	0.094 (0.074)	0.088 (0.077)	0.104 (0.075)	0.088 (0.084)
Direct taxes	0.034 (0.032)	0.033 (0.031)	0.031 (0.031)	0.017 (0.032)	0.026 (0.028)	0.022 (0.028)	0.029 (0.028)	0.034 (0.026)
Transfer payments	0.113*** (0.034)	0.114*** (0.034)	0.111*** (0.034)	0.106*** (0.035)	0.105*** (0.033)	0.102*** (0.033)	0.108*** (0.033)	0.104*** (0.032)
Net financial assets (t-1)	0.146*** (0.035)	0.142*** (0.036)	0.149*** (0.036)	0.144*** (0.037)	0.144*** (0.033)	0.141*** (0.033)	0.149*** (0.035)	0.137*** (0.031)
Home values	0.105* (0.053)	0.106** (0.053)	0.106** (0.053)	0.080 (0.048)	0.081* (0.045)	0.087* (0.046)	0.091* (0.046)	0.094* (0.047)
Global trade (t-1)	0.064** (0.031)	0.067** (0.032)	0.065** (0.031)	0.066** (0.032)	0.056 (0.034)	0.064* (0.037)	0.063** (0.028)	0.053* (0.031)
Tourist arrivals	-0.003 (0.006)	-0.003 (0.006)	-0.004 (0.006)	-0.001 (0.006)	-0.004 (0.006)	-0.005 (0.005)	-0.005 (0.006)	-0.003 (0.006)
Slope of the curve (t-1)	-0.001 (0.001)							
One-year interest rate (t-1)		-0.001 (0.001)						
Interest rate shock (t-1)			0.001 (0.004)					
US interest rate (t-2)				-0.001 (0.002)				
Slope of the curve (t-4)					0.004*** (0.001)			
One-year interest rate (t-4)						0.003*** (0.001)		
Interest rate shock (t-4)							0.006** (0.003)	
US interest rate (t-4)								0.003 (0.002)
Error correction component	-0.647*** (0.132)	-0.646*** (0.133)	-0.649*** (0.135)	-0.611*** (0.128)	-0.712*** (0.124)	-0.696*** (0.137)	-0.716*** (0.111)	-0.753*** (0.112)
Number of observations	82	82	82	80	78	78	78	78
R^2	0.530	0.530	0.529	0.536	0.595	0.588	0.585	0.592
R^2-Adjusted	0.472	0.472	0.470	0.476	0.541	0.533	0.530	0.538

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Lavi (1998) and the Bank of Israel (2015) reported positive coefficients for the interest rate, but both reported a time lag of a year and they therefore interpret the outcome as evidence of the strength of the substitution effect. They argue that an interest rate increase in a previous period caused households to postpone consumption by a year, and we therefore see higher consumption in the present period. Even if we replace the one-quarter lag in the regression with a four-quarter lag in the interest rate, we will obtain a positive coefficient (see Table 2 columns 5–8), a result that is highly consistent with Lavi and the Bank of Israel.[29] In this case, there is an advantage to using quarterly data, since the direct, negative effect of the interest rate (with a one-quarter time lag) could not be examined using annual data.

c. Effect of the security situation

In the long term, the coefficient for tourist arrivals, which provides an estimate of the security situation, is negative and significant. In the short term, the coefficient is approximately zero and not positive, as we would expect. Notably, this outcome is not sensitive to the choice of different variables representing the tourism situation, and even use of the number of Israelis killed by Palestinians confirms that the security situation has no direct effect on the private consumption of households (Table A6).

This is a surprising result as it is counterintuitive. We would expect an unstable security situation to deter households from going out to shopping malls, thus harming private consumption.[30] A separate assessment of the main components of consumption reveals that the above result remains valid even when we examine private consumption excluding durables or current consumption excluding nonresidents (Table 3). Notably, in this context, we must relate to private consumption by Israelis only, so as to neutralize fluctuations in consumption by tourists arising from the security situation. In the final analysis, these fluctuations are not recorded in total private consumption given that the Central Bureau of Statistics (CBS) subtracts consumption by nonresidents in Israel from total private consumption. However, the CBS does not do this for the different components of consumption, particularly current consumption.[31]

[29] Lavi and the Bank of Israel used the real annual interest rate.

[30] Empirical support for this argument with respect to Israel can be found in Tur-Sinai (2005), and partially also in Plesner and Uzieli (2009). These studies were based on microeconomic data for the Second Intifada period.

[31] For a definition of private consumption as part of the National Accounts, see footnote 2.

Table 3: The Private Consumption Equation - Main Components

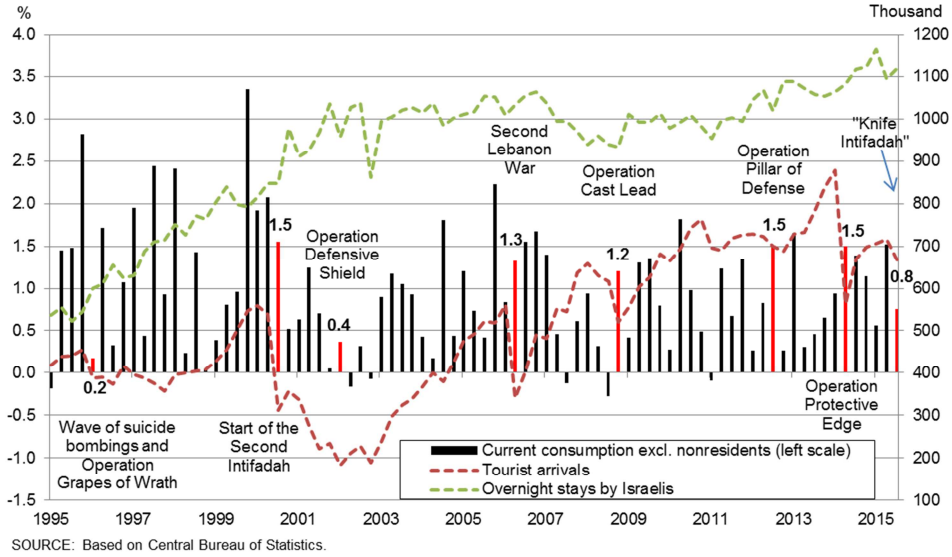
	Total private consumption	Excluding durable goods	Current consumption	Current consumption excluding nonresidents	Consumption of durable goods
Long-range coefficients					
Income from labor	0.306***	0.144*	0.155**	0.165***	1.678***
	(0.078)	(0.076)	(0.063)	(0.061)	(0.516)
Direct taxes	-0.090**	-0.068	-0.092**	-0.083**	-0.292
	(0.043)	(0.041)	(0.035)	(0.034)	(0.290)
Transfer payments	0.058	0.055	0.136***	0.126***	0.088
	(0.052)	(0.050)	(0.042)	(0.041)	(0.341)
Net financial assets	0.182***	0.169***	0.185***	0.150***	0.364
	(0.044)	(0.043)	(0.036)	(0.035)	(0.291)
Home values	0.050**	0.059***	0.052***	0.045***	0.002
	(0.020)	(0.019)	(0.016)	(0.016)	(0.131)
Global trade	0.095**	0.105***	0.021	0.100***	-0.031
	(0.039)	(0.037)	(0.031)	(0.030)	(0.254)
Tourist arrivals	-0.026**	-0.030***	0.015*	-0.024***	0.036
	(0.010)	(0.010)	(0.008)	(0.008)	(0.067)
Slope of the curve	0.000	-0.000	0.002	-0.001	0.016
	(0.003)	(0.002)	(0.002)	(0.002)	(0.017)
Bounds test	5.787	3.502	4.197	3.856	4.825
Significance level when all variables are I(0)	***	***	***	***	***
Significance level when all variables are I(1)	***	**	***	**	***
Short-term coefficients					
Return on labor	0.106	0.082	0.074	0.106*	0.293
Income from labor	(0.081)	(0.058)	(0.045)	(0.054)	(0.413)
Direct taxes	0.034	0.047*	0.033	0.035	-0.086
	(0.032)	(0.026)	(0.025)	(0.025)	(0.185)
Transfer payments	0.113***	0.051***	0.028*	0.050***	0.556***
	(0.034)	(0.018)	(0.015)	(0.015)	(0.185)
Net financial assets (t-1)	0.146***	0.051**	0.051**	0.042	0.905***
	(0.035)	(0.024)	(0.024)	(0.026)	(0.205)
Home values	0.105*	0.038	0.033	0.022	0.555*
	(0.053)	(0.039)	(0.033)	(0.034)	(0.285)
Global trade (t-1)	0.064**	0.047*	-0.004	0.018	0.203
	(0.031)	(0.027)	(0.035)	(0.034)	(0.198)
Tourist arrivals	-0.003	0.001	0.023***	-0.005	-0.014
	(0.006)	(0.004)	(0.005)	(0.004)	(0.037)
Slope of the curve (t-1)	-0.001	0.000	-0.001	-0.001	-0.005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)
Error correction component	-0.647***	-0.420***	-0.635***	-0.576***	-0.578***
	(0.132)	(0.146)	(0.134)	(0.125)	(0.142)
Number of observations	82	82	82	82	82
R^2	0.530	0.355	0.516	0.369	0.492
R^2-Adjusted	0.472	0.275	0.455	0.290	0.428

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Figure 2 shows that tourist arrivals clearly correspond with the security situation, while private consumption excluding nonresidents, and particularly overnight stays in hotels by Israelis[32], are not sensitive to security events. How is it possible that the data for the private consumption of Israelis do not reflect times of war and terrorism?

One explanation is that consumption declines immediately, but that later on in the same quarter it is compensated for, so that overall consumption, as reflected in the National Accounts, is not affected. But this is only a partial explanation since it is not always possible to compensate for something that has not been consumed at a particular time (e.g. a cancelled vacation). Other explanations could be discounts and special offers provided by businesses, particularly hotels and guest houses, the diverting of some purchases to the Internet (online shopping), and even war-time consumption as reflected in the increased purchase of food, clothing and toiletries that households purchase for the armed forces.[33] The short-term results show that these patterns may offset the negative effect of war and terrorism on consumption.

Figure 2: Rate of Change in Private Consumption Excluding Nonresidents' Consumption, 1995–2015
(seasonally adjusted quarterly data)



SOURCE: Based on Central Bureau of Statistics.

[32] For an in-depth analysis of the effect of terrorism on Israel's hotel market, distinguishing between tourists and Israelis, see Sharabany and Menashe (2011).

[33] Another explanation is offered by Eckstein & Tsiddon (2004), who argue that an increase in terrorism levels shortens the planning outlook of households, thus leading to increased consumption in the short term at the expense of saving, and consequently also to a decline in long-term consumption. Although the first part of this argument is consistent with the short-term results we obtained, this theory does not explain the long-term findings of this study.

The significant negative path of the coefficient in the long term might be attributable to the nature of the response of tourist arrivals to the security situation: They drop sharply in times of war or during a wave of terrorism, but then gradually increase when the security situation improves. In this situation, the direct negative impact of the security situation on Israelis has already worn off, but the low level of demand by tourists for local goods and services might lead to special offers and lower prices, thus encouraging consumption by Israeli households.[34]

We find empirical support for this argument in Table 4, which shows the changes in tourist arrivals and in hotel prices in the Consumer Price Index in the wake of security events in the sample period. The results confirm that similar to tourist arrivals, the price of hotel nights in the three months after a war, military operation or wave of terrorism remains lower (in most cases) than in the three months before the security event.

Table 4: Tourist arrivals and the price of overnight stays due to military confrontations (seasonally adjusted monthly data), 1995 to 2015

Periods	Military confrontation	Tourist arrivals[a]	Prices of overnight stays[a,b]
March-April 1996	Wave of suicide bombings and Operation Grapes of Wrath	-16.3%	5.8%
October 2000	Outbreak of Second Intifadah	-41.1%	-3.1%
April 2002	"Operation Defensive Shield"	-17.6%	-2.4%
July-August 2006	Second Lebanon War	-34.9%	0.6%
Jauary 2009	Operation "Cast Lead"	-14.1%	-1.3%
November 2012	"Operation Pillar of Defense"	-8.3%	-1.1%
July-August 2014	"Operation Protective Edge"	-27.4%	-1.3%

[a] Rate of change in the three months following the confrontation, relative to the three months preceding it.
[b] Prices of overnight stays are based on the Hotels and Guest Houses item in the Consumer Price Index.
SOURCE: Based on Central Bureau of Statistics.

6. ROBUSTNESS TESTS

The long-term results presented in Table 1 are based on an estimation using an ARDL model. Table 5 shows that the size and significance of the income, financial assets portfolio and tourism variables are maintained even when Equation (1) is estimated using an OLS or Fully Modified OLS[35] (FMOLS) model. In contrast, regarding the significance of the other

[34] Tourist arrivals do not have any negative impact on the consumption of durables, given that demand by tourists is mainly directed to current consumption.
[35] Another method of estimation designed to accommodate the problem of an absence of stationarity that was developed by Philips & Hansen (1990).

variables, the different estimation models do not provide the same results. In this case, the results obtained using an ARDL model are preferred, given that it accommodates the problem of a lack of stationarity (in contrast with the OLS) and is preferable to FMOLS with respect to small samples (Pesaran and Shin).

Table 5: Long range - Various estimation methods

	ARDL	FMOLS	OLS
Long-range coefficients			
Income from labor	0.306***	0.359***	0.358***
	(0.078)	(0.009)	(0.049)
Direct taxes	-0.090**	-0.064***	-0.066**
	(0.043)	(0.005)	(0.027)
Transfer payments	0.058	0.078***	0.071***
	(0.052)	(0.006)	(0.026)
Net financial assets	0.182***	0.096***	0.099***
	(0.044)	(0.005)	(0.032)
Home values	0.050**	0.040***	0.042***
	(0.020)	(0.003)	(0.013)
Global trade	0.095**	0.156***	0.153***
	(0.039)	(0.005)	(0.027)
Tourist arrivals	-0.026**	-0.017***	-0.017***
	(0.010)	(0.001)	(0.006)
Slope of the curve	0.000	-0.004***	-0.004**
	(0.003)	(0.000)	(0.001)
Number of observations	83	83	84

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

The short-term results were obtained from an estimation using an OLS model so that a possible effect of the change in consumption on the simultaneous change in the income components raises concern that the estimates are biased.[36] But the results presented in Table 6, column 2SLS confirm that this fear is unfounded. To overcome possible simultaneity, we also estimated Equation (2) using auxiliary variables (2SLS), using wages in the public sector and the statutory income tax index, which are usually determined by the government in previous periods and are therefore not affected by the simultaneous change in consumption. Previous studies in Israel (Lavi; Bank of Israel) and elsewhere (Estrada et al., 2013; Case, Quigley and Shiller, 2013) used lags of the change in the explanatory variables based on a similar argument regarding exogeneity. However, these studies did not address the correlation with the explanatory variables, and there is no reason to assume in advance that it is strong.[37] Staiger and Stock (1997) explain that in the case of a weak correlation,

[36] Use of the ARDL model allows the coefficients of the long-term link to be estimated without bias even in a case of endogeneity, provided that the lag structure explained by Pesaran & Shin is chosen.

[37] Even the use of global trade as an auxiliary variable is not ideal, since the correlation between global trade and the income from labor (in rates of change) is relatively low. Furthermore, the global trade index is already included in the consumption equation and was found to be statistically significant.

the estimates might be considerably biased even in large samples, and they point to First Stage F>10 as a rule of thumb for a strong correlation. Our case is in no way standard since it refers to the simultaneous treatment of two endogenous variables (the income from labor and direct taxes), and we therefore do not present the first stage but make do with the correlation matrix that appears at the bottom of Table 6. This matrix illustrates the advantage of using public sector wages and the statutory income tax index as auxiliary variables over independent lags of the endogenous variables. The lags column shows that in this case, the use of lags as auxiliary variables biases some of the results so that the elasticity of the transfer payments and asset portfolio declines slightly, and the significance of global trade disappears. The coefficient of direct taxes therefore increases, contrary to

Table 6: Short range - Various estimation methods

	OLS	2SLS	Lags	FD
Short-term coefficients				
Income from labor	0.106 (0.081)	0.255 (0.208)	0.282 (0.297)	0.094 (0.082)
Direct taxes	0.034 (0.032)	-0.113 (0.186)	0.158 (0.118)	0.045 (0.034)
Transfer payments	0.113*** (0.034)	0.113*** (0.034)	0.099*** (0.029)	0.114*** (0.037)
Net financial assets (t-1)	0.146*** (0.035)	0.148*** (0.038)	0.112** (0.045)	0.144*** (0.035)
Home values	0.105* (0.053)	0.091* (0.050)	0.128* (0.066)	0.094 (0.068)
Global trade (t-1)	0.064** (0.031)	0.102* (0.062)	-0.003 (0.074)	0.057 (0.035)
Tourist arrivals	-0.003 (0.006)	-0.001 (0.008)	-0.002 (0.007)	-0.000 (0.006)
Slope of the curve (t-1)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.002)	-0.001 (0.001)
Error correction component	-0.647*** (0.132)	-0.716*** (0.148)	-0.637*** (0.117)	
Number of observations	82	81	81	82
R^2	0.530	0.457	0.390	0.375
R^2-Adjusted	0.472	0.388	0.313	0.307

Standard deviations appear in parentheses. * denotes a significance level of 10%; ** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Correlation matrix		
(Variables, rates of change)	Income from labor	Direct taxes
Self-lag (t-1)	0.003	-0.030
Self-lag (t-2)	0.240	0.229
Auxiliary variable[a]	0.596	0.277

[a] Public sector wages regarding the return on labor and the statutory income tax index regarding direct taxes (actual).

economic logic and in contradiction to the correction of the bias obtained from the use of the aforementioned auxiliary variables, which are better correlated with the endogenous variables. Column FD presents the results obtained without an error correction component and, notably, the results remain similar, but the explanatory power of the regression drops considerably.

Other tests, presented in Table A7, were designed to mitigate some of the concerns relating to dependence of the results in the sample years or the localized effects of economic crises in the previous decade. In columns 2 and 3 we therefore omitted the first / last five years and in columns 4 and 5 we omitted the quarters that were included in the recession periods of the early 2000s and the economic crisis of 2008.[38] In fact, the results of the estimation show that most of the findings presented above remain stable during the different sample periods. The exception was the coefficient of housing values in the long term, which shrinks by half and is no longer significant for the 1995–2010 sample period. This result confirms that a significant part of the wealth effect originating in housing values is attributable to an increase in home prices in recent years. The Bank of Israel (2015) obtained a similar result when it found that effect of real estate values on consumption only becomes significant from 2003. To estimate the possible effect of a structural break on the regression coefficients, we examined (by means of an ADF test) at what point in time a structural break becomes most likely for each of the variables. Following the results of this test, we created a dummy variable with a value of 1 after and zero before this point in time. We then created an interaction (multiple) between the actual variable and the dummy variable, and in each column we added one of the interaction variables. As Table A8 shows, we found no evidence of the effect of structural breaks in the variables on the regression coefficients.

7. THE DEVELOPMENT OF PRIVATE CONSUMPTION OVER TIME

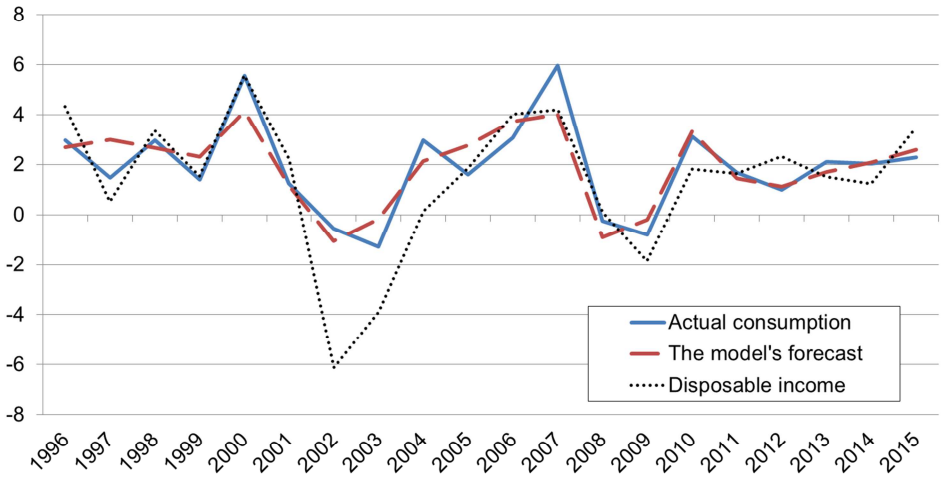
Figure 3 shows the rate of annual change in private consumption per capita and disposable income from labor and transfer payments, as well as the model forecast. The graph shows that disposable income only provides a partial explanation for the development of private consumption, which is generally lower than the model forecast. As evidence, the average deviation (in absolute values) of disposable income[39] is higher than the value forecast according to the model (1.22 compared with 0.66), particularly in the latter period (0.87

[38] The crisis of 2000 included the quarters 2000:Q4–2003:Q2, and the 2008 crisis included the quarters 2008:Q2–2009:Q2. To identify the recessions in business turnover, we reconstructed the study of Djivre & Yakhin (2011) using revised data, and we ascertained that the results were consistent with periods of a decline in the output gap according to the Bank of Israel model.

[39] Even after adjustment for 2002, in which the difference between the increase in disposable income and private consumption was exceptional, the average annual deviation of disposable income is significantly greater than that of the model forecast (0.99 compared with 0.67).

compared with 0.22 in the period 2010–2015). This comparison demonstrates the importance of other variables in addition to disposable income[40] in the consumption function—as opposed to the permanent income function—and primarily the wealth variables: financial assets and home values.

Figure 3: Private Consumption, the Model's Forecast, and Disposable Income[a], 1995–2015
(fixed prices, per capita rate of change)



[a] Disposable income from labor and transfer payments.
SOURCE: Based on Central Bureau of Statistics.

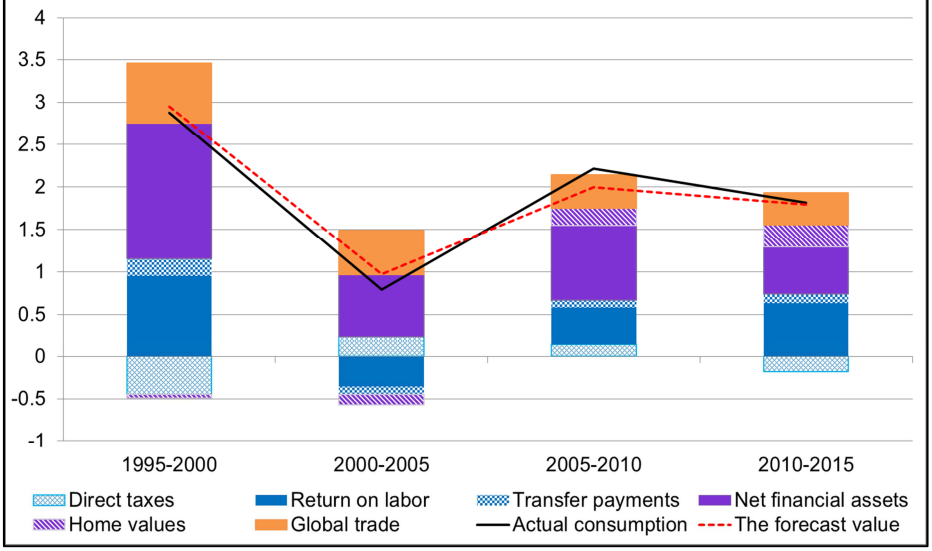
Figure 4 shows the contributions of the key components to the long-term growth of private consumption. The solid black line represents the average annual rate of increase of per capita private consumption in five-year periods, and the red dotted line represents the value forecast according to the model. Each period is represented by a column whose height denotes the average cumulative contribution of the key variables to explaining the fluctuations in private consumption.[41] The different colors in the columns represent the average, marginal contribution of each of the variables in that period. The explanatory contribution of each variable equals the change in that variable multiplied by its coefficient from the long-term equation. The difference between actual private consumption and its forecast value in each period represents the unexplained residual in the regression.

[40] We did not mention disposable private income from all sources here since that also includes income from capital for the business sector, and its average deviation is higher than that of disposable income from labor and from transfer payments (1.46 compared with 1.22).

[41] The contributions of tourist arrivals and the interest rate do not appear in the graph since their average contribution is close to zero.

The picture emerging from the graph is that the value of financial assets, disposable income from labor and from transfer payments and global trade together enable private consumption to grow throughout the years of the sample. Furthermore, in the past ten years, home values have also made a steadily increasing contribution.

Figure 4: Contribution of the Various Components to Explaining Private Consumption in the Long Term

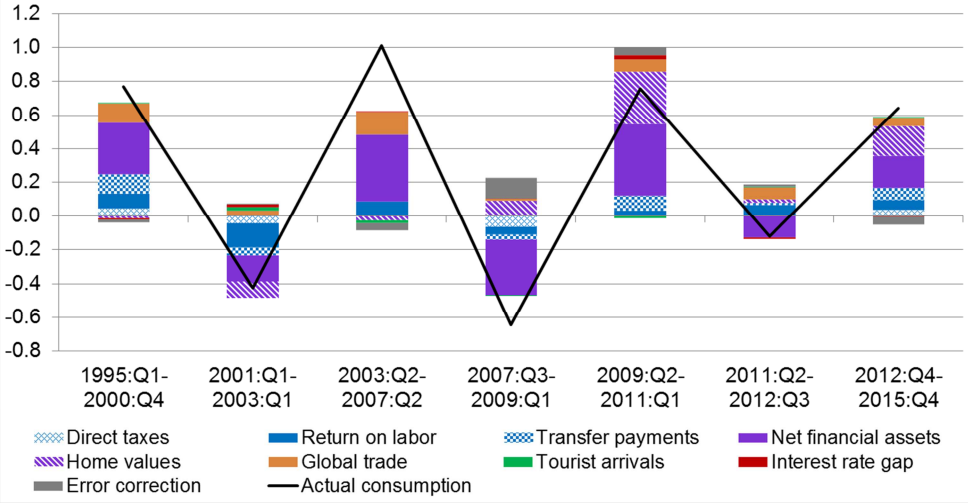


In contrast, Figure 5 shows the development of changes in private consumption and how each variable explains these changes in the short term. The black line represents the average quarterly increase in per capita private consumption in periods of economic expansion and downturn, based on the segments presented in Figure 1. In this graph, the explanatory contribution of each variable equals the change in that variable multiplied by its coefficient from the short-term equation. The difference between actual private consumption (the black line) and the cumulative contribution in each period represents the unexplained residual in the regression.

Notably, the variable with the greatest contribution to explaining the immediate response of private consumption is the net financial assets portfolio, and the importance of the other factors varies over time. In the second half of the 1990s, private consumption grew reasonably, supported by the growth of global trade and income from labor and transfer payments, until in the early 2000s, with the advent of the hi-tech crisis and the Second Intifada, it declined when the income from labor collapsed. This trend was reversed from 2003, when consumption again increased until the global financial crisis of 2008, once again supported by the expansion of global trade and, to a lesser degree, also by an increase in the income from labor. Since that crisis, global trade and the income from labor have

contributed less, while in contrast, the importance of home values has increased. In recent years, the wealth variables—the financial assets portfolio and home values—have come to explain most of the fluctuations in private consumption. During this period, changes in transfer payments have also made a noticeable contribution.

Figure 5: Contribution of the Various Components to Explaining Private Consumption in the Short Term



8. SUMMARY

This study attempts to identify and quantify the important factors that determine private consumption in Israel. For this purpose, an aggregate private consumption function in Israel was estimated for the years 1995–2015, through a standard model with error correction. We found a long-term relationship between the level of consumption and income and wealth, and also that the long- and short-term results are influenced differently.

The results of the estimation show that private consumption is mainly influenced by income from labor and the value of financial assets, and there is also evidence of a wealth effect from home values. In contrast, we did not find that changes in current income affect consumption, with the exception of changes in income from transfer payments. Short-term changes in consumption are explained mainly by changes in the financial asset portfolio, and since 2008 home values have had a stronger effect, so that in recent years wealth variables explain most of the fluctuations in private consumption. We also noticed that global trade directly affects private consumption, beyond its effect through income. Finally, we found that the interest rate has a direct, although not large, effect and we found no evidence that the security situation has any effect.

The conclusions of this study can be added to the general sense of agreement regarding the important variables in the consumption equation. But the broad range of results in economic literature as to the intensity of the effect of the different variables should deter us from adopting estimates obtained for other countries. A separate estimation of the aggregate private consumption function in Israel is therefore required. Furthermore, the differences in the results we obtained with respect to previous studies conducted in Israel—for example, regarding the short-term effect of income on consumption—confirm that studies of this kind must be revised periodically, mainly due to structural changes that may take place over time. Finally, the validity of the above-mentioned findings should be examined through studies that use microeconomic data for the Israeli economy as well.

APPENDICES

Table A1: List of Variables and Sources

Variable	**Source**
Private consumption	Central Bureau of Statistics
Income from labor of salaried employees throughout the economy	Central Bureau of Statistics
Employees' income tax	Central Bureau of Statistics
National Insurance deductions, including health tax	Central Bureau of Statistics
Net transfer payments to the public	Central Bureau of Statistics
The public's financial assets portfolio	Bank of Israel
Household debt	Bank of Israel
Index of Home Prices	Central Bureau of Statistics
Residential building completions	Central Bureau of Statistics
Global Trade Index	OECD
Tourist arrivals	Central Bureau of Statistics
Tourist overnight stays	Central Bureau of Statistics
Visitors' arrivals	Central Bureau of Statistics
Export of tourism services	Central Bureau of Statistics
Israelis killed by Palestinians	B'Tselem
Real 1-year yield	Bank of Israel
Real 10-year yield	Bank of Israel
US federal funds rate	Bloomberg
Real wage per employee post - government sector	Central Bureau of Statistics
Statutory tax index - direct taxes	Bank of Israel
Population	Central Bureau of Statistics

Table A2: Critical values for the bounds test

Table CI(iii) Case III: Unrestricted intercept and no trend

	0.1		0.05		0.025		0.01		Mean		Variance	
k	*I(0)*	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*
0	6.58	6.58	8.21	8.21	9.8	9.8	11.79	11.79	3.05	3.05	7.07	7.07
1	4.04	4.78	4.94	5.73	5.77	6.68	6.84	7.84	2.03	2.52	2.28	2.89
2	3.17	4.14	3.79	4.85	4.41	5.52	5.15	6.36	1.69	2.35	1.23	1.77
3	2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61	1.51	2.26	0.82	1.27
4	2.45	3.52	2.86	4.01	3.25	4.49	3.74	5.06	1.41	2.21	0.6	0.98
5	2.26	3.35	2.62	3.79	2.96	4.18	3.41	4.68	1.34	2.17	0.48	0.79
6	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43	1.29	2.14	0.39	0.66
7	2.03	3.13	2.32	3.5	2.6	3.84	2.96	4.26	1.26	2.13	0.33	0.58
8	1.95	3.06	2.22	3.39	2.48	3.7	2.79	4.1	1.23	2.12	0.29	0.51
9	1.88	2.99	2.14	3.3	2.37	3.6	2.65	3.97	1.21	2.1	0.25	0.45
10	1.83	2.94	2.06	3.24	2.28	3.5	2.54	3.86	1.19	2.09	0.23	0.41

SOURCE: Pesaran, Shin and Smith (2001).

Table A3: Unit root tests

Variable	Test	Level/ Change	Intercept and trend	Zt	Cv (5%)	Integration
Private consumption	ADF	Level	With I&T	-3.1	-3.47	I(1)
		Level	With I	-0.65	-2.9	I(1)
		Level	None	3.73	-1.95	I(1)
		1st	None	-8.08	-1.95	I(0)
	kpss	Level	With I&T	0.06	0.15	I(0)
		Level	With I	1.29	0.46	I(1)
		1st	With I	0.04	0.46	I(0)
Income From labor	ADF	Level	With I&T	-1.98	-3.47	I(1)
		Level	With I	-0.99	-2.9	I(1)
		Level	None	2.21	-1.95	I(1)
		1st	None	-8.58	-1.95	I(0)
	kpss	Level	With I&T	0.08	0.15	I(0)
		Level	With I	1.07	0.46	I(1)
		1st	With I	0.06	0.46	I(0)
Direct taxes	ADF	Level	With I&T	-1.92	-3.47	I(1)
		Level	With I	-1.85	-2.9	I(1)
		Level	None	0.67	-1.95	I(1)
		1st	None	-9.94	-1.95	I(0)
	kpss	Level	With I&T	0.17	0.15	I(1)
		Level	With I	0.22	0.46	I(0)
		1st	With I	0.14	0.46	I(0)
Transfer payments	ADF	Level	With I&T	-3.58	-3.47	I(0)
		Level	With I	-2.81	-2.9	I(1)
		Level	None	0.89	-1.95	I(1)
		1st	None	-13.07	-1.95	I(0)
	kpss	Level	With I&T	0.14	0.15	I(0)
		Level	With I	0.66	0.46	I(1)
		1st	With I	0.14	0.46	I(0)
Net financial assets	ADF	Level	With I&T	-1.74	-3.47	I(1)
		Level	With I	-1.42	-2.9	I(1)
		Level	None	3.85	-1.95	I(1)
		1st	None	-5.65	-1.95	I(0)
	kpss	Level	With I&T	0.19	0.15	I(1)
		Level	With I	1.26	0.46	I(1)
		1st	With I	0.11	0.46	I(0)
Home values	ADF	Level	With I&T	0.62	-3.47	I(1)
		Level	With I	1.62	-2.9	I(1)
		Level	None	1.98	-1.95	I(1)
		1st	None	-6.31	-1.95	I(0)
	kpss	Level	With I&T	0.31	0.15	I(1)
		Level	With I	0.44	0.46	I(0)
		1st	With I	0.55	0.46	I(1)

Global trade	ADF	Level	With I&T	-1.4	-3.47	I(1)
		Level	With I	-1.79	-2.9	I(1)
		Level	None	6.18	-1.95	I(1)
		1st	None	-3.67	-1.95	I(0)
	kpss	Level	With I&T	0.21	0.15	I(1)
		Level	With I	1.29	0.46	I(1)
		1st	With I	0.16	0.46	I(0)
Tourist arrivals	ADF	Level	With I&T	-2.31	-3.47	I(1)
		Level	With I	-1.98	-2.9	I(1)
		Level	None	-0.05	-1.95	I(1)
		1st	None	-10.25	-1.95	I(0)
	kpss	Level	With I&T	0.17	0.15	I(1)
		Level	With I	0.45	0.46	I(0)
		1st	With I	0.07	0.46	I(0)
Slope of the curve	ADF	Level	With I&T	-3.51	-3.47	I(0)
		Level	With I	-2.57	-2.9	I(1)
		Level	None	-2.14	-1.95	I(0)
		1st	None	-9.72	-1.95	I(0)
	kpss	Level	With I&T	0.1	0.15	I(0)
		Level	With I	0.92	0.46	I(1)
		1st	With I	0.08	0.46	I(0)

Table A4: Private consumption equations - various criteria for determining the number of lags

	Lag1	AIC	BIC
Long-range coefficients			
Income from labor	0.306***	0.274***	0.307***
	(0.078)	(0.076)	(0.078)
Diret taxes	-0.090**	-0.078*	-0.049
	(0.043)	(0.044)	(0.046)
Transfer payments	0.058	0.046	0.028
	(0.052)	(0.057)	(0.066)
Net financial assets	0.182***	0.192***	0.163***
	(0.044)	(0.047)	(0.048)
Home values	0.050**	0.059***	0.063***
	(0.020)	(0.020)	(0.024)
Global trade	0.095**	0.090**	0.110**
	(0.039)	(0.041)	(0.042)
Tourist arrivals	-0.026**	-0.028**	-0.019*
	(0.010)	(0.011)	(0.011)
Slope of the curve	0.000	-0.000	-0.003
	(0.003)	(0.002)	(0.002)
Structure of lags	(1,1,1,1,1,1,1,1,1)	(1,0,1,1,1,1,0,1,0)	(1,0,0,1,0,0,0,0,0)
Bounds test	5.787	7.406	7.604
Breusch-Godfrey	0.355	0.891	0.587
Short-range coefficients			
Income from labor	0.106	0.114	0.123
	(0.081)	(0.079)	(0.079)
Diret taxes	0.034	0.032	0.028
	(0.032)	(0.034)	(0.035)
Transfer payments	0.113***	0.111***	0.107***
	(0.034)	(0.035)	(0.034)
Net financial assets (t-1)	0.146***	0.145***	0.116***
	(0.035)	(0.036)	(0.037)
Home values	0.105*	0.108**	0.105**
	(0.053)	(0.053)	(0.052)
Global trade (t-1)	0.064**	0.057*	0.078**
	(0.031)	(0.033)	(0.031)
Tourist arrivals	-0.003	-0.003	-0.002
	(0.006)	(0.006)	(0.006)
Slope of the curve (t-1)	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)
Error correction component	-0.647***	-0.604***	-0.592***
	(0.132)	(0.142)	(0.150)
Number of observations	82	82	82
R^2	0.530	0.514	0.526
Adjusted R^2	0.472	0.453	0.467

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Table A5: Private consumption equations - various definitions of wealth variables

	(1)	(2)	(3)	(4)	(5)
Long-range coefficients					
Income from labor	0.306***	0.426***	0.498***	0.446***	0.475***
	(0.078)	(0.107)	(0.109)	(0.113)	(0.105)
Diret taxes	-0.090**	-0.103	-0.146**	-0.081	-0.094*
	(0.043)	(0.063)	(0.061)	(0.067)	(0.049)
Transfer payments	0.058	0.132*	0.159**	0.105	0.111*
	(0.052)	(0.072)	(0.069)	(0.076)	(0.059)
Net financial assets	0.182***				
	(0.044)				
Home values	0.050**				
	(0.020)				
Net financial assets		0.106*	0.082		
		(0.060)	(0.052)		
Home values net of GDP growth		0.036		-0.000	
		(0.036)		(0.032)	
Global trade	0.095**	0.226***	0.194***	0.236***	0.227***
	(0.039)	(0.032)	(0.028)	(0.035)	(0.019)
Tourist arrivals	-0.026**	-0.017	-0.012	-0.007	-0.008
	(0.010)	(0.015)	(0.014)	(0.015)	(0.014)
Slope of the curve	0.000	-0.000	-0.001	-0.001	-0.003
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)
Bounds test	5.787	3.754	3.755	3.623	4.151
Short-range coefficients					
Income from labor	0.106	0.163*	0.143	0.202**	0.188**
	(0.081)	(0.085)	(0.087)	(0.077)	(0.081)
Diret taxes	0.034	0.047	0.031	0.047	0.036
	(0.032)	(0.038)	(0.040)	(0.043)	(0.045)
Transfer payments	0.113***	0.115***	0.118***	0.101***	0.103***
	(0.034)	(0.037)	(0.038)	(0.037)	(0.038)
Net financial assets (t-1)	0.146***				
	(0.035)				
Home values	0.105*				
	(0.053)				
Net financial assets		0.091**	0.093**		
		(0.041)	(0.039)		
Home values net of GDP growth		0.081		0.075	
		(0.050)		(0.049)	
Global trade (t-1)	0.064**	0.080	0.063	0.086	0.069
	(0.031)	(0.053)	(0.046)	(0.072)	(0.068)
Tourist arrivals	-0.003	0.003	0.002	0.008	0.009
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Slope of the curve (t-1)	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Error correction component	-0.647***	-0.415***	-0.478***	-0.395***	-0.430***
	(0.132)	(0.139)	(0.127)	(0.139)	(0.135)
Number of observations	82	82	82	82	82
R^2	0.530	0.388	0.392	0.328	0.314
Adjusted R^2	0.472	0.312	0.325	0.254	0.249

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Table A6: Private consumption equations - various estimations for reprsenting the security situation

	(1)	(2)	(3)	(4)	(5)
Long-range coefficients					
Income from labor	0.306***	0.295***	0.323***	0.310***	0.244***
	(0.078)	(0.082)	(0.085)	(0.078)	(0.085)
Diret taxes	-0.090**	-0.083*	-0.106**	-0.096**	-0.073
	(0.043)	(0.045)	(0.049)	(0.043)	(0.049)
Transfer payments	0.058	0.072	0.069	0.032	0.105*
	(0.052)	(0.053)	(0.053)	(0.055)	(0.055)
Net financial assets	0.182***	0.181***	0.177***	0.196***	0.160***
	(0.044)	(0.047)	(0.045)	(0.046)	(0.050)
Home values	0.050**	0.036*	0.051**	0.059***	0.035
	(0.020)	(0.020)	(0.021)	(0.021)	(0.022)
Global trade	0.095**	0.092**	0.097**	0.065	0.121***
	(0.039)	(0.042)	(0.040)	(0.043)	(0.043)
Slope of the curve	0.000	0.002	0.000	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Tourist arrivals	-0.026**				
	(0.010)				
Tourist overnight stays		-0.054**			
		(0.025)			
Visitors' arrivals			-0.021**		
			(0.009)		
Export of tourism services				-0.025***	
				(0.009)	
Israelis killed by Palestinians					0.000
					(0.000)
Bounds test	5.787	5.505	5.665	6.029	5.076
Short-range coefficients					
Income from labor	0.106	0.097	0.104	0.096	0.097
	(0.081)	(0.080)	(0.080)	(0.079)	(0.084)
Diret taxes	0.034	0.036	0.030	0.035	0.030
	(0.032)	(0.032)	(0.032)	(0.031)	(0.032)
Transfer payments	0.113***	0.113***	0.114***	0.106***	0.118***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.035)
Net financial assets (t-1)	0.146***	0.150***	0.145***	0.154***	0.144***
	(0.035)	(0.035)	(0.035)	(0.033)	(0.035)
Home values	0.105*	0.098*	0.105*	0.110**	0.104*
	(0.053)	(0.053)	(0.053)	(0.052)	(0.053)
Global trade (t-1)	0.064**	0.062*	0.065**	0.063**	0.068*
	(0.031)	(0.031)	(0.031)	(0.031)	(0.034)
Slope of the curve (t-1)	-0.001	-0.000	-0.001	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tourist arrivals	-0.003				
	(0.006)				
Tourist overnight stays		-0.010			
		(0.014)			
Visitors' arrivals			-0.001		
			(0.006)		
Export of tourism services				-0.010*	
				(0.006)	
Israelis killed by Palestinians					0.000
					(0.000)
Error correction component	-0.647***	-0.637***	-0.636***	-0.671***	-0.590***
	(0.132)	(0.133)	(0.131)	(0.126)	(0.134)
Number of observations	82	82	82	82	82
R^2	0.530	0.528	0.526	0.545	0.511
Adjusted R^2	0.472	0.469	0.467	0.488	0.450

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Table A7: Private consumption equations - selected periods

	1995-2015	2000-2015	1995-2010	Excluding the 2000 crisis	Excluding the 2008 crisis
Long-range coefficients					
Income from labor	0.306***	0.362***	0.282***	0.349***	0.291***
	(0.078)	(0.101)	(0.093)	(0.098)	(0.085)
Diret taxes	-0.090**	-0.105*	-0.096*	-0.080	-0.093*
	(0.043)	(0.056)	(0.055)	(0.050)	(0.047)
Transfer payments	0.058	0.014	0.077	0.054	0.059
	(0.052)	(0.074)	(0.074)	(0.058)	(0.055)
Net financial assets	0.182***	0.167***	0.214***	0.179***	0.190***
	(0.044)	(0.052)	(0.066)	(0.048)	(0.053)
Home values	0.050**	0.066**	0.023	0.050**	0.051**
	(0.020)	(0.025)	(0.044)	(0.022)	(0.023)
Global trade	0.095**	0.089**	0.054	0.085*	0.090*
	(0.039)	(0.043)	(0.062)	(0.044)	(0.045)
Tourist arrivals	-0.026**	-0.028**	-0.025*	-0.030**	-0.026**
	(0.010)	(0.011)	(0.013)	(0.014)	(0.011)
Slope of the curve	0.000	0.001	-0.001	-0.002	0.000
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Bounds test	5.787	4.454	4.247	4.727	5.149
Short-range coefficients					
Income from labor	0.106	0.157*	0.138	0.174	0.092
	(0.081)	(0.089)	(0.089)	(0.118)	(0.082)
Diret taxes	0.034	0.026	0.045	0.031	0.035
	(0.032)	(0.047)	(0.037)	(0.041)	(0.033)
Transfer payments	0.113***	0.097**	0.121***	0.103***	0.129***
	(0.034)	(0.041)	(0.041)	(0.037)	(0.038)
Net financial assets (t-1)	0.146***	0.135***	0.154***	0.137***	0.132***
	(0.035)	(0.042)	(0.041)	(0.041)	(0.044)
Home values	0.105*	0.089	0.114*	0.099	0.105*
	(0.053)	(0.054)	(0.061)	(0.061)	(0.054)
Global trade (t-1)	0.064**	0.059	0.056	0.048	0.064
	(0.031)	(0.039)	(0.035)	(0.029)	(0.064)
Tourist arrivals	-0.003	-0.003	-0.003	-0.000	-0.002
	(0.006)	(0.006)	(0.007)	(0.008)	(0.006)
Slope of the curve (t-1)	-0.001	-0.001	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Error correction omponent	-0.647***	-0.684***	-0.636***	-0.650***	-0.640***
	(0.132)	(0.127)	(0.146)	(0.140)	(0.136)
Number of observations	82	64	62	71	77
R^2	0.530	0.598	0.567	0.491	0.511
Adjusted R^2	0.472	0.531	0.492	0.416	0.445

Standard deviations appear in parentheses. * denotes a significance level of 10%; ** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

Table A8: Private consumption equations - structural breaks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Short-range coefficients								
Income from labor	0.118	0.105	0.105	0.104	0.104	0.103	0.112	0.105
	(0.098)	(0.082)	(0.082)	(0.081)	(0.083)	(0.081)	(0.081)	(0.082)
Diret taxes	0.031	0.032	0.034	0.033	0.035	0.034	0.041	0.034
	(0.033)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.031)	(0.033)
Transfer payments	0.112***	0.112***	0.113***	0.113***	0.113***	0.114***	0.112***	0.115***
	(0.035)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.039)
Net financial assets (t-1)	0.144***	0.146***	0.145***	0.144***	0.145***	0.137***	0.144***	0.146***
	(0.037)	(0.036)	(0.036)	(0.036)	(0.035)	(0.039)	(0.035)	(0.036)
Home values	0.105**	0.106*	0.104*	0.104*	0.108*	0.111**	0.122**	0.106*
	(0.053)	(0.054)	(0.054)	(0.053)	(0.057)	(0.055)	(0.054)	(0.055)
Global trade (t-1)	0.066**	0.065**	0.063*	0.063*	0.063**	0.052	0.067**	0.063**
	(0.030)	(0.032)	(0.032)	(0.032)	(0.032)	(0.034)	(0.031)	(0.032)
Tourist arrivals	-0.002	-0.003	-0.003	-0.003	-0.003	-0.003	-0.008	-0.003
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Slope of the curve (t-1)	-0.001	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Structural break coefficients								
Income from labor	0.000							
	(0.001)							
Diret taxes		-0.000						
		(0.000)						
Transfer payments			0.000					
			(0.000)					
Net financial assets (t-1)				-0.000				
				(0.000)				
Home values					0.001			
					(0.001)			
Global trade (t-1)						-0.001		
						(0.001)		
Tourist arrivals							0.004***	
							(0.001)	
Slope of the curve (t-1)								0.001
								(0.002)
Error correction component	0.645**	-0.645***	-0.644***	-0.643***	-0.644***	-0.651***	-0.646***	-0.646***
	(0.133)	(0.133)	(0.136)	(0.134)	(0.133)	(0.132)	(0.131)	(0.133)
Number of observations	82	82	82	82	82	82	82	82
R^2	0.531	0.531	0.530	0.531	0.531	0.533	0.544	0.531
Adjusted R^2	0.465	0.465	0.464	0.465	0.465	0.467	0.480	0.465

Standard deviations appear in parentheses. * denotes a significance level of 10%;
** denotes a signifcance level of 5%; *** denotes a significance level of 1%.

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