Chapter 7:
Balance of Payments Issue: Energy and Commodity Prices[1]

- Over the past two years, oil prices have declined by 65 percent, and other commodity prices have declined by 20 percent.
- The lower oil and commodity prices have saved the Israeli economy about $5 billion (1.6 percent of GDP).
- The lower oil and commodity prices have led to increased savings, and have also likely contributed to increased consumption and economic activity in Israel.
- The high price of oil in the past decade, and concern over its environmental damage, led to significant technological improvements, which have increased the supply of energy and reduced the demand for oil. The surplus capacity in the oil industry weakened the strength of the OPEC cartel, and lowered the price of oil.
- The decline in energy and commodity prices did not contribute to accelerated economic activity in the global economy.

[1] Commodities: The reference is to commodities such as oil and copper, traded on the global commodity markets.

1. MAIN DEVELOPMENTS

Over the past two years, global commodity prices have declined markedly. The price of oil dropped by 65 percent, and the prices of other commodities declined by close to 20 percent (in current dollar terms). The decline in commodity prices was a boon for economies that are net importers of natural resources, including Israel, at the expense of natural resource exporters. The net contribution of the decline in commodity and energy prices to the increase in Israel's national income between 2013 and 2015 is estimated at $5 billion, the equivalent of 1.6 percent of GDP.[1] This considerable amount will be almost completely directed to increase the economy's savings abroad and to import durable goods, the purchase of which is another future use of sources received. The Current Account surplus, which reflects the economy's net savings abroad, increased during the same period by $4.5 billion (2014–15 compared with the two previous years[2]). In view of the exceptional increase in current private consumption, a possible hypothesis is that the decline in commodity prices abroad also contributed to increasing domestic demand, thereby supporting increased economic activity in Israel.

The net contribution of the decline in commodity and energy prices to the increase in Israel's national income between 2013 and 2015 is estimated at 1.6 percent of GDP.

The decline in oil prices led to a change in the distribution of income between net energy exporters (hereinafter: exporters) and net energy importers (hereinafter: importers). The exporters are losing money and are restraining consumption, and the importers are profiting and are increasing consumption. However, the main change is reflected in a change in savings, and not in a change in consumption. There was a similar phenomenon in the Israeli economy in the past. In the first stage, the Israeli consumer barely uses the new sources to increase his current consumption. Therefore, GDP also does not grow significantly. The sources are mainly directed toward savings abroad (the equivalent of a Current Account surplus). If the decline in prices persists, demand for consumption increases gradually, prices in the market increase relative to global prices (appreciation of the real exchange rate[3]), and the Current Account surplus becomes depleted. Our empirical examination shows that lower global energy and commodity prices do not accelerate the long-term growth rate of the Israeli economy relative to growth in other advanced economies.

The decline in global commodity prices increased Israel's Current Account surplus.

[1] Between 2013 and 2015, the price of importing commodities to Israel declined by 9 percent relative to commodity export prices (excluding ships, aircraft and diamonds). The average of commodity exports and commodity imports (excluding ships, aircraft and diamonds) is $56 billion, so that the contribution over the two years totaled, as stated, $5 billion. Calculating it differently, the cost of importing energy products declined by $7 billion (from $14.6 billion in 2013 to $7.6 billion in 2015). Refined fuel exports by the refineries in 2013 totaled $3.5 billion, and in the second quarter of 2013, the flow of natural gas from the Tamar site began. The decline in the expenditure on the net import of energy products, net of these effects, totaled about $4.8 billion in the past two years.

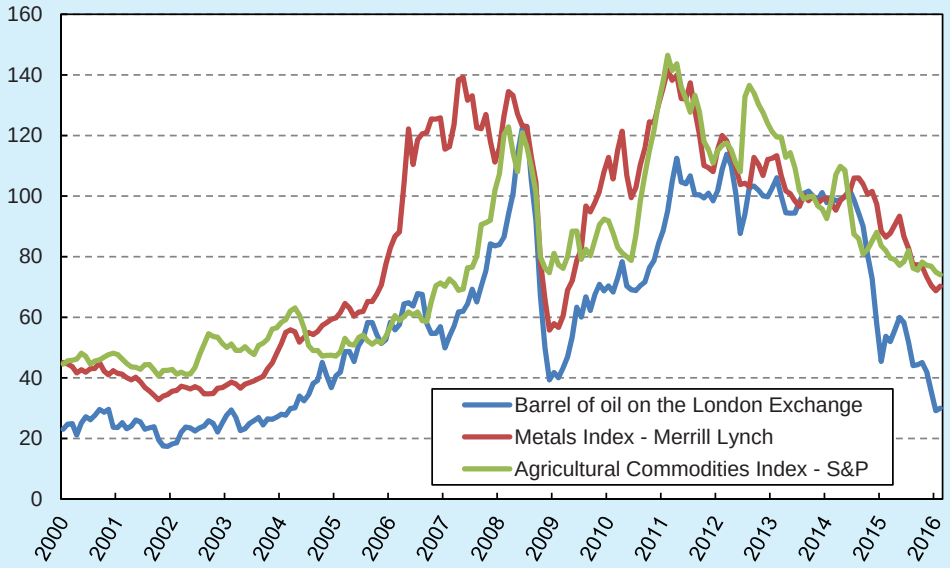
[2] In 2014 and 2015, the dollar expenditure on vehicle imports for private consumption increased by 32 percent compared with the two previous years (an increase of $0.9 billion). The import of current consumption products and of investment products did not deviate upward from the long-term trend. Oil prices also have a large impact on demand for vehicles due to the fact that they are complementary products.

[3] The appreciation is calculated relative to the price levels in Israel's trading partners, some of which are energy exporters.

The decline in global commodity prices contributed to an increase in economic activity in Israel in 2015.

The decline in energy and commodity prices was accompanied in 2015 by an increase in economic activity in Israel. The decline in commodity prices abroad increased the disposable income of Israelis, providing them with an incentive to increase demand for consumer goods in general, and for domestically produced products in particular. The rapid increase in demand was translated into an increase in output thanks to the increased utilization of the production factors in the economy. The employment rate increased by one percentage point in 2015, while domestic output increased and supplied the increase in demand for current private consumption without a decline in the rate of the economy's savings abroad. The increase in demand in the past two years was not accompanied by an appreciation of the shekel—apparently assisted by the near-zero interest rate and the Bank of Israel's foreign exchange purchases—which moderated the negative impact to the tradable sector's volume of activity. In summation, the combination of excess capacity in the economy and an accommodative monetary policy made it possible to increase domestic activity without significantly eroding the Current Account surplus (savings abroad), and almost without appreciation.

Figure 7.1
Commodity Price Indices
(January 2014 = 100, current dollar prices)



SOURCEL: Bloomberg, L.P.

2. THE FACTORS IN THE DECLINE OF ENERGY PRICES

The decline in global energy prices was the result of supply and demand factors. The supply side featured the maturation of the oil fracking revolution that took place in recent years in the US, expectations of the removal of the oil embargo from Iran, and an increase in Iraq's output (in 2014).[4] On the demand side, China was prominent in leading the increase in global demand for oil in the past decade, though it has recently undergone a structural change and a cyclical slowdown that are moderating the growth of its demand for oil. The concern over the serious ramifications of the use of oil in terms of global warming is another important restraining factor. The changes in supply and demand have led to excess capacity, and have forced OPEC to change its conduct, which contributed to a further decline in oil prices.

The decline in demand for oil and the increase in its supply led to excess capacity and reduced the power of the OPEC cartel.

The need to restrain greenhouse gas emissions and the high price of oil in the previous decade served as incentives for the development of a series of technologies that contributed to increased energy efficiency in the production of a wide variety of products—including vehicle engines, home lighting implements and air conditioners.[5] As a result, oil consumption in the US is lower today than it was two decades ago, in complete contrast to previous forecasts, which projected that the pace of growth would be similar to the growth of GDP. The difference vis-à-vis the projection reflected a decline in the volume of travel and an improvement (beyond the forecast) in the energy efficiency of transportation. According to Cox et al.[6], the volume of fuel use in the US is expected to remain stable over the next decade, thanks to the implementation of energy efficiency measures and the enforcement of stringent air pollution standards in the transportation sector.

Energy efficiency and the enforcement of stringent air pollution standards in the transportation sector halted the increase of oil consumption in the advanced economies.

A major technological improvement that contributed to the decline in fuel prices is the oil fracking revolution in the US. Fuel production in the US doubled in just six years, with the US becoming one of the largest fuel producers in the world, alongside Russia and Saudi Arabia. The increase in fuel production in the US in the past four years is the equivalent of 4.5 percent of global production.[7] Since the cost of fuel production through fracking is relatively high, the decline in energy and oil prices

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[4] In their study "Oil Prices, Inflation Expectations and Monetary Policy" (2015), N. Sussman and O. Zohar found that the effect of supply factors was dominant in the decline of oil prices toward the end of 2014. In the second half of 2015, the slowdown in global demand became an additional factor. They also found that the decline in energy prices led to a decline in five-year inflation expectations in the US, Europe and Japan, because the central bank interest rates in those countries were near zero and could not decline further to offset the decline in energy prices.

[5] Between 2000 and 2012, energy consumption declined by 4 percent in the US; by 9 percent in Japan; by 6 percent in Germany; by 11 percent in the UK; and by 1 percent in France. (In Israel, energy consumption increased, but per capita energy consumption declined by 7 percent.)

[6] Cox, I., J. Furman, J. Linn, and M. Obstfeld Vox (2015), "The Surprising Decline in US Petroleum Consumption".

[7] Oil production in the US increased in linear fashion from 5.7 million barrels per day in September 2011 to 9.4 million barrels per day in March 2015. The large oil producers are Russia, Saudi Arabia and the US (9-10 million barrels per day), followed by China, Canada, Iraq and Iran (3-4 million barrels per day).

to below the $70 per barrel benchmark will lead to a reduction in new investment in fracking production through existing technologies, and a further decline (below $40 per barrel) is even expected to halt such investment.[8] As of now, the decline in oil production in the US is very moderate. Fuel production in January 2016 was just 4 percent lower than the June 2015 peak, even though there was a significant decline in new investment.

Alongside this improvement, there was significant advancement in deep water drilling technology over the past decade, and the costs of producing renewable energy—solar and wind—declined sharply.

Another change on the supply side is the removal of the international embargo on trade with Iran, which holds about 10 percent of total global oil reserves. Iran is expected to return to its pre-embargo production volume—adding about 1 million barrels per day in production, which is the equivalent of 1.25 percent of global production.

On the demand side, the decline in oil prices in 2015 was a result of the economic slowdown in China. Between 2000 and 2012, China's energy consumption increased at a dizzying pace—2.7 times—and its share of global energy consumption doubled (from 10 percent to 20 percent), becoming equal with its proportion of the world's population. In recent years, the rapid increase in China's energy consumption was halted due to the economic slowdown in that country, and as a result of the implementation of a new five-year plan, one of the targets of which is to maintain environmental quality, as well as the transition from an industrial production and export based economy to a more balanced economy that is based on the services sector and on domestic private consumption.[9]

In recent years, the rapid increase in China's energy consumption was halted.

OPEC is a main factor in the global oil market. There are 13 large oil exporting countries that are members of OPEC, and together they account for between 33 and 40 percent of total world oil production, and hold 80 percent of the world's proven oil reserves. The organization operated during some periods as a cartel, and limited the quantity of oil produced by its members with the aim of raising its global price. The power of the cartel increased during periods when the demand for oil increased rapidly, and declined during periods of surplus production capacity, as between 1985 and 1999, when oil prices were very low. In the past two years, the organization has avoided reducing the production quotas of its member countries, and even increased them. The factors operating to weaken the cartel include surplus production capacity (mainly a result of technological improvements), conflicts between member countries (Iran and Saudi Arabia), and the member countries' increasing dependence on oil revenue, which makes it difficult for them to reduce production quotas.

The power of the OPEC cartel increased during periods when the demand for oil increased rapidly, and declined during periods of surplus production capacity, as between 1985 and 1999 and in 2015.

A main factor that may support the stability of oil prices at low levels in the future is the concern over the effects of the use of fossil fuels on global warming and the

[8] Azeki, R. and O. Blanchard (2015), "The 2014 Oil Price Slump: Seven Key Questions", CEPR policy portal.

[9] Since 2012, annual growth amounts to about 3.5 percent per year.

A main factor that may support the stability of oil prices at low levels in the future is the concern over the effects of the use of fossil fuels on global warming.

immense damage such warming may cause. This concern led countries around the world to reach an ambitious agreement at the UN Climate Conference held in Paris in 2015, where it was decided to reduce the volume of global emissions by between 40 and 70 percent by 2050, thereby limiting global warming to no more than 2 degrees Celsius. If this agreement is ratified and implemented by most countries around the world, it will markedly reduce global demand for oil over time, and will lead to a lasting reduction in the price of oil (relative to its price in the last decade). However, there is concern that the decline in the price of oil will provide an incentive for increasing its use, mainly among developing economies.

The effect of the decline in fuel prices on economic growth

Fluctuations in energy prices have not had a large effect on global economic growth, other than the energy crises that developed more than three decades ago.[10] The exchange between energy inputs and other inputs (capital and labor) is minimal, and the effect of the energy inputs on the volume of employment and on the stock of capital is therefore not large. While higher fuel prices lead to reduced use of energy-intensive machinery and equipment, meaning an actual decline in the stock of capital, this effect is not large and is asymmetrical. The increase in fuel prices in the 1970s and the first half of the 1980s led to an economic slowdown in the US, but the decline in oil prices in the second half of the 1980s did not have a significant effect on growth.[11] A similar lack of symmetry was found in the other advanced economies belonging to the OECD.[12] Another study found that the effect of oil price shocks on inflation and GDP in the US declined over the years. The researchers believe that this is a result of a structural change in the US economy—a decline in the weight of the energy-intensive manufacturing sector and an increase in the weight of the services sector—leading to a decline in the importance of energy input in the production function of the US economy, and an increase in the importance of information systems input.[13] Similar processes took place in other advanced economies, including Israel.

The decline in oil prices in the second half of the 1980s did not have a significant effect on global economic growth.

The main use of oil is in transportation, hence an increase in the supply of oil lowers the cost of shipping and of commuting. Such lower costs make it possible to expand the geographic circle within which cooperation between employees and firms, customers, service providers, and so forth is possible, thereby contributing to

[10] Bersk, R. and I. Kilian (2004), "Oil and the macroeconomy Since the 1970s", NBER Working Paper Series.

[11] Mork, K. (1989), "Oil Shocks and the Marcoeconomy When Prices Go Up and Down: An Extension of Hamilton's Results", *Journal of Political Economy*, 97, 740–744.

[12] Rodriguez, R.J., and M. Sanchez (2005), "Oil Price Shocks and Real GDP Growth: Empirical Evidence from some OECD Countries", *Applied Economics*, 37, 201–228.

[13] Doroodian, K. and R. Boyd (2003), "The Linkage Between Oil Price Shocks and Economic Growth with Inflation in the Presence of Technological Advances: A CGE Model", *Energy Policy*, 31, 989–1006.

an increase in trade, productivity and output.[14] However, in the past two years, there has been only a relatively moderate increase in the use of oil[15], despite the dramatic decline in its price. (An increase in production will mainly help increase the global oil inventory.) The relatively moderate growth in the use of oil hints that the contribution of increased oil supply to the growth of global GDP is not large. A broader view relates to the global economy as going through a recession. In such a situation, an increase in supply alone will not contribute to growth in global GDP; an increase in demand is also required.

A decline in the price of oil will contribute to global GDP if the use of oil increases. However, in the past two years, there has been only a moderate increase in the use of oil worldwide.

Whether the reason for the decline in demand has to do with the economic slowdown in China or whether it has to do with externalities such as global climate regulations, the resulting price decline is not contributing to an acceleration of global economic activity. First, the decline in the price of oil acts to lower investments in the development of oil and gas reservoirs and in the development of new sources[16], which moderates economic activity around the world. Second, the rapid and sharp decline in oil prices puts the financial and political stability of countries that rely on oil exports as the main source of foreign exchange revenue at risk. A decline in revenues to below a certain benchmark leads to a crisis, meaning a disproportionate negative impact to world growth. In other words, a far-reaching change in the distribution of revenue may negatively impact aggregate demand and growth. In contrast, the decline in the price of oil is contributing to the extrication of the European and Japanese economies from the crises they have been experiencing.

The decline in oil prices is having contradictory effects on global demand. The overall effect is not necessarily positive.

The World Bank estimates that the decline in oil prices between July 2014 and January 2016 was mainly the result of supply factors. (During that period, the price of oil declined by 70 percent, and the World Bank estimates that increased supply alone lowered the price by 45 percent.) According to the World Bank's macroeconomic model, this development is expected to contribute more than one percent to the GDP of the US and of the eurozone, and to increase global GDP by 0.7–0.8 percent in the medium term. The OECD's macroeconomic model projects that stability in the price of oil at $50 per barrel will contribute 0.25–0.5 percent to the GDP of OECD countries in 2016.[17] The International Monetary Fund also projects a positive effect on the GDP of the advanced economies, alongside a decline of one percent in the GDP of commodity exporters and of 2.5 percent in the GDP of oil exporters (in 2016–17). According to the IMF's model, a change in the distribution of revenue resulting from

According to the World Bank's model, the decline in oil prices is expected to increase global GDP by 0.7–0.8 percent in the medium term, but it is doubtful whether this projection will come to pass.

[14] Matching firms and employees that are distant from each other increases the participation rate and streamlines the utilization of each employee's unique human capital (increase in output). Lower transportation costs increase the variety of available positions and services, which provides an incentive for increasing the supply of labor and consumption of services.

[15] In the past two years, oil output increased by 2.5 percent per year, and oil consumption increased by 1.3 percent per year (the second half of 2015 compared to the parallel output in 2013). In 2011 and 2012, global oil production increased by 1.4 percent per year. (SOURCE: Energy Information Administration).

[16] Investments in the development of oil and gas fields and in exploration for new fields are estimated to have declined in 2015 by $150 billion. The decline in the price of oil is halting investment in renewable energy, because the use of such energy has become more expensive than the alternative.

[17] OECD, Economic Outlook, November 2015.

a decline in the price of oil makes a positive contribution to global demand. The change in the global distribution of revenue transfers revenue from the governments of oil exporters, which have a high rate of savings, to consumers in oil importing countries, which have a low rate of savings, thereby contributing to increased global demand and accelerated global growth. However, in the opinion of IMF economists[18] the situation this time may be different: Oil exporting countries are forced to lower government expenditures (and to depreciate their currencies) to a greater extent than in the past due to instability in the financial markets, and consumers in the advanced economies increased private consumption to a lesser extent than in the past, because interest rates in the West were near-zero even before the decline in energy prices, and did not decline in response to the decline in oil prices as they had done in the past.[19] As such, the increase in private consumption in the eurozone and in Japan was more moderate than in the past.

The technological improvements that led to increased oil supply are expected to contribute to global economic activity. However, their contribution is not as large as in the past due to the decline in the importance of oil as a factor of production, and due to concern over the externalities of the use of fuel.

In summation, the increase in the supply of oil and the decline in OPEC's strength in parallel with the decline in demand for oil led to a sharp decline in prices. The supply factors that acted to lower oil prices were expected to accelerate global economic activity, but their contribution is not as large as in the past, for a number of reasons: the decline in the importance of oil as a factor of production, concern over the externalities of the use of fuel, the unique background conditions in the eurozone and in Japan, the serious crises in some of the oil exporting countries, and the sharp decline in investments in the energy industry.

3. AN INTERNATIONAL COMPARISON OF THE SHORT-TERM EFFECT OF THE DECLINE IN COMMODITY PRICES

Lower import prices lead to an increase in savings, because the marginal tendency to consume from the additional income is smaller than one.

The economic literature contains hard empirical evidence that lower import prices lead to a short-term increase in the Current Account surplus in small, open economies.[20] The explanation by Harberger (1950) and Laursen and Metzler (1959) is that the marginal tendency to consume from the additional income is smaller than one.[21] Most of the additional income was saved and contributes to a larger Current Account surplus, while the other portion serves for consumption (from domestic production and imports).

[18] IMF, World Economic Outlook updates, January 2016.

[19] Sussman, N. and O. Zohar (2015), "Oil Prices, Inflation Expectations and Monetary Policy", Bank of Israel, Research Department, Discussion Paper 2015.09. The study finds that the decline in energy prices led to a decline in 5-year inflation expectations in the US, Europe and Japan, because the central bank interest rates in those countries are near-zero and cannot decline to offset a decline in energy prices as in the past.

[20] G. Otto (2013), "Terms of Trade Shocks and the Balance of Trade: There Is A Harberger-Laursen-Metzler Effect", *Journal of International Money and Finance*, 22, 155–184.

[21] Later models also included expectations regarding future income, and found that a decline in commodity prices considered as only temporary led to an increase mainly in savings (and not in consumption), while a decline considered as prolonged led to an increase mainly in consumption (and not in savings).

Of the portion that serves for consumption, some is channeled to consumption of domestically produced products, thereby contributing to increased domestic activity and an increase in prices (relative to the price levels in other economies).

The following is an examination of the effect of a short-term exogenic shock to energy and commodity prices: How much did it affect savings (the Current Account surplus); how much did it affect the GDP growth rate; and how much did it affect the real exchange rate (meaning higher prices in the economy relative to the trading partners). The examination will focus on the years 2005 and 2006, when the prices of raw materials and energy increased sharply, and on the years 2014 and 2015, when the prices dropped sharply.[22] It will examine the difference between the effect of the shock on energy-exporting countries and on energy-importing countries (diff-in-diff), assuming that the shock was the main factor affecting those economies.[23]

The horizontal scale in Figures 7.2 to 7.5 shows the direct contribution of a change in the terms of trade to the economy's national income.[24] The terms of trade are the ratio of export prices to import prices. An increase means lower import prices relative to the prices of the economy's exports. In 2005 and 2006, exporters of natural resources benefited from increases in the prices of their exports, and are therefore on the right side of the horizontal scale, while importers of natural resources suffered from higher import prices, and are therefore on the left side of the horizontal scale (Figure 7.2). In 2015, the reverse was true (Figure 7.3): Natural resource importers are on the right side of the scale, reflecting an increase in their national income due to improved terms of trade (a decline of import prices), while exporters are on the left side of the scale, reflecting a loss in income caused by the decline in export prices (and worsening terms of trade).

The study examined the effect of an improvement in the terms of trade on the Current Account in all countries—advanced and developing[25]—for 2005 and 2006, and found that an improvement in the terms of trade equal to one percent of GDP is consistent with an increase of more than one percent of GDP in the Current Account surplus. The countries tended to save all of the improvement in the terms of trade

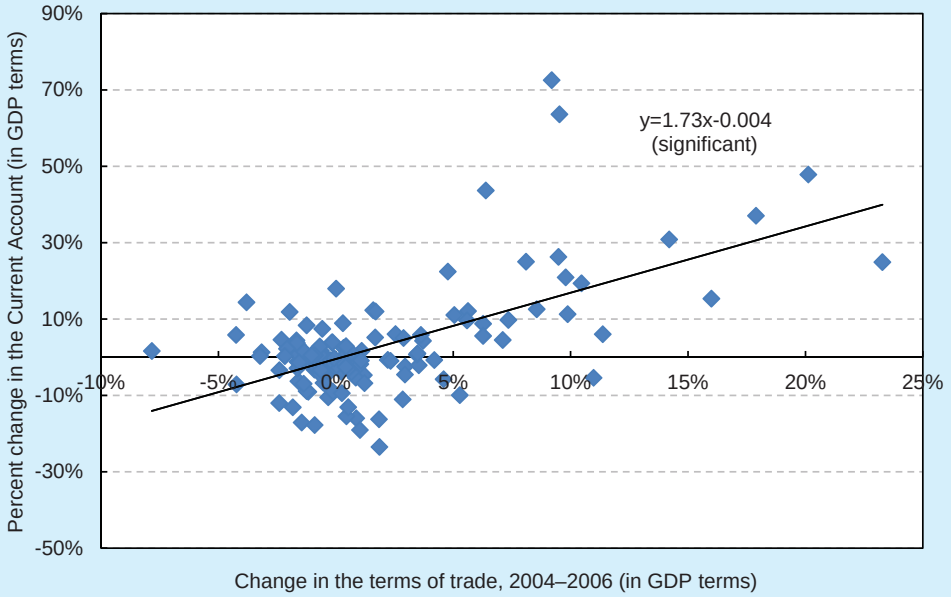
[22] To be more precise: It examines the change in the period from the fourth quarter of 2014 to the third quarter of 2015 relative to the same period a year earlier. During that period, the Merrill Lynch Commodities Index declined by 29 percent.

[23] The US and China are large economies that may have an effect on the global price of oil, and were therefore excluded from the examination.

[24] The horizontal scale shows the change in the terms of trade, multiplied by the average of commodity imports and exports, relative to GDP. This multiplication makes it possible to equivalize the improvement in the terms of trade in GDP terms (national income), meaning to take into account the fact that the contribution of a given improvement in the terms of trade is larger the greater the weight of exports and imports in GDP.

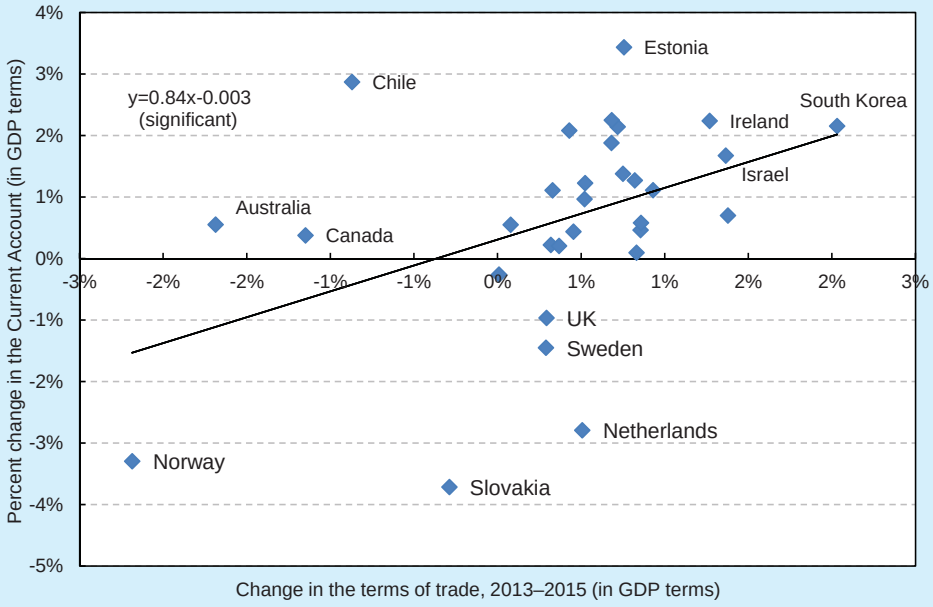
[25] World Bank data. The World Bank published data on the terms of trade for 148 countries (out of 248 economies in the world). Data on per capita GDP were published for all 148 countries; data on the Current Account surplus were published for 145 of them; and data on the real exchange rate were published for 78 of them. All of the countries for which there were data were included in the estimations and in the Figures, excluding the US and China which, due to their size, may have an effect on the global price of oil.

Figure 7.2
Effect of a Change in the Terms of Trade on the Current Account, 2004–06



Results of the statistical test: There is a significant correlation.
The sample includes 145 countries, with the US and China (large economies) were omitted.
SOURCE: World Bank.

Figure 7.3
The Effect of a Change in the Terms of Trade on the Current Account, 2013–15



Results of the statistical test: There is a significant correlation.
The sample includes all OECD countries, with the US (large economy) omitted.
SOURCE: OECD.

and even beyond that. This result was found to be robust even when controlling for policy shocks or fiscal and monetary policy reactions. In the advanced economies, an improvement in the terms of trade equal to one percent of GDP in 2005 and 2006 increased the Current Account surplus by 0.7 percent of GDP (after excluding three outlier observations—Norway, Estonia and Iceland) to 0.9 percent of GDP (excluding Iceland). This result remained in place even when controlling for the development of public consumption and the change in the interest rate. In 2014 and 2015, an improvement in the terms of trade equal to 1 percent of GDP led to an increase of 0.85 percent of GDP in the Current Account surplus of the advanced economies (Figure 7.3). The conclusion from these examinations is that the decisive majority of an improvement in the terms of trade will be channeled to increasing the Current Account surplus, meaning an increase in the economy's savings abroad.[26]

In the short term, the decisive majority of an improvement in the terms of trade will be channeled to increasing the economy's savings abroad. As such, the marginal tendency to consume from the additional income is much smaller than one.

The growth rate of per capita GDP was not significantly impacted by a change in the terms of trade either in the sample that included all the countries, or in the samples that included only the advanced economies (for 2005–06 and for 2014–15), or when controlling for monetary and fiscal policy. Energy importers, which benefited in 2015 from a marked improvement in the terms of trade, actually experienced lower growth than in 2014 (by 0.4 percentage points), while the decline in the growth rate of the four commodity exporters (Australia, Canada, Norway and Chile) was actually more moderate (just 0.2 percentage points).[27]

An improvement in the terms of trade was not found to have a significant effect on economic activity in the short term.

The examination for 2005–06 found that an improvement in the terms of trade equal to 1 percent of GDP led to a negligible appreciation of just 0.3 percent in the real (effective) exchange rate, at a marginal level of statistical significance (Figures 7.4 and 7.5). An improvement in the terms of trade has no effect on the real exchange rate after adding the control variables.[28] In the sample of advanced economies, the improvement in the terms of trade led to an appreciation of the real exchange rate, meaning an increase in prices in the economy relative to price levels in other countries (trading partners). Between 2013 and 2015, an improvement in the terms of trade equal to one percent of GDP led to a contemporaneous appreciation of 2.2 percent. A more moderate effect of 0.5 percent was estimated for the years 2005—06 (0.8 percent excluding South Korea). The results for the advanced economies were shown to be robust even after controlling for fiscal and monetary policy. The appreciation that took place in the advanced economies is consistent with the above finding that

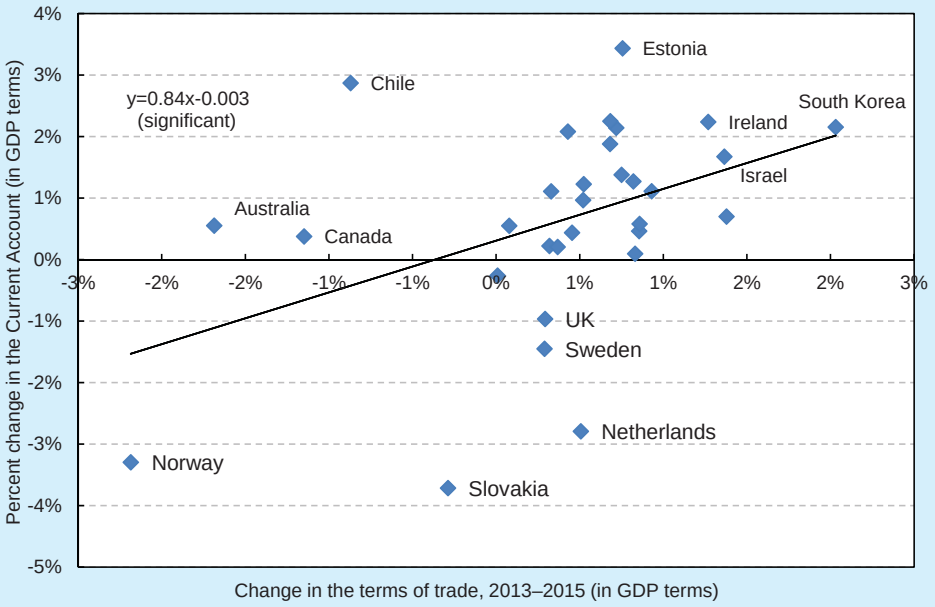
An improvement in the terms of trade leads to an increase in the relative price levels of the advanced economies.

[26] And a worsening of the terms of trade led to realizations from assets abroad.

[27] The broad sample for 2005–06 included many advanced economies that had difficulty raising capital from foreign investors. An improvement in the terms of trade of such countries can be expected to lead to relatively high growth of consumption and of GDP, and more moderate growth of savings. However, in practice, we found a large increase in savings and did not find a significant increase in GDP. The reason may be that during that period (2005–06), the revenue of the wealthy oil-producing countries increased rather than the revenue of poorer developing economies, and the wealthy countries have no difficulty in raising capital from foreign investors.

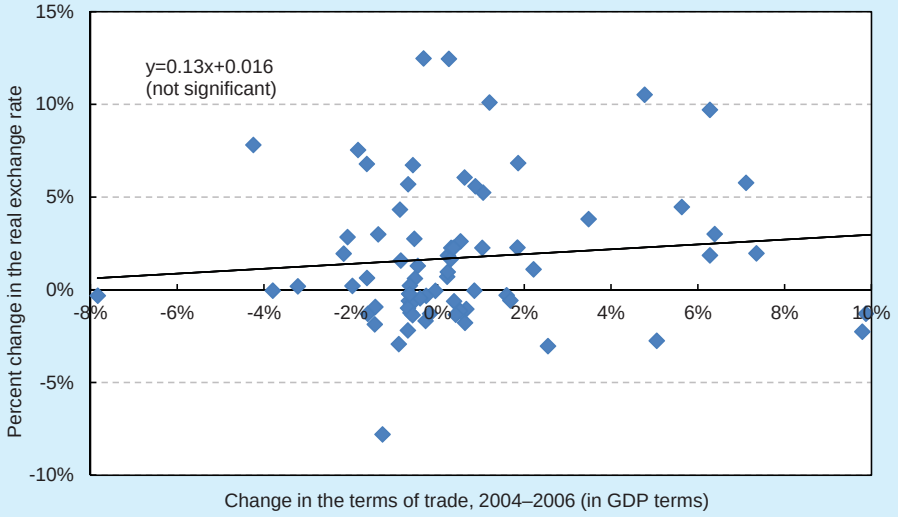
[28] A possible explanation for the lack of connection between the terms of trade and appreciation is that most of the developing economies have a fixed exchange rate regime or limitations on the flow of capital, which restrict changes in the exchange rate.

Figure 7.3
The Effect of a Change in the Terms of Trade on the Current Account, 2013–15



Results of the statistical test: There is a significant correlation.
The sample includes all OECD countries, with the US (large economy) omitted.
SOURCE: OECD.

Figure 7.4
The Effect of a Change in the Terms of Trade on the Real Effective Exchange Rate, 2004–06



Results of the statistical test: There is no significant correlation.
The sample includes 78 countries, with the US and China (large economies), as well as Zambia and Equatorial Guinea (outliers) omitted.
SOURCE: World Bank.

a small part of the improvement in the terms of trade was channeled to increased consumption and was not fully offset by the increase in the Current Account.

In summation, the countries that benefited from price changes channeled most of the resulting income to increasing savings abroad. The countries negatively impacted by the fluctuations in commodity prices borrowed from the countries that benefitted from those changes or realized savings that were held abroad, thereby maintaining their current consumption levels (relative to the other countries). This pattern was made possible due to the deep international capital market, in which advanced economies can borrow from each other and lend to each other with relative ease (excluding countries with particularly large external debts). The large fluctuations in commodity prices in 2005–06 and in 2014–15 caused large fluctuations in savings (in the Current Account surplus) and only moderate fluctuations in consumption and in GDP. Importers and exporters moderately adjusted their standards of living.

The large fluctuations in commodity prices in 2005–06 and in 2014–15 caused large fluctuations in savings and only moderate fluctuations in consumption and in GDP.

Table 7.1
The effect of the terms of trade (in GDP terms) on the Current Account, per capita GDP, and the real exchange rate, in 2014–15 and in 2005–06

	Advanced economies 2014-2015		Advanced economies 2005-2006		All countries 2005-2006	
Control variables	No	Yes	No	Yes	No	Yes
Effect on the Current Account	0.84	0.86	0.92[a]	1.1[a]	1.7	1.9
Effect on GDP	No significant effect	No significant effect	No significant effect	No significant effect	No significant effect	No significant effect
Effect on the exchange rate	2.34	2.35	0.76[b]	0.78[b]	0.30 (borderline)	No significant effect

Sample countries exclude the US, China and countries for which there were no available data.

The dependent variables: The annual growth rate of per capita GDP during the relevant period (in 2015 or the average of 2005 and 2006), minus that of the preceding period; the Current Account surplus minus that of the preceding period (in GDP terms for the preceding period); the change in the real exchange rate calculated by the IMF.

The explanatory variables: The change in the terms of trade multiplied by the average of goods exports and imports, divided by GDP. This change measures the contribution of the terms of trade to national revenue.

Additional control variables: Public consumption (rate of change, first difference), and the short-term interest rate (change from previous period).

[a] Excluding Iceland. With Iceland and without the control variables, there is no significant effect.

[b] Excluding South Korea. With South Korea there is no significant effect.

SOURCE: World Bank and OECD.

4. THE ESTIMATED EFFECT OF ENERGY PRICES ON THE ISRAELI ECONOMY

The effect of the changes in global energy prices on the Israeli economy was examined, focusing on four main variables—the Current Account surplus, per capita GDP, current private consumption, and the real effective exchange rate. In order to isolate the effect of fluctuations in commodity prices on the Israeli economy, we controlled for factors that may have an effect on the development of the examined variables: the GDP growth rate in advanced economies (or in the US), the growth rate in the high technology sector in the US, the interest rate in the US, terrorist attacks in Israel[29], and the wave of immigration in the 1990s.[30] A regression was estimated for each of the four dependent variables in the long term[31] and in the short term (quarterly data, from 1995 until the third quarter of 2015). Table 7.2 presents the results of the estimations and the effect of the change in energy prices[32] (relative to Israel's GDP price deflator) for each of the four variables in the long and short terms. The effects of a change in energy prices and of a change in the terms of trade on the four variables are very similar (almost identical). Therefore, only the effect of a change in the price of energy is presented.

A change in energy prices was not found to have a statistically significant effect in the short term on per capita GDP or on private consumption. Most (60 percent) of the amount saved due to lower energy prices would be channeled in the short term to increased savings abroad, meaning to an increase in the Current Account surplus. A change in energy prices was not found to have an (immediate) statistically significant contemporaneous effect on the change in the real exchange rate. However, the price of energy is one of the factors dictating the long-term exchange rate, and a deviation from the long-term connection leads to convergence in the following quarter: A decline of 10 percent in the price of energy leads to an appreciation of 0.5 percent in the following quarter (and of 1.5 percent in the long term). A prolonged decline in energy prices leads to a gradual appreciation of the real exchange rate in the long term.

A prolonged decline in energy prices leads to a gradual appreciation of the real exchange rate in the long term, which gradually erodes the Current Account surplus.

A decline in energy prices does not accelerate Israel's long-term growth rate relative to other advanced economies, and an increase in energy prices does not slow it down. The growth rate of per capita GDP is connected in the long term to the growth rate in the other advanced economies and to other factors, but is not connected to energy prices.[33]

The growth rate of per capita GDP is connected in the long term to the growth rate in the other advanced economies and to other factors, but is not connected to energy prices.

[29] The number of Israelis murdered by Palestinians in Israel.

[30] The objective is to estimate the effect of energy prices on the Israeli economy. If variables were omitted from the regression, they were such that are not in line with energy prices.

[31] Co-integration estimation. All of the variables in the long-term estimations had a unit root. The assumption regarding a unit root for the following variables was not rejected: the Energy Price Index (relative to GDP prices), Israel's Current Account surplus and the real exchange rate, Israel's per capita GDP and the US per capita GDP. This assumption could have been rejected regarding the real 5-year interest rate in the US (borderline significance level).

[32] The price of energy is calculated by the Central Bureau of Statistics.

[33] In order to obtain a co-integration connection (stationary remainders) it would have been necessary to use four variables: the per capita GDP growth rate in the US, terrorist attacks (number of Israelis murdered by terrorists in Israel), the business cycle in the high technology industries in the US (the US Tech-Plus index), and the absorption of the wave of immigration (population in Israel).

Table 7.2
The short- and long-term effects of a 10 percent decline in energy prices on selected variables

	Current Account surplus	Real exchange rate	Per capita GDP (fixed prices)	Nondurables consumption (fixed prices)
Short-term	60 percent channeled to savings	Appreciation of 0.5 percent	Not significant	Not significant
Long-term	Not significant	Appreciation of 1.5 percent	Not significant	Not significant
Long-term factors	No long-term cointegration equation found	Per capita GDP in Israel relative to per capita GDP in the US and energy prices	Per capita GDP in the US, the Tech-Plus index in the US, the terrorism index, and population growth in Israel	GDP in Israel (in fixed prices)

Israeli GDP, per capita GDP, and current consumption, as well as per capita GDP in the US, all at fixed prices.

Energy price is the price of energy in Israel relative to GDP prices (SOURCE: Central Bureau of Statistics).

Terrorism index is the number of Israelis murdered by Palestinians in Israel.

Current Account surplus is in dollars.

SOURCE: Based on Central Bureau of Statistics.

The long-term estimation found that nondurable private consumption (per capita) is connected only with the (per capita) GDP growth rate, which is not affected in the long term by energy prices. Energy prices therefore do not have a direct effect on consumption, but may have an indirect effect through their effect on per capita GDP in the other advanced economies (which, as stated, has an effect on GDP in Israel). According to accepted theory, current private consumption will change only in response to a change in the real interest rate or to a change in permanent income, which is the total income expected to be received in the future in real terms. Only a decline in prices that is considered persistent will increase permanent income and current private consumption.

In summation, the estimations carried out show that the public is not using most of the new sources to increase current consumption, such that GDP is not increasing exceptionally. The additional sources are being directed mainly toward savings abroad, thereby increasing the Current Account surplus. If the change persists, domestic demand will increase gradually, the surplus demand will increase GDP and lead to price increases in the economy relative to global prices (gradual real appreciation of the real exchange rate), the profitability of exporters and of the manufacturers of import alternatives will decline, and the Current Account surplus (created as a result of the improvement in the terms of trade) will erode. The findings show that a decline in energy prices does not accelerate the economy's growth rate in the long term

A decline in oil prices makes it possible to divert the sources that had served to finance oil imports to increase the import of consumer goods instead, thereby contributing to an improvement in the standard of living.

relative to growth in other advanced economies. Such a decline also does not increase current private consumption (unless it accelerates long-term growth in the advanced economies). However, a decline in oil prices does make it possible to divert the sources that had served to finance oil imports to increase the import of consumer goods instead (and to divert factors of production from export production to production for current consumption), thereby contributing to an improvement in the standard of living.

The development of the oil fracking industry in the US, the broad use of renewable energy in Europe, and the discovery of natural gas in Israel are reducing Israel's sensitivity, and that of its main trading partners, to oil price shocks.

Finally, developments in the energy industry contribute to stabilizing Israel's balance of payments: The development of the oil fracking industry in the US, the broad use of renewable energy in Europe, and the discovery of natural gas in Israel are reducing Israel's sensitivity, and that of its main trading partners, to oil price shocks. A prominent example of such a shock occurred between 2002 and 2008, when global oil prices increased by 390 percent. Expenditures on the import of fuel to Israel increased by 420 percent during that period (from $3 billion to $13 billion, evidence of the rigidity of demand for oil relative to price) and reached 5.5 percent of GDP. The purchasing power of US consumers also eroded, with the expenditure on energy as a share of total private consumption in the US doubling (from 4 percent to 8 percent), at the expense of other expenditures such as the import of goods and services from Israel. The result was a deficit in Israel's goods and services account, and a very large real depreciation of the real exchange rate of the shekel—16 percent between 2002 and 2007. Had the fuel price increase taken place in one year, rather than gradually, the Israeli economy would have suffered a serious crisis. As stated, the likelihood of such a scenario repeating itself and causing a crisis in the future is expected to decline. While the demand for oil in the short and medium terms remains rigid, Israel is expected to increase its use of natural gas and of renewable energy to power land transport, similar to processes underway among its trading partners.