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MASTER'S THESIS

Fiscal Policy in Israel:

Cyclicality of government expenditures

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Abstract

The behavior of fiscal policy over the business cycle has received increasing attention from researchers in recent years. The terms pro-cyclical and counter-cyclical are used to describe how an economic policy is related to economic fluctuations, indicating a government's approach to spending and taxation. A pro-cyclical fiscal policy can be summarized as governments choosing to increase public spending and reduce taxes during an economic boom, but cut spending and raise taxes during a recession. A counter-cyclical fiscal policy refers to the opposite approach: reducing spending and raising taxes during a boom period, whereas increasing spending and cutting taxes during a recession. Most economists would agree with the normative prescription that tax rates and discretionary government spending should follow a counter-cyclical pattern. Pro-cyclical fiscal policy leads to macroeconomic instability and aggravates crises. Literature shows that, although considered sub-optimal, developing countries historically adopted pro-cyclical fiscal policies. In recent times, however, we are observing a shift in this trend, since several developing economies have been able to escape the pro-cyclicality trap and become counter-cyclical (Vegh and Vuletin, 2014).

This work analyzes cyclicality of government expenditures in Israel. Previous literature found that, although Israel has traditionally adopted a highly pro-cyclical fiscal policy, it has attenuated since the Economic Stabilization Program in 1985. This work adds to previous literature in Israel through two new angles: first, it continues the analysis using updated data in order to check whether Israel also "graduated" by turning into counter-cyclical fiscal policy; second, it analyzes for the first time the transmission channels that allowed Israel to change fiscal policy reaction to cycles.

The main finding of this work is that since 2008, right before the worldwide economic crisis, Israel's fiscal policy "graduated" and turned into counter-cyclical. We show that this result is valid for total general government expenditure in real terms (deflated by GDP prices). According to our findings, total government expenditure's coefficient was -0.1 since 2008 (i.e., countercyclical) after showing a positive value for all previous sub-periods of Israel's economic history. It also happens among cyclically adjusted deficits, which show significant counter-cyclical levels in particular from 2005. Expenditures' components - in particular transfer payments - are following the same

direction: despite traditional pro-cyclicality levels, transfer payments coefficient became -0.5 for the period after 2008. We also found that pro-cyclicality of fiscal policy in the past was mainly related to recessions, a pattern that is similar to developing economies since those are periods of rising government deficit. Consequently, governments cut expenditure or raise taxes as a way of coping with the increasing deficit.

Another finding of the present work is that high public debt seems to be the main restraint toward adopting counter-cyclical fiscal policy over time. Our regressions show that historical procyclicality was associated with a high external and total debt. This finding is consistent with the reduction of pro-cyclicality that occurred when Israel's government debt as a percent of GDP was reduced substantially, and became lower than most developed economies after the last world economic crisis. In addition, historical pro-cyclicality proved stronger in recession compared expansion years, and the difference stems indeed from high debt periods.

1. Introduction

The behavior of fiscal policy over the business cycle has received increasing attention from researchers in recent years. The terms pro-cyclical and counter-cyclical are used to describe how an economic policy is related to economic fluctuations, indicating a government's approach to spending and taxation. A pro-cyclical fiscal policy can be summarized as governments choosing to increase public spending and reduce taxes during an economic boom, but cut spending and raise taxes during a recession. A counter-cyclical fiscal policy refers to the opposite approach: reducing spending and raising taxes during a boom period, whereas increasing spending and cutting taxes during a recession.

Most economists would agree with the normative prescription that tax rates and discretionary government spending should follow a counter-cyclical pattern. Pro-cyclical fiscal policy leads to macroeconomic instability and aggravates crises. Literature shows that, although considered sub-optimal, developing countries historically adopted pro-cyclical fiscal policies. In recent times, however, we are observing a shift in this trend, since several developing economies have been able to escape the pro-cyclicality trap and become counter-cyclical (Vegh and Vuletin, 2014).

Regarding the revenue side of Israeli fiscal policy, Strawczynski (2014) recently concluded that while direct taxes are a-cyclical, indirect taxes are changed pro-cyclically. In turn, the present work relates to the cyclicality of public expenditures in Israel. Israel's case is interesting since it is considered an industrial economy and is known for having pursued a highly pro-cyclical fiscal policy. However, as shown by Strawczynski and Zeira (2007), both the government deficit and expenditures have become less pro-cyclical after Israel's Economic Stabilization Program (1985), a period that is characterized by improved fiscal discipline. Strawczynski and Zeira's study was the first to call attention for this topic, and it is time to update their analysis in order to include the last global economic crisis of 2008.

This work aims to investigate whether Strawczynski and Zeira's assumption stand the test of time. Has in fact Israel confirmed the trend of passing from pro-cyclical fiscal policy, as was common to many developing countries, to counter-cyclical fiscal policy, as is typical of developed countries? Is it following the wave of several emerging economies and converging to the world counter-cyclical trend? We present some

innovations compared to Strawczynski and Zeira's paper. First, as mentioned, we test how Israel reacted to the last global crisis, which could be a fireproof owing to its magnitude worldwide. Moreover, we update their methodology – for instance, by using instrumental variable and co-integration technique – and check for the mechanism behind Israel's traditional pro-cyclical policy in respect of public expenditures over time, a point that has not been studied so far.

The work is organized as follows. Section 2 discusses the relevant literature on the subject, such as the advantages of counter-cyclical policies and the historical difference between groups of countries; as well as introduces the Israeli case. In Section 3 we describe the data, the methodology and the basic long-run model. Section 4 presents the short-run findings. It analyses the evolution of expenditure's response to output change since 1960, including a differentiation between recession and expansion periods. We also describe the results regarding each public expenditure components in separate – transfers, consumption and investment. Section 5 compares between economic and political restraints to check the mechanisms behind Israel's fiscal behavior over time. Section 6 measures cyclicality of government deficit in recent years. Section 7 concludes.

2. Literature review

It is not an overstatement to say that an implicit consensus emerged in literature, claiming that counter-cyclical policies are preferable than pro-cyclical reactions. On the one hand, theoretical work clearly suggests that counter-cyclical policy should alleviate the severity and duration of crises. For instance, Altig et al. (2011) and Nakata (2013) show that the optimal fiscal policy in a stochastic model with sticky prices is indeed counter-cyclical. While the first takes monetary policy as given, the former shows how both counter-cyclical monetary and fiscal policy complement each other.

On the other hand, also empirical studies reached the same conclusion. Pro-cyclical fiscal policy is sub-optimal because it would exacerbate the business cycle (Ilzetzki & Vegh, 2008) - what Kaminsky, Reinhart and Vegh (2005) named the "when it rains, it pours" phenomenon. In their recent study, Vegh and Vuletin (2014) deeply analyze the Latin America's case from 1960 to 2010 and conclude that, when applied, counter-cyclical policy responses have been effective in reducing the duration and intensity of

recessions. Likewise, they show that pro-cyclical fiscal policy in some Eurozone countries has increased the duration and intensity of the last global crisis.

Over the last 20 years, a large and growing literature has argued toward a fundamental difference between how fiscal policy is conducted in developing countries compared to industrial countries. Traditionally, while fiscal policy in industrial countries is either a-cyclical or counter-cyclical, fiscal policy in developing countries is, by and large, pro-cyclical. Gavin and Perotti's (1997) influential paper inaugurated the debate when concluding that, comparing to OECD countries, fiscal policy in Latin America was volatile and pro-cyclical.

A large number of authors have reached similar conclusions and extended them to other regions, to the point that it has become part of the conventional wisdom. For instance, Frankel, Vegh and Vuletin (2013) illustrate this contrast when comparing 94 countries between 1960-2009: while more than 90% of developing countries (67 out of 73) showed pro-cyclical government spending, around 80% of industrial countries (17 out of 21) presented counter-cyclical government spending over this period.

Likewise, Ilzetzki and Vegh (2008) found fiscal policy is indeed pro-cyclical in developing countries, even after addressing endogeneity between government expenditures and GDP with several econometric tools. At least for developing countries, this provides clear evidence that the "when it rains it pours" phenomenon is empirically relevant and should indeed be a serious public policy concern. In fact, the ability to transition from a pro-cyclical fiscal policy to an a-cyclical or counter-cyclical policy is viewed as a badge of macroeconomic honor in the developing world and as a sign that the country belongs to an exclusive club that relies on sound economic policies.

This leads us to the following question: Why would policymakers in developing countries pursue pro-cyclical fiscal policy? After all, such policy cannot be optimal since it will tend to reinforce the business cycle, exacerbating booms and aggravating busts, what would lead to undesirable consequences such as increasing unemployment rates. As summarized by Frankel, Vegh and Vuletin (2013), the most convincing explanations in the literature fall in two non-excluding fields. The first is related to economic distortions, as imperfect access to international credit markets and lack of financial depth (Caballero & Krishnamurthy, 2004; Gavin & Perotti, 1997). Lack of access to credit markets in bad times will naturally leave governments with no choice

but to cut spending and raise taxes. The second reason is related to political restraints (Talvi & Vegh, 2005; Tornell & Lane, 1999). Political pressures for additional spending in good times are hard to resist, particularly when there may exist a genuine need for more government spending in critical social areas. Therefore, improving access to credit in bad times and designing rules and institutions that aim to ensure that fiscal revenues are saved in good times so that they are available in bad times would alleviate the undesirable consequences of pro-cyclical fiscal policy. This issue will be taken up later in section 5.

An interesting finding from the last decade is that, despite this historical sub-optimal behavior, developing countries are experiencing a "shift" in terms of cyclical policies. Frankel, Vegh & Vuletin (2013) argue that about a third of the developing world have been able to "graduate" in the sense of overcoming the problem of pro-cyclicality and becoming counter-cyclical. Among the 73 developing countries of their study, 26 showed in 2000-2009 a counter-cyclical fiscal policy, up from 6 in 1960-1999.

Indeed, Didier, Hevia and Schmukler (2012) documented a structural break in the way emerging economies responded to the last global shock. The global crisis found many emerging economies with more fiscal space, better domestic balance sheets and the required credibility to conduct expansionary fiscal and monetary policies. Therefore, they resumed their higher growth rates earlier and converged more quickly to their pre-crisis growth trend in comparison to previous crises. The resilience of emerging economies to the 2008 crisis might be somehow attributed to a combination of sounder macroeconomic and financial policy frameworks with a shift towards safer domestic and international financial stances.

Similarly, Vegh and Vuletin (2014) concluded that unlike the crises of the 1990s - when emerging economies usually lacked the policy tools available to advanced economies to counter-cyclically respond to external shocks - many developing countries were able to implement counter-cyclical monetary and fiscal policies, which have indeed helped in reducing the duration and intensity of the last crises in Latin America.

Where does Israel fit in this story? The most comprehensive work about the country's fiscal policy was written by Strawczynski & Zeira (2007). The authors call attention for the importance of analyzing Israel separately. Unlike other developed countries, Israel historically implemented a traditional pro-cyclical fiscal policy.

Interestingly, Alesina and Tabelini (2005) even take out Israel from their study for being an outlier.

Figure 1 reproduces the aforementioned Frankel, Vegh & Vuletin's (2013) international comparison and clearly illustrates the contrast between industrial and developing countries (respectively represented by orange and blue bars) in respect of public spending cyclicality. We include a black bar to represent Israel data, which does not appear in the original work. The figure presents the correlation between the cyclical components of real government spending (deflated by the GDP deflator) and real GDP for the period 1960-2009, where a positive (negative) correlation indicates pro-cyclical (counter-cyclical) government spending. Cyclical components have been estimated using the Hodrick-Prescott Filter. Although classified as a developed country, Israel presents a correlation value of 0.43, which is remarkable pro-cyclical.

Figure 1: International comparison regarding cyclicality of public spending, 1960-2009
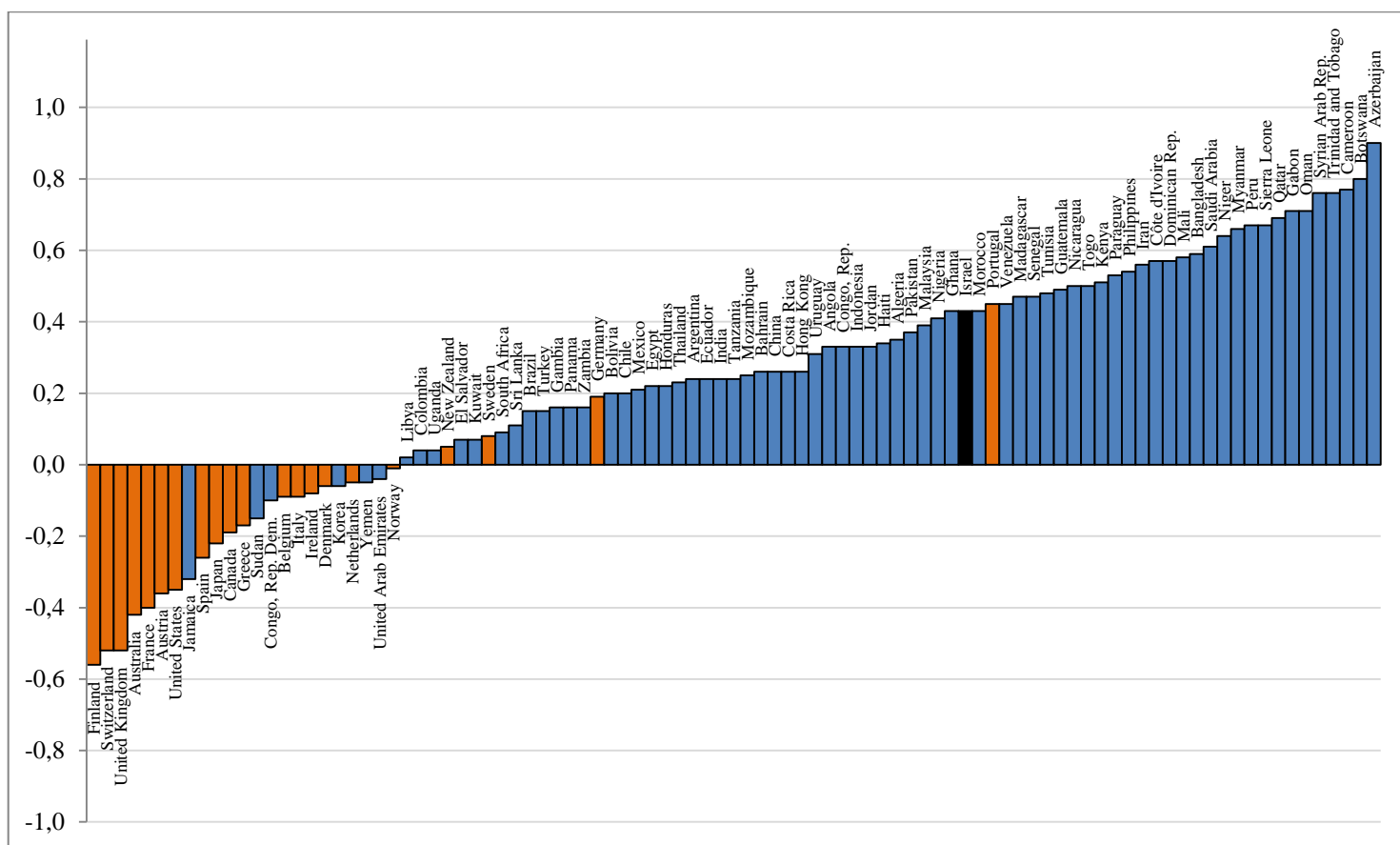
According to Strawczynski and Zeira's article, when cyclicality is measured uniformly, it does not capture Israel's particularities (such as wars, immigration or the Stabilization Program), what can bias pro-cyclicality of fiscal policies. Moreover, although in the 1960-2005 period expenditures are pro-cyclical and government deficits only mildly counter-cyclical, both of them have become more counter-cyclical after Israel's Economic Stabilization Program (1985), a period that is characterized by improved fiscal discipline. As they concluded, it is an indication that Israel was going through a transition from pro-cyclical to counter-cyclical fiscal policy.

Strawczynski (2014) covers the revenue side when studying how statutory taxes are changed by the government in expansions and recessions. It was found that while direct taxes are a-cyclical, indirect taxes (in particular VAT) are changed pro-cyclically. The main reason for statutory tax changes is the existence of economic crises. In the following sections we contribute to completing the fiscal policy picture by analyzing the expenditure side in details.

3. Methodology

Government expenditures and national product are two non-stationary time series that become stationary when differenced, meaning that they might be co-integrated. We will therefore make use of co-integration technique, which allows us to incorporate both short-term dynamics and long-run expectations.

According to the co-integration method, the first stage is to run a long-run equation of the model, augmented to additional variables that are candidates for contributing to co-integration. In turn, short-term equations require lags in order to check for a possible lagged cyclical reaction, so for this step we will consider a symmetric structure from the long-run framework and compute its residuals. This approach is named error-correction mechanism: we use lagged error-terms from the long-run specification in order to adjust the time series to match the long-term equilibrium. Indeed, a country's economic structure stems from the long-run relationship, but cyclicality is a short-term phenomenon in which fiscal policy reacts to business cycle fluctuations.

That said, we begin our analysis with a simplified fiscal policy specification, which examines the response of changes of expenditures to the product growth:

(1) $\log(G) = \alpha + \beta \log(Y) + Z + v$.

The dependent variable is the logarithm of real government expenditures, $\log(G)$, and the main independent variable is the logarithm of Israeli real output, $\log(Y)$. There is a set of exogenous control variables, denoted by Z, which might also explain expenditures besides the effect of GDP. It is worth noting that all fiscal variables are converted into constant prices using the GDP deflator, since we do not want to eliminate any growth in government spending that takes the form of an increase in the relative price of public sector outputs (Lane, 2003). For example, a possible reaction of fiscal policy to cycles may be channelized through government wages. This would be captured by our approach, while would not happen in case of simply using government expenditure at constant prices.

In order to address the endogeneity concern between public expenditures and GDP we run two-stage least square models using the world trade as an instrumental variable for the GDP. Jaimovich and Panizza (2007) suggest the use of country's trade partners output as instrument to the GDP in the fiscal policy context. Since Israel is an open and small economy and its trade is evenly distributed among the different continents, the world trade is a good proxy for it and serves well as instrumental variable. There is no doubt this variable is exogenous from Israel's point of view, and it was already successfully used in Israeli context (Strawczynski, 2014).

To choose the model's variables, we start from Strawczynski and Zeira's (2007) framework, which include Israeli characteristics that might bias pro-cyclicality of fiscal policy. We first consider total country population (POP_TOT) as an intuitive control variable. Then, we add a variable to catch the influence of the Economic Stabilization Program, since from 1985 Israel has considered improved its fiscal policy. This variable is denoted by dum85*$\log(Y)$, which represents the interaction between the log of the product and a dummy for the period after the program (i.e., for all years before 1985 it receives value 0; and for all years starting from 1985 it receives value 1). This framework is illustrated through the first model in the Table 1 below.

Table 1. Explaining public expenditures in the long-run

Period: 1960-2014	Dependent Variable: log(G)				
	(1)	(2)	(3)	(4)	(5)
C	186.17***	16.30**	8.61	-27.65	-24.80
log(Y)	11.54***	3.31***	3.30***	3.54***	3.65***
log(POP_TOT)	-21.26***	-3.31***	-2.39**	2.07	1.78
dum85*log(Y)	0.05*	-1.69***	-2.00***	-2.67***	-4.26**
dum85*log(POP_TOT)		1.38***	1.64***	2.19***	5.41
log(POP_DEP)			-0.49	-1.57*	-1.28
log(IMM_5)			0.00	0.04	0.04
log(TECH)				-2.42**	-2.81**
dum85					-29.11
Observations	55	55	55	55	55
Adjusted R^2	0.71	0.99	0.99	0.99	0.99
Durbin-Watson	0.46	1.05	1.05	1.12	1.14
ADF	-3.04	-6.04***	-6.04***	-6.14***	-6.06**

Notes: In all tables, statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively. In addition, all regressions are two-stage least square with world trade as instrumental variable for the output. Over all long-run equations, significance for ADF tests of residuals is based on McKinnon's (1991) critical values.

Although all coefficients are significant at least at the 10% level, model (1) is not appropriate for co-integration technique once the ADF value is not. In other words, the equation residual did not pass the unit-root test and is not stationary, so it does not satisfy the conditions for co-integration. Based on Strawczynski and Zeira's (2001), our first attempt to improve the model is to include a variable for interaction also between the period from 1985 and the total population, as illustrated in model (2).

This change was considerably effective. First of all, ADF value is now strongly significant. As expected, the adjusted R^2 is quite high and the Durbin-Watson statistic is low. This happens because economic time series are dominated by smooth, long-term trends. That is, the variables behave individually as nonstationary random walks. The

coefficient of log(Y) is positive, indicating that expenditures' reaction to GDP changes in Israel is pro-cyclical. The coefficient of the interaction dum85*log(Y) is negative, corroborating the finding that fiscal policy has become less pro-cyclical since the Economic Stabilization Program.

The next step is to add candidate variables for contributing to co-integration. In model (3) we include two more demographic indicators. The first is the dependent population (POP_DEP), which consists in the population below age 15 and over age 65. The second is the effect of immigration, which is computed as the aggregate immigrants that arrived in the last 5 years (IMM_5). We can therefore comprise the government spending in absorption, from direct support to newcomers until construction and infrastructure. The effect of immigration waves is unique to Israel, since the country absorbs many Jewish immigrants. This effect might bias pro-cyclicality upwards, so it should be controlled for in order to get a more reliable measure of cyclicality of fiscal policy (Strawczynski and Zeira, 2007). Despite these changes, the new variables do not considerably impact the results.

Model (4) includes a variable for technological progress (TECH), calculated as the U.S. output detrended with Hodrick-Prescott filter. It captures exogenous technology shocks that might affect expenditures rather than the long-term trend. The coefficient proves to be significant. Total population losses significance on account of the dependent population variable. This model presents the highest ADF value among the ones tested, which already would be a determinant criterion in its favor. Moreover, as literature suggests, it incorporates all Israel specificities such as variables for demographic trends and responses to technology shocks. Finally, the expenditure response to product fluctuations is closer to the observed in previous works. Strawczynski and Zeira (2007) points out that after 1985 expenditures are significantly less pro-cyclical, reaching almost a-cyclical levels. Indeed, when summing up the coefficients of the whole period product and of its interaction with the dummy for the 1985-2014 years, the result is closer to zero (a-cyclical policy) than in the other specifications. For these reasons, we consider this model preferable to the previous presented.

We run a variation of this model, which includes also the variable dum85 in separate. Results are shown in model (5). It tests the hypothesis of a structural break from 1985 not only in terms of the "slope" of the curve (represented by the interaction

term) but also for a level change in that year. The constant term for the 1985-2014 period is not significant and the ADF value is even lower than in model (4). Strawczynski and Zeira's (2001) work on Israeli defense expenditures also checked co-integration change in their model and received lower values for ADF in the equation that contains a dummy for year 1985 and beyond. For these reasons, we keep the choice of adopting model (4) as our basic framework from now on. Therefore, the basic long-run model is as follows:

(2) $\log(G) = \alpha + \beta \log(Y) + \gamma \log(\text{POP\_TOT}) + \delta \text{ dum85}*\log(Y) + \varepsilon$
$\text{dum85}*(\text{POP\_TOT}) + \zeta \log(\text{POP\_DEP}) + \eta \log(\text{IMM\_5}) + \theta \log(\text{TECH}) + v$.

As required by co-integration, variables are I(1) (first-order integrated series). The unit root test results are reported in Appendix 2. The next section presents the short-term analysis of government expenditures over time and the business cycle, as well as for each of its components in separate.

4. Cyclicality of government expenditures in Israel

4.1. Cyclicality of government expenditures over time

Since we are dealing with short-term dynamics, for all continuous variables we apply now the first difference of the logarithm (dlog) instead of simply the log. Naturally, exclusively long-run trends (namely, break points for the output and the population from 1985 on) are not included in the equations. In addition, following Strawczynski (2014), changes in GDP are instrumented in the short-term by changes in world trade with one and two lags.

The other long-term basic model components are preserved, with three additional variables. The first is the error term, denoted by RESID(-1). Secondly, we add a dummy variable (WAR) to catch years of large increases in defense costs. Although relatively frequent in Israeli history, wars imply in momentary impacts over expenditures, so it was included only in the short-term. War years are based in Strawczynski and Zeira's (2007) similar variable, with the addition of military operations and expressive terrorist events as the Intifada. Finally, each equation contains a variable representing the interaction between a dummy for a certain period (dum_PERIOD) and the GDP. Each

dummy relates to the period beginning at 1985, 1990, 1995, 2000, 2005 or 2008 until 2014. The last range (2008-2014) interrupts the 5-year ladder in order to catch the influence of the last global economic crisis. The coefficient of each interaction term indicates the cyclicality level of that specific time period in comparison to the entire sample. We can reach the ultimate cyclicality level for each time period by summing up the coefficients of the product and the interaction term. Equation (3) represents the short-run model described above:

(3) $dlog(G) = \alpha + \beta\,dlog(Y) + \gamma\,dlog(POP\_TOT) + \delta\,dum85*dlog(Y) + \varepsilon$ $dum85*(POP\_TOT) + \zeta\,dlog(POP\_DEP) + \eta\,dlog(IMM\_5) + \theta\,dlog(TECH) + \iota$ $RESID(-1) + \kappa\,WAR + \lambda\,dumPERIOD*\,dlog(Y) + \nu$.

Table 2 summarizes the short-term results regarding public expenditures' cyclicality.

Table 2. Cyclicality of Public Expenditures in the short-run

Period (adjusted): 1963-2014	Dependent Variable: dlog(G)					
	(1)	(2)	(3)	(4)	(5)	(6)
C	-0.02	-0.07*	-0.01	0.03	0.00	-0.04
dlog(Y)	2.94***	2.87***	3.34***	3.32***	2.52***	1.85***
dlog(POP_TOT)	0.69	6.13	3.36	-3.69	-1.21	0.69
dlog(POP_DEP)	-0.93	-1.22	-1.91	0.17	0.65	0.93
dlog(IMM_5)	-0.02	-0.05	-0.10**	-0.09**	-0.06*	-0.03
dlog(TECH)	-1.07	-3.53	-3.04	-2.14	-2.48	-1.79
dum85*dlog(Y)	-1.36***					
dum90*dlog(Y)		-1.46***				
dum95*dlog(Y)			-2.08***			
dum00*dlog(Y)				-2.20***		
dum05*dlog(Y)					-2.10**	
dum08*dlog(Y)						-1.93*
RESID(-1)	-0.52***	-0.52***	-0.64***	-0.61***	-0.50***	-0.40***
WAR	0.07***	0.07***	0.07***	0.08***	0.08***	0.08***
Observations	52	52	52	52	52	52
Adjusted R^2	0.51	0.51	0.44	0.45	0.55	0.58
Durbin-Watson	1.69	1.78	1.76	1.81	2.11	1.82

The fact that all residuals are remarkably significant corroborates the existence of co-integration relationship. So is WAR variable, what justifies its inclusion in the short-term frameworks. Its positive sign shows that spending is higher in years of conflicts. One can note that GDP coefficient is always positive and significant, meaning that cyclicality of fiscal policy for the whole 1960-2014 period is, as expected, pro-cyclical. For all tested periods coefficients of the interaction terms are negative and significant: in comparison to the entire sample, each time period considerably reduces the pro-

cyclicality levels. The following figure illustrates the sum between coefficients of the product and the interaction terms for each equation, what enables us to see the evolution of Israeli expenditure reaction to GDP changes over time.

Figure 1: Expenditure reaction to GDP changes

First year of the time period; Last year = 2014
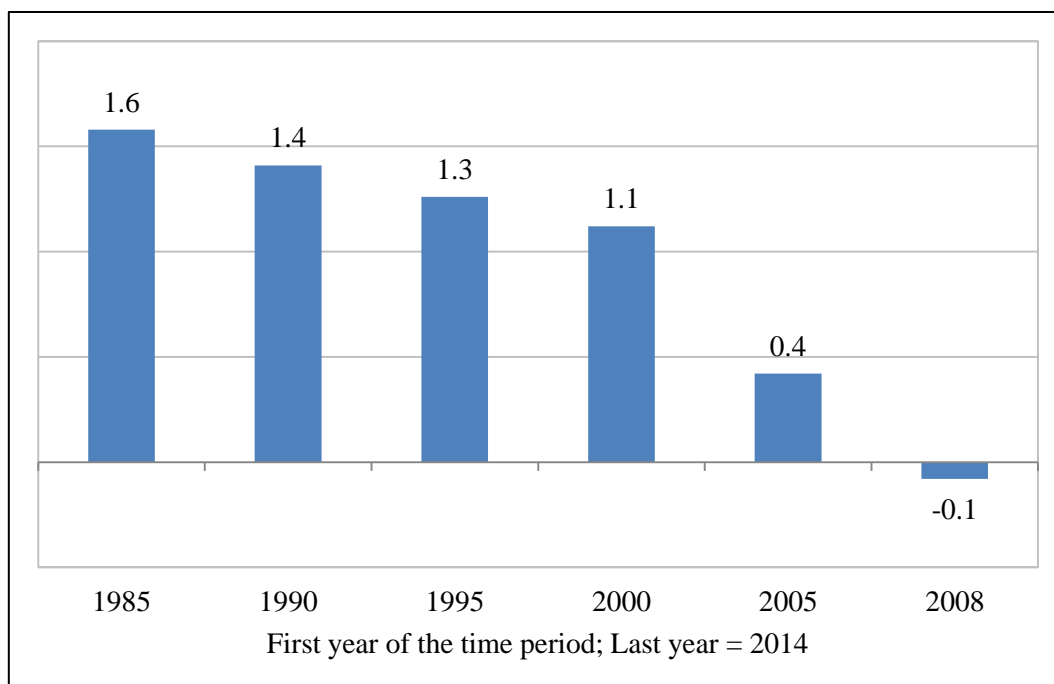
The chart shows a very interesting picture. After 1985, when inflation was stabilized and fiscal discipline was renewed, Israel gradually reduced its pro-cyclical behavior, since the final coefficient systematically decreases over time. In Frankel, Vegh & Vuletin's (2013) words, Israel's fiscal policy is "graduating" in the last decades: from pronounced pro-cyclical policy since 1960, it reached even counter-cyclical levels in the last global crisis.

This movement is similar to many developing countries, which have recently been able to switch from traditional pro-cyclical policy to counter-cyclical responses. For example, we can compare Israel's case to Latin America countries. Vegh and Vuletin (2014) calculate eight countries' spending policy response by the average correlation during crisis periods between the cyclical component (using the Hodrick-Prescott filter) of government spending and GDP. Here, positive correlation coefficients indicate pro-cyclical fiscal policy, while negative coefficients mean counter-cyclical policies. Table 3 reproduces their findings, followed by Israel calculations.

While in light of the individual fiscal paths it is difficult to assess an overall policy stand in the region, it seems that on average Latin America have improved fiscal managements. Although in the pre-1998 period the spending response was clearly pro-cyclical (correlation coefficient of 0.6), it fell to half (coefficient of 0.3) in the post-1998. In particular, Brazil, Chile and Mexico switched their fiscal policy responses from pro-cyclical before 1998 to counter-cyclical after 1998.

A similar pattern is observed concerning Israel's spending policy: it gradually reduced its pro-cyclical response levels over time until reaching an even counter-cyclical spending policy after 2008. While among Latin America countries cyclicality is measured by correlation between expenditures and GDP, in Israel's case it is reported as the coefficients derived from the short-run regressions of Table 2, which takes into account Israel's particularities. Nevertheless, it stands out that these countries follow similar "graduation" stories.

Table 3: Cyclicality of spending policy among Latin America countries and Israel

Country	Before 1998	After 1998	Before 1985	After 1985	After 2000	After 2008
Argentina	0.1	0.8				
Brazil	0.6	-0.3				
Chile	0.6	-0.2				
Colombia		0.2				
Mexico	0.5	-0.5				
Peru	0.6	0.8				
Uruguay	0.9	0.7				
Venezuela		0.8				
Region Average	0.6	0.3				
Israel			2.9	1.6	1.1	-0.1

4.2. Cyclicality of government expenditures over the business cycle

A relevant question is related to the business cycle fluctuation: would Israel fiscal policy behave different in booms and recessions? In order to define expansions and recessions, we estimate the GDP value based on its growth rate. It is important to mention that the trend of output growth changed significantly in 1973: from an average annual growth rate of 8.45% in 1961-1973, it declined to less than half (4.16%) in 1974-2014. For this reason we consider those two periods in separate when calculating the

estimated product. The years that the actual GDP lies below the estimated value are considered recession periods; and those that the actual GDP lays above it are labeled as expansion.

That said, we create a variable, named dumBELOW, which denotes 1 for years of recession and 0 for years of expansion. Model 1 in Appendix 3 shows the basic short-term framework with this variable included. Analyzing the coefficient of the interaction term between this dummy (recession years only) and the product, we can conclude that fiscal policy was more pro-cyclical – due to the positive sign – in recessions in comparison to expansion periods. The same coefficient, but this time with negative sign, is obtained when substituting the dumBELOW variable for its correspondent dumABOVE, which includes expansion years only. This specification is reported in Model 2. The interpretation is similar: comparing to recession years, expenditure reaction to GDP changes in booms is counter-cyclical. Results for the entire period, with no interaction dummy, are presented in Model 3. In sum, the figure below compares cyclicality levels between these three specifications.

Figure 2: Cyclicality over the business cycles
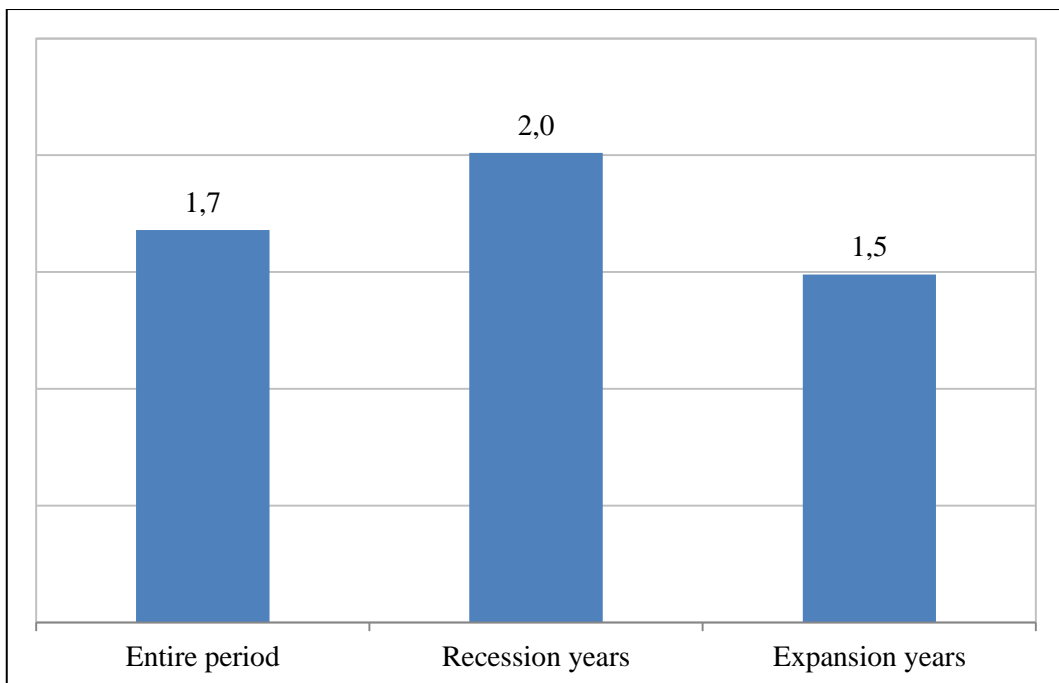
4.3. Cyclicality of government expenditures components: transfer payments, government consumption and public investment

In addition to the public expenditure, we will check the cyclicality of its components: transfers, consumption and investment. Appendix 4 presents the long-run equations for each one of them. The only difference regarding the basic model is the addition of a variable for the annual unemployment rate in the transfers' specification. As expected, higher unemployment rates lead to an increase in transfer payments. All models meet the co-integration requirements and, just as total expenditures, the three components show pro-cyclical behavior for the entire period.

We turn next to the short-term analysis, presented in Appendix 5 (transfer payments) and 6 (government consumption). Interaction terms between time periods and GDP change in public investment equations were not significant at any equation, so the results were not displayed. Similar to Figure 1, Figure 3 shows transfers and consumption responses to variations in GDP for each time period. Only calculations of significant coefficients are displayed in the chart.

Figure 3: Cyclicality of public expenditure components
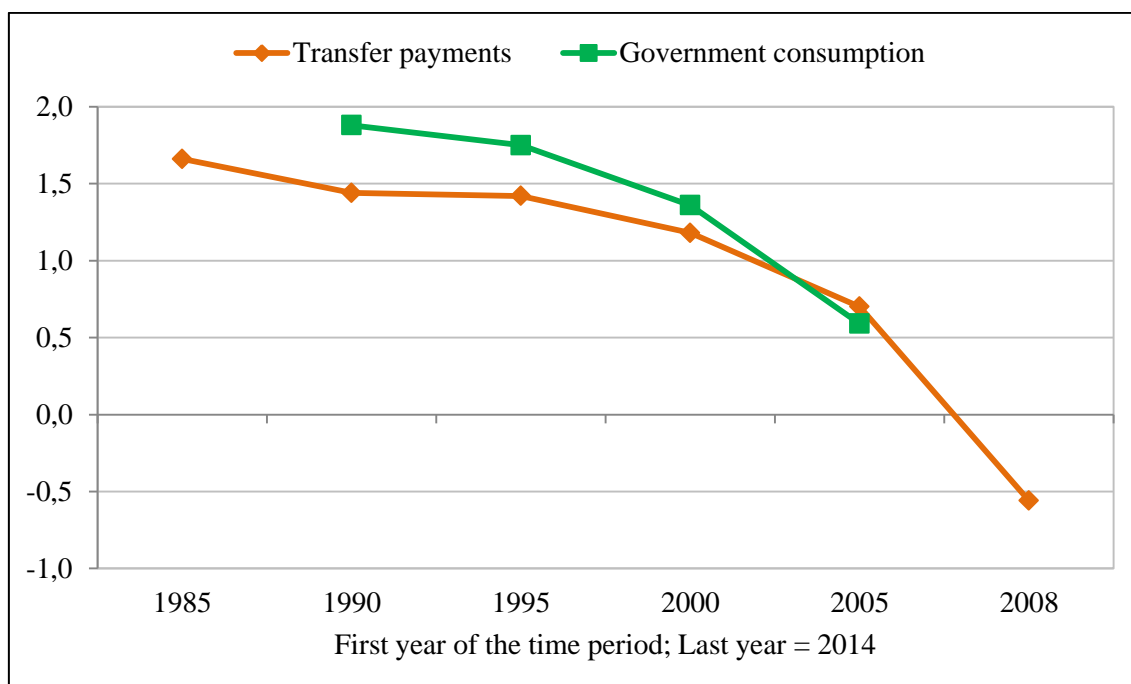
Just as government expenditures, both categories have become less pro-cyclical over time. Transfer payments coefficients are significant for all time periods and are even counter-cyclical in the last years of the sample, with a final cyclical coefficient of -0.56. Indeed, transfer payments is known as the most discretionary component of government expenditures in the short-term and its reactions to business cycle fluctuations are faster than consumption and investments. Interestingly, from Figures 1 and 3 one can note that cyclical behavior of public expenditures and transfers are quite similar, both in the evolution of the coefficients and its values in each time period.

In sum, public expenditures reaction gradually changed from historically pro-cyclical levels since 1960 to even counter-cyclical policy in recent years. This progress is ratified by consumption's and, especially, transfers' performance. In the next section we discuss the mechanism behind this fiscal policy shift in Israel.

5. Which mechanism explains most of government expenditures cyclicality?

In fact, over the last decade Israel has been able to overcome the problem of pro-cyclicality and becoming counter-cyclical. It would be classified by Frankel, Vegh and Vuletin (2013) as a "recent graduate" country. That said, one question remains: why has Israel pursued pro-cyclical fiscal policy so long, once it is not optimal?

We resume the debate initiated in the literature survey, where the main convincing explanations were grouped into economic and political factors. On the one hand, lack of access to international credit markets and financial depth would force governments reduce spending and raise taxes in bad times. On the other hand, political pressures for additional spending in good times are hard to resist, particularly in the presence of political distortions. To address this subject, we follow Frankel, Vegh and Vuletin (2013) and include in our basic model two sets of control variables - economic and political - aimed at capturing alternative theories regarding cyclicality of fiscal policy.

First, we test whether external and total debt–GDP ratios matter for fiscal behavior over the business cycle. Indeed, government debt is considered one of the main explanatory factors for pro-cyclical fiscal policy (Gali, 2005; Strawczynski & Zeira, 2013). High external debt causes severe constraints on the ability to secure new loans ("precarious creditworthiness"), which forces countries to cut their budget deficits.

We then control for foreign direct investment levels (Strawczynski & Zeira, 2013) and foreign-exchange reserves holdings (Didier, Hevia & Schmukler, 2012), which would also expand the fiscal space. Reserve accumulation has recently served two purposes in emerging economies: it gave central banks significant room to contain the depreciation of their currencies and served as a self-insurance mechanism during the crisis, eliminating concerns about debt-rollover difficulties.

We also control for the degree of financial integration and depth. Among others, Gavin and Perotti (1997) and Riascos and Vegh (2003) have argued that limited access to international capital markets, particularly in bad times, may limit the ability of governments to pursue counter-cyclical policies. Caballero and Krishnamurthy (2004) have stressed the role of financial depth. Financial integration is measured using the Chinn–Ito financial openness index (Chinn and Ito, 2006); and financial depth using liquid liabilities over GDP (Levine et al., 2000). Finally, we control for Israeli credit rating over time, based on Standard & Poor's outlook. Credit rating evaluates a country's credit risk: it estimates its ability to pay back the debt and provides an implicit forecast of the likelihood of defaulting. As pointed out by Didier, Hevia and Schmukler (2012), country's credibility seems an important component to conduct active counter-cyclical policy.

Table 4 shows the results for each equation in separate. From all tested variables, only debt-GDP ratios proved to impact public expenditures cyclicality. Coefficients are positive, confirming the assumption that higher debt rates contribute to accentuate pro-cyclicality. This finding is relevant given the fact that Israel reached a public debt of almost 300% of the GDP in 1984, whereas the current mark stands on around 65%.

Table 4. Alternatives to Economic Mechanisms

Period (adjusted)	Dependent Variable: dlog(G)						
	1963-2014	1963-2014	1971-2014	1963-2014	1971-2014	1963-2009	1963-2014
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dlog(Y)	1.69***	1.51**	0.97*	2.05***	0.79*	1.59**	1.72**
dlog(Y)*d(DEBT_EXT)	4.34**						
dlog(Y)*d(DEBT_TOT)		3.70***					
dlog(Y)*dlog(FDI)			-0.03				
dlog(Y)*dlog(FOREX)				0.01			
dlog(Y)*d(FIN_INT)					-0.87		
dlog(Y)*d(FIN_DEPTH)						0.00	
dlog(Y)*d(CRED_RAT)							-0.10
Observations	52	52	44	52	44	52	52
Adjusted R^2	0.63	0.69	0.57	0.57	0.58	0.61	0.60
Durbin-Watson	1.95	2.27	2.08	1.93	2.04	1.95	2.00

Note: Constant, total population, dependent population, immigration, technological progress, residuals and war terms are not reported.

The same procedure is done in order to check whether political factors affect cyclicality of government expenditures. It is worth noting that the Israeli system of government is based on parliamentary democracy. The Knesset's (Israeli parliament) 120 members are elected by secret ballot to 4-year terms, and a government can change without a general election. Moreover, the Knesset may decide to call for new elections before the end of the 4-year term, what happens with high frequency. For instance, no Knesset since 1988 election has finished its original 4-year term.

The first variable we test is the number of members which comprises the coalition. The assumption is that the greater the coalition, the more stable the government. A broad coalition would be able to overcome political barriers in the parliament in order to approve counter-cyclical measures, which is frequently considered unpopular. As concluded by Lane (2003), countries with dispersed political power are most likely to run pro-cyclical policies. An alternative way to measure government's strength is

through the number of party lists in the coalition. The expected effect now is the opposite: a coalition with many lists requires more negotiation between parties and fragmented policymaking, what increases political constraints.

The next variables to be tested are years of parliament and government changes. The first is a dummy for general election years, and the last is similar with the addition of years in which government changed. For example, Alesina and Tabellini (2005) call attention to distorted fiscal policy before the elections due to voters' problems of adverse selection and moral hazard. Moreover, Turrini (2008) shows that elections might explain the fiscal stance because of the existence of an electoral budget cycle: elections appear to be associated both with significantly larger reduction in government revenue and with expenditure increases.

We finally test the role of political parties. It is argued that leftist parties adopt counter-cyclical fiscal policies while rightwing parties adhere to pro-cyclical fiscal stances (Cusack, 2001). We created three dummies for years in which the main party in the coalition (i.e., Prime Minister's party) was labeled either as a left-wing, right-wing or center party. The equations are not reported for space considerations, but interaction coefficients between the partisan dummies are far from significant. Model (5) shows the results for a fourth dummy regarding party identification, which represents years of national unity governments. It is a broad coalition government in which major rival parties formed a ruling coalition. The logic is that this special framework would lead to lower political fragmentation. The coefficient term is negative as expected, but not significant to the model.

Table 5 presents the relevant coefficients for the variables described above. In any of the equations the political interaction term showed statistically significant. Unlike economic factors – namely, public debt – political concerns do not seem to determinate expenditures cyclicality in Israel.

Table 5. Alternatives to Political Mechanisms

Period (adjusted)	Dependent Variable: dlog(G)				
	1963-2014	1963-2014	1963-2014	1963-2014	1963-2014
	(1)	(2)	(3)	(4)	(5)
dlog(Y)	2.13***	1.95***	1.66***	1.80***	1.80***
dlog(Y)*d(COALIT_MEMBERS)	0.001				
dlog(Y)*d(COALIT_LISTS)		0.07			
dlog(Y)*ELECTIONS			-0.01		
dlog(Y)*GOV_CHANGE				-0.07	
dlog(Y)*NAT_UNITY					-0.79
Observations	52	52	52	52	52
Adjusted R^2	0.56	0.59	0.61	0.60	0.62
Durbin-Watson	1.92	1.92	1.96	1.97	1.93

Note: Constant, total population, dependent population, immigration, technological progress, residuals and war terms are not reported.

We continue the analysis based on the finding that public debt, both external and total, is the main limitation for pursuing counter-cyclical policies over time. In Table 6 we run additional regressions to take a step further on this matter. The first three specifications relate to external debt, whereas the last three make a parallel considering total public debt instead. Results are quite the same for both cases.

Given the turbulent fiscal history of Israel, we build a dummy variable (DEBT_HIGH) that considers years when the debt-GDP ratio was over the median. Models (1) and (4) show the results for external and total public debt, respectively. The positive interaction coefficient of this term with the product suggests that years with relative high debt levels contributed to pro-cyclicality.

From the previous section we know that fiscal policy was more pro-cyclical in recessions than during expansion periods. Have periods of high debt behaved differently during booms and recessions? Interestingly, the answer seems to be positive. The high debt restraint considerably impacts expenditures reaction to GDP fluctuations especially in recession years (models (2) and (5)), but has no effect in expansion periods (models

(3) and (6)). In sum, results from Table 6 suggest that pro-cyclicality of fiscal policy in Israel stems from high debt periods, and in particular concerning years of business cycle contraction.

Table 6. Government debt and the business cycle

| Period (adjusted): 1963-2014 | Dependent Variable: dlog(G) | | | | | |
| | DEBT = External Debt | | | DEBT = Total Debt | | |
	(1)	(2)	(3)	(4)	(5)	(6)
dlog(Y)	1.52**	1.37**	1.78***	1.44**	1.21**	1.83***
dlog(Y)*DEBT_HIGH	1.23**			1.14***		
dlog(Y)*dumBELOW*DEBT_HIGH		1.27***			1.34***	
dlog(Y)*dumABOVE*DEBT_HIGH			-0.01			0.31
Observations	52	52	52	52	52	52
Adjusted R^2	0.51	0.68	0.60	0.63	0.70	0.58
Durbin-Watson	1.80	1.82	1.96	1.94	1.84	2.06

Note: Constant, total population, dependent population, immigration, technological progress, residuals and war terms are not reported.

6. Cyclicality of the government deficit

This section addresses the cyclicality of general government deficit. Deficits are expected to be more counter-cyclical than expenditures due to strong pro-cyclicality of tax revenues (Barro, 1979). This seems to be indeed the case of Israel, as concluded by Strawczynski and Zeira (2007): public deficits have been mildly counter-cyclical throughout Israel's history, especially after 1985.

Unlike Strawczynski and Zeira (2007), this work uses cyclically adjusted deficit (denoted as CADEF) instead of simply real values, which corrects for the influence of the economic cycle on the public finances and arrive at a measure that better reflects the underlying budget position. It thus eliminates the need of instrument the GDP, since the cyclical components of spending and revenues are removed. The Bank of Israel provides data for this variable starting from 1999.

We elaborate a model similar to equation (3), which is based on stationary values. Unlike expenditures, which are measured in rates of changes, deficits are measured as shares of GDP in order to avoid non-stationarity[1]. The deficit equation examines the response of the government deficit to the rate of growth of the output and to additional explaining variables (Z):

(4) $CADEF = \alpha + \beta \, d\log(Y) + Z + v$.

Table 7 presents the results for this model. We begin our analysis with specification (1), which includes only rates of change of the output as explanatory variable, with no additional variables. Once the explained variable is cyclically adjusted budget deficit, a negative GDP coefficient indicates counter-cyclical fiscal policy. As expected, deficit is indeed counter-cyclical. This regression with no control variables is very weak and its Durbin-Watson statistic is still quite low.

We then add three more variables to the model. The first is the number of lists in the coalition (Roubini and Sachs, 1989). As stated earlier, a fragmented coalition represents less stable governments and would adopt counter-cyclical policies less likely. According to Roubini and Sachs (1989), it is important to explain fiscal deficit policies not only in economical but also in political terms. For instance, difficulties of political management in coalition governments may prevent faster deficit reduction rates.

The next variable we control for is Israeli credit rating. It estimates its ability to pay back the debt and provides an implicit forecast of the likelihood of defaulting. A country's credibility seems to be an important component to conduct active counter-cyclical policy (Didier, Hevia and Schmukler, 2012).

Finally, we consider the flow of immigrants in the current year as a percentage of the population. It is an exogenous one-time expense and fits well in the Barro's (1979) tax smoothing model, where tax policies would remain neutral over business cycle and are affected mainly by temporary increases in government spending. Therefore,

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[1] Note that ex-ante one would expect the deficit as a percent of GDP to be stationary, otherwise the government debt could explode. However, this is not necessarily the case in short periods. We use data from the Bank of Israel, which calculates the cyclically adjusted deficit only since 1999. In this period the deficit is not I(0) at a 10 percent level (see Appendix 2). Therefore, we look at this section as a preliminary analysis of cyclically adjusted deficits which were not explored in the past. We leave for future research a more complete analysis of the cyclically adjusted deficit, once enough data will be collected.

immigration "peaks" would lead Israeli government to raise the deficit in order to finance the temporary expenditure with debt.

Controlling for these variables improved the regression, as shown by model (2), and the deficit remains counter-cyclical. Model (3) checks whether deficit policy changed over time by adding an interaction term between the product and a dummy for the years 2005-2014. In 2005 Israeli government introduced an expenditure ceiling policy, which formally restricted the annual real growth of central government spending (Brender, 2012). Moreover, we test only for the period after 2005 - and not after 2008 for example - due to the low number of degrees of freedom. Interestingly, results show that although deficit was counter-cyclical over the entire period, this behavior is far more intense from 2005 on: both the interaction term takes for itself the statistical significance and its coefficient value is higher in absolute terms.

Table 7. Cyclicality of the government deficit

Period (adjusted): 1999-2014	Dependent Variable: CADEF		
	(1)	(2)	(3)
C	4.22***	-1.89	-2.06
dlog(Y)	-21.02*	-18.41*	-2.14
COALIT_LISTS		0.26	0.31**
CRED_RAT		0.82**	0.95***
IMM_SHARE		1.87*	0.43
dum05*dlog(Y)			-31.11**
Observations	16	16	16
Adjusted R2	0.11	0.49	0.66
Durbin-Watson	0.72	2.03	2.14

7. Conclusions

It is known that although considered a developed country, Israel traditionally used to follow pro-cyclical fiscal policy. Strawczynski and Zeira (2007) claim that a possible

explanation for why fiscal policy in Israel remained pro-cyclical until recently can be the trauma from the years of fiscal turmoil, 1973-1985, when public expenditures went up to 75% of GDP and the deficit reached 15% of GDP. That period led to a large public debt, which concerns the government until nowadays. This would explain why periods of recession, when revenues decline, are used by fiscal authorities to reduce public expenditures in order to cope with the debt increase, avoiding counter-cyclical measures as in developed economies. "An interesting question", they state, "is when will the public sector in Israel overcome this trauma and converge to policies implemented in most developed countries" (p. 65). The present work addresses this issue.

We analyze cyclicality of public expenditures in Israel during the 1960-2014 period. Co-integration technique is used to disentangle the short-run dynamics between public expenditures and the GDP. We first show that government expenditures in Israel are "graduating" over the years: from pronounced pro-cyclical levels since 1960, it reached a slightly counter-cyclical policy since the last global crisis. We then conclude that fiscal policy was more pro-cyclical in recessions than in expansion periods. Moreover, when testing cyclicality of expenditures' components in separate, it was found that government consumption and particularly transfer payments followed the same path. This finding contributes to the existing knowledge in the sense that previous literature claimed that expenditure responses were at most nearly a-cyclical until 2005. Likewise, cyclically adjusted deficits have reached significant counter-cyclical levels recently, in particular since 2005.

Therefore, Israel has finally been able to switch, as many developing countries done recently, from pro-cyclical to counter-cyclical responses. It has already brought benefits. For instance, counter-cyclical fiscal policy contributed to moderating the effect of the last global crisis on the economy and its relatively quick recovery (Braude, 2012).

An interesting question is about the mechanism behind this shift. Comparing several economic and political variables, we conclude that high debt-GDP ratio was the main restraint to prevent adopting counter-cyclical fiscal policy. In addition, pro-cyclicality proved stronger in years of economic recession in comparison to years of expansion. It seems that the difference stems indeed from high debt periods. With a stable and controlled debt, an interesting question is whether Israel will continue in this direction and reach even more pronounced counter-cyclical levels, similar to developed countries.

8. References

Altig, D., Christiano, L. J., Eichenbaum, M., & Linde, J. (2011). Firm-specific capital, nominal rigidities and the business cycle. *Review of Economic Dynamics*, 14(2), 225-247.

Alesina, A., & Tabellini, G. (2005). Why is fiscal policy often procyclical?. (No. w11600). *National Bureau of Economic Research.*

Barro, R. J. (1979). On the determination of the public debt. *The Journal of Political Economy*, 940-971.

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

Brender, A. (2012). The Story of Israel's New Fiscal Rule: Theoretical Design Meets Politics. *Rules and Institutions for Sound Fiscal Policy after the Crisis*, 611.

Caballero, R. J., & Krishnamurthy, A. (2004). Smoothing sudden stops. *Journal of Economic Theory*, 119(1), 104-127.

Chinn, M. D., & Ito, H. (2006). What matters for financial development? Capital controls, institutions, and interactions. *Journal of development economics*, 81(1), 163-192.

Cusack, T. R. (2001). Partisanship in the setting and coordination of fiscal and monetary policies. *European Journal of Political Research*, 40(1), 93-115.

Didier, T., Hevia, C., & Schmukler, S. L. (2012). How resilient and countercyclical were emerging economies during the global financial crisis?. *Journal of International Money and Finance*, 31(8), 2052-2077.

Frankel, J. A., Vegh, C. A., & Vuletin, G. (2013). On graduation from fiscal procyclicality. *Journal of Development Economics*, 100(1), 32-47.

Gali, J. (2005). Modern perspectives on fiscal stabilization policies. *CESifo Economic Studies*, 51(4), 587-599.

Gavin, M., & Perotti, R. (1997). Fiscal policy in Latin America. *NBER Macroeconomics Annual,* 12, 11-72. Mit Press.

Ilzetzki, E., & Vegh, C. A. (2008). Procyclical fiscal policy in developing countries: Truth or fiction? (No. w14191). *National Bureau of Economic Research*.

Jaimovich, D., & Panizza, U. (2007). Procyclicality or Reverse Causality? *RES Working Papers 1029.* Inter-American Development Bank, Research Department.

Lane, P. R. (2003). The cyclical behaviour of fiscal policy: evidence from the OECD. *Journal of Public Economics*, 87(12), 2661-2675.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, 46(1), 31-77.

MacKinnon, J. G. (1991), "Critical values for cointegration tests," Chapter 13 in *Long-Run Economic Relationships: Readings in Cointegration*, ed. R. F. Engle and C. W. J. Granger. Oxford, Oxford University Press.

MacKinnon, J. G. (1996), "Numerical distribution functions for unit root and cointegration tests," *Journal of Applied Econometrics*, 11, 601–618.

Kaminsky, G. L., Reinhart, C. M., & Vegh, C. A. (2005). When it rains, it pours: procyclical capital flows and macroeconomic policies. *NBER Macroeconomics Annual 2004*, 19, 11-82. MIT Press.

Nakata, T. (2013). Optimal fiscal and monetary policy with occasionally binding zero bound constraints. *FEDS Working Paper,* No. 2013-40.

Riascos, A., & Vegh, C. A. (2003). Procyclical government spending in developing countries: The role of capital market imperfections. *University of Maryland*, Working paper.

Strawczynski, M. (2014). Cyclicality of statutory tax rates. *Israel Economic Review*, 11(1), 67-96.

Strawczynski, M., & Zeira, J. (2001). Reduction in the relative size of the government in Israel after 1985, in *The Israeli Economy, 1985–1998: From Government Intervention to Market Economies*, Avi Ben-Bassat (Ed.), 51-78. MIT Press.

Strawczynski, M., & Zeira, J. (2007). Cyclicality of fiscal policy in Israel. *Israel Economic Review*, 7(1), 47-66.

Strawczynski, M., & Zeira, J. (2013). Procyclicality of fiscal policy in emerging countries: the cycle is the trend. *Central Banking, Analysis, and Economic Policies Book Series*, 17, 427-466.

Roubini, N., & Sachs, J. D. (1989). Political and economic determinants of budget deficits in the industrial democracies. *European Economic Review*, 33(5), 903-933.

Talvi, E., & Vegh, C. A. (2005). Tax base variability and procyclical fiscal policy in developing countries. *Journal of Development Economics*, 78(1), 156-190.

Tornell, A., & Lane, P. R. (1999). The voracity effect. *American Economic Review*, 89, 22-46.

Turrini, A. (2008). *Fiscal policy and the cycle in the Euro Area: The role of government revenue and expenditure* (No. 323). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Vegh, C. A., & Vuletin, G. (2014). The road to redemption: Policy response to crises in Latin America. *IMF Economic Review*, 62(4), 526-568.

9. Appendices

Appendix 1. Data Coverage and Sources

Variable Name	Description	Coverage	Source
G	Total Government Expenditures	1960-2014	Bank of Israel
Y	Real Gross Domestic Product, in 2010 prices	1960-2014	Bank of Israel
WORLD_TRADE	World trade volume of goods and services	1960-2014	IMF World Economic Outlook
POP_TOT	Total population	1960-2014	The Israel Central Bureau of Statistics
POP_DEP	Dependent Population: sum of the population under age 15 and over age 65	1960-2014	The Israel Central Bureau of Statistics
IMM_5	Immigrant population that arrived in the last five years	1960-2014	The Israel Central Bureau of Statistics
TECH	Technological progress, calculated as the U.S. GDP detrended with Hodrick-Prescott filter	1960-2014	U.S. Bureau of Economic Analysis
WAR	Dummy for years with occurrence of wars and expressive military operations and terrorist events. Included years: 1967-8 (Six-Day War), 1970 (War of Attrition), 1973 (Yom Kippur War), 1982 (First Lebanon War), 2001-3 (Second Intifada), 2006 (Second Lebanon War), 2008 (Operation Cast Lead), 2012 (Operation Pillar of Defense), 2014 (Operation Protective Edge)	1960-2014	Strawczynski and Zeira (2007) + own elaboration
GOV_TRANSFERS	Transfer payments	1960-2014	Bank of Israel
GOV_CONSUMPTION	Government consumption	1960-2014	Bank of Israel
GOV_INVESTMENT	Government investment	1960-2014	Bank of Israel
UNEMPLOYMENT	Unemployment rate	1960-2014	Bank of Israel
DEBT_EXT	External public debt	1960-2014	Bank of Israel
DEBT_TOT	Total public debt	1960-2014	Bank of Israel
FDI	Foreign direct investment	1970-2014	UNCTAD Stat
FOREX	Foreign Exchange Reserves	1960-2014	The World Bank DataBank
FIN_INT	Financial integration, calculated	1970-2014	Chinn and Ito

	using the Chinn–Ito financial openness index (KAOPEN)		(2006) + authors website for updated values
FIN_DEPTH	Financial depth, calculated as liquid liabilities over GDP (M3)	1961-2009	The World Bank DataBank
CRED_RAT	Credit Rating, calculated using Standard and Poor's (S&P) rating. The computed values are as follows: BBB- = 1; BBB = 2; BBB+ = 3; A- = 4; A = 5; A+ = 6. S&P started rating Israel in 1988. We completed the data for earlier years with the lowest rating value (1).	1960-2014	Israeli Ministry of Finance
COALIT_MEMBERS COALIT_LISTS ELECTIONS GOV_CHANGE NAT_UNITY	Coalition Members Coalition Lists Elections Government Change National Unit Government	1960-2014	The Knesset Website
CADEF	Cyclically adjusted deficit	1999-2014	Bank of Israel
IMM_SHARE	Immigrant population that arrived in the current year, as share of the total current population.	1960-2014	The Israel Central Bureau of Statistics

Database and complete regression outputs used in this work is available upon request.

Appendix 2. Unit root test results for variables in the long-run models

Variable Name	ADF	
	I(0)	I(1)
G	0.11 (0.96)	-5.90 (0.00)
Y	5.78 (1.00)	-4.05 (0.00)
POP_TOT	1.85 (0.99)	-0.89 (0.79)
POP_DEP	2.14 (0.99)	-2.70 (0.08)
IMM_5	-2.85 (0.06)	-4.23 (0.00)
TECH	1.81 (0.99)	-2.39 (0.14)
UNEMPLOYMENT	-1.98 (0.30)	-5.59 (0.00)
CADEF	-1.80 (0.36)	-2.97 (0.06)

The unit root tests used in this study are the Augmented Dickey-Fuller, and the optimal lag length has been chosen using Schwarz criterion. We use McKinnon's (1996) critical values. P-values are presented in parentheses. Excepting Total population, all series were found to be I(1) at least at 15% level, meaning that their first-difference is non-stationary and possesses a unit root.

Even though in a short-run model, we include the CADEF variable to this table, which despite the results was expected to be I(0). Nevertheless, the small sample size does not enable an accurate analysis, and future work is required for a more complete investigation on the cyclically adjusted deficit.

Appendix 3. Cyclicality of public expenditure over the business cycle

Period (adjusted): 1963-2014	Dependent Variable: dlog(G)		
	(1)	(2)	(3)
C	-0,12***	-0,12***	-0,10***
dlog(Y)	1,48***	2,02***	1,68***
dlog(POP_TOT)	1,63	1,63	0,57
dlog(POP_DEP)	0,68	0,68	0,75
dlog(IMM_5)	-0,04	-0,04	0,03
dlog(Y_USA_HP)	0,25	0,25	0,49
dumBELOW*dlog(Y)	0,53*		
dumABOVE*dlog(Y)		-0,53*	
RESID(-1)	-0,35***	-0,35***	-0,32**
WAR	0,07***	0,07***	0,08***
Observations	52	52	52
Adjusted R^2	0,65	0,65	0,61
Durbin-Watson	1,79	1,79	1,97

Appendix 4. Cyclicality of public expenditure components in the long-run

Dependent Variable: Period: 1960-2014	log(GOV_TRANSFERS) (1)	log(GOV_CONSUMPTION) (2)	log(GOV_INVESTMENT) (3)
C	-30.30	-0.06	182.5***
log(Y)	3.95***	2.91***	3.00***
log(POP_TOT)	1.77	-0.96	-22.10***
log(POP_DEP)	-0.39	-1.07	4.87***
log(IMM_5)	0.05	0.01	-0.02
log(TECH)	-4.18**	-0.19	6.55***
dum85*log(Y)	-1.80***	-1.37**	3.55***
dum85*log(POP)	1.48***	1.12**	-2.93***
log(UNEMPLOYMENT)	0.45***		
Observations	55	55	55
Adjusted R^2	0.99	0.99	0.92
Durbin-Watson	0.73	0.84	1.49
ADF	-4.50	-6.52***	-6.42***

While co-integration is not obtained at 10 percent in the specification for transfer payments (the critical value is -5.28), we will be able to cross-check the long-run relationship by looking at the significance of the lagged error term in the short-run regressions, which according to the Engle-Granger hypothesis will be significant if a co-integration relationship exists.

Appendix 5. Cyclicality of Transfer Payments in the short-run

Period (adjusted): 1963-2014	Dependent Variable: dlog(GOV_TRANSFERS)					
	(1)	(2)	(3)	(4)	(5)	(6)
C	0.00	-0.03	0.01	0.05	0.00	0.00
dlog(Y)	2.48***	2.81***	3.45***	2.99***	2.04**	1.38*
dlog(POP_TOT)	1.12	6.77	4.58	-1.60	0.02	1.59
dlog(POP_DEP)	0.17	-0.60	-1.34	0.78	1.22*	1.49**
dlog(IMM_5)	-0.01	-0.04	-0.08**	-0.07**	-0.04	-0.02
dlog(TECH)	-2.08	-5.18**	-5.28**	-3.70**	-2.72	-2.81
dum85*dlog(Y)	-0.82*					
dum90*dlog(Y)		-1.37***				
dum95*dlog(Y)			-2.03***			
dum00*dlog(Y)				-1.81***		
dum05*dlog(Y)					-1.34*	
dum08*dlog(Y)						-1.94*
dlog(UNEMPLOYMENT)	0.26***	0.30***	0.35***	0.30***	0.22***	0.17**
RESID(-1)	-0.37***	-0.34***	-0.37***	-0.36***	-0.33***	-0.33***
WAR	0.02	0.02	0.02	0.03*	0.03	0.02
Observations	52	52	52	52	52	52
Adjusted R^2	0.61	0.59	0.59	0.63	0.60	0.57
Durbin-Watson	1.38	1.55	1.77	1.49	1.58	1.48

Appendix 6. Cyclicality of Government Consumption in the short-run

Period (adjusted): 1963-2014	Dependent Variable: dlog(GOV_CONSUMPTION)					
	(1)	(2)	(3)	(4)	(5)	(6)
C	0.04	-0.06	-0.01	0.06	0.01	-0.06
dlog(Y)	2.75***	2.95***	3.64***	3.88**	2.72**	2.09***
dlog(POP_TOT)	0.72	4.61	3.30	-3.35	-0.45	0.26
dlog(POP_DEP)	-1.25	-1.74	-2.77	-1.07	-0.38	-0.11
dlog(IMM_5)	-0.03	-0.05	-0.10*	-0.11*	-0.07	-0.04
dlog(TECH)	-0.27	-2.29	-2.59	-2.53	-2.50	-0.10
dum85*dlog(Y)	-0.80					
dum90*dlog(Y)		-1.07*				
dum95*dlog(Y)			-1.89*			
dum00*dlog(Y)				-2.52**		
dum05*dlog(Y)					-2.13*	
dum08*dlog(Y)						-0.70
RESID(-1)	-0.45**	-0.49**	-0.62**	-0.69**	-0.50**	-0.34**
WAR	0.06***	0.06***	0.07***	0.08***	0.07***	0.07***
Observations	52	52	52	52	52	52
Adjusted R^2	0.09	0.00	0.22	0.26	0.11	0.25
Durbin-Watson	1.47	1.50	1.49	1.54	1.72	1.60