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The Effects of International Trade on Labor Market Reallocation and Inequality

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Abstract

This paper studies the effects of international trade on labor market reallocation and on inequality in Israel since 1990.

The empirical work – mostly at the individual worker and firm sectorial levels – links trade developments, particularly changes in export shares and import penetration, to labor market outcomes. The latter include employment (levels and changes), unemployment, labor market transitions, and various moments of the wage distributions (means and various measures of dispersion).

A key conclusion is that trade expansion was not associated with simple outcomes, such as increases in export sector employment and wages or declines in import sector employment and wages. The outcomes turn out to be much more complex, and, in some cases, even run counter to these simple scenarios. Rather, the findings are of reallocational effects on the labor market, leading to worker transitions across sectors and employment states and to increases in wage inequality. Policy implications of these results are delineated and discussed.

The Effects of International Trade on Labor Market Reallocation and Inequality[2]

1. Introduction

The key aim of this study is to provide an assessment of the contribution of trade liberalization to labor market developments in Israel since 1990. It looks both at macroeconomic relationships and at microeconomic, sectorial-level relations of trade and labor. In particular, it looks at the key labor market outcomes, namely employment, unemployment and wages, in terms of averages, dispersion and dynamics. The paper then offers conclusions for policy.

The structure of the paper is as follows:

Two sections review trade and the labor market in Israel: Section 2 does so with data using descriptive statistics and Section 3 with a review of the relevant literature. Subsequently Section 4 presents the frontier of academic research on the connections between trade and labor markets and points to their implications for Israel. Building on the preceding discussion it presents the emerging, central issues for Israel. Section 5 presents the data and the methodology and Section 6 presents the results. Section 7 discusses the implications for policy. Section 8 concludes. Technical matters and data issues are presented in Appendices.

[2] I would like to thank Elhanan Helpman and Kerem Cosar for helpful conversations, Lior Gallo from the Bank of Israel for data advice, and David Eliezer for highly dedicated, excellent research assistance. Any errors are my own.

2. Key Facts on Trade and Labor in Israel

In what follows I outline the key relevant background facts.

General Background on Israel's Trade Policy Since 1993

In the course of the 1990s Israel has gained access to new markets. The Israeli government embarked on an "exposure" plan for the economy, opening it up to competing imports. The plan consisted of two-staged liberalization: abolishing import licenses and quotas and introducing tariffs instead and then reducing tariffs.

In addition, Israel signed free trade agreements with various countries, for both political and economic considerations. Two important FTAs worth noting – predating the period covered -- are with the EEC (1975) and the U.S. (1985).

Israel, a contracting party to the General Agreement on Tariffs and Trade (GATT) since 1962, took an active part in the Uruguay Round, leading to the establishment of the World Trade Organization (WTO). The WTO Agreement was ratified by the Knesset on January 15th, 1995. At the WTO, Israel is defined as a developing country, which gives it certain rights, such as higher tariffs and extra time in implementing agreements and commitments. As part of its membership obligations, Israel made adjustments in tariffs and in its foreign trading system. For example, a change was made in the methods by which goods are evaluated. Until 1998 goods value was based on the Brussels Convention method (1957) which allowed raising the value artificially in order

[3] This sub-section is based on official documentation, in particular the review of tariff history, chapter 6 in the Israel Tax Authority, History of Customs Report, 2010. See http://ozar.mof.gov.il/ita2013/eng/mainpage.htm. Note that the current paper does not cover the entire history but from 1990 onwards.

to protect local production with high tariffs. According to the WTO principles, it was determined that goods are to be evaluated by the price actually paid, and thus had significant implications for tariffs. In order to deal with tax evasion by importers, it was decided to use fixed sums duties on some of the goods.

Israel is also a signatory of the WTO Information Technology Agreement (1997) requiring participants to eliminate duties on IT products covered by the Agreement. Israel is party to the Agreement on Government Procurement (GPA) of 1994, and has participated in the negotiations of the revised GPA.

One of the results of these processes was the entry of big international firms into the local market. Microsoft started activity in Israel in the first half of the 1990s, while Cisco and Oracle did so in the second half of the decade. IBM, HP, and Intel, which had already opened branches in Israel, greatly expanded their activity from the second half of the 1990s. Google and Marvell opened branches in Israel in the middle of the 2000s, as did Facebook in 2012.

Table 1 lists the key events in this context in the period 1990-2014. Further detailed information is available in WTO (2012).

Table 1: The evolution of trade liberalization, 1990-2014

Year		Description
1990	1)	Sales tax and tariffs on imports of durable goods and textiles are cut (mainly from the US).
	2)	Export subsidies are removed.
1991		The Israeli government decides on the first stage of the Exposure Plan: curtailing administrative restrictions and replacement of imports quotas by high protective tariffs.
1992	1)	Second stage of the "Exposure Plan": gradual reduction of tariffs.
	2)	Trade agreement with the EFTA group of countries.
1993	1)	Abolition of the general levy on imports and of exchange rate insurance for exporters.
	2)	Third stage of the Exposure Plan: abolition of tariffs for imports from countries Israel does not have agreements with.
	3)	The Israeli government decides to slow the pace at which the textiles, clothing and glass industries are exposed to competing imports.
1994		GATT agreement of tariff reduction by 115 countries, including Israel.
1995	1)	Abolition of tariffs on industrial goods with the US
	2)	Israel becomes a member of the WTO.
	3)	The Israeli government signs a new free trade agreement with the European Union (replacing the previous one in 1975).
1996-1997	1)	The completion of the Exposure Plan for most of merchandise imports: iron and steel, chemicals, pharmaceuticals, fertilizers, cosmetics, films, tires, leather, paper, printed matter, glass, furniture and toys.
	2)	The government signs free trade agreements with Turkey, Canada, the Czech Republic and Slovakia.
	3)	The government signs with Jordan a Qualifying Industrial Zone agreement for economic cooperation and free trade.

1998	1)	The completion of the Exposure Plan in sensitive industries: wood, footwear, ceramics, and motors.
	2)	The government signs free trade area agreements with Poland and Hungary.
2000	1)	The official termination of the Exposure Plan with the completion of exposure in two last and very sensitive industries: textiles and
	2)	clothing.
	3)	The government reduces sales tax on both domestic production and imports of about 300 items and cancels the tax on 300 other items.
		The government signs a free trade agreement with Mexico.
2001		The government signs free trade agreements with Rumania and Bulgaria.
2004	1)	The government signs with the U.S. and Egypt a Qualifying Industrial Zones agreement for economic cooperation and free trade.
	2)	Tariff rates on processed foods and fresh farm products were reduced.
2010	1)	Free trade agreement between Israel and the Mercosur market comes into force.
	2)	Israel and the European Union have liberalized their bilateral trade in agricultural products through a new Protocol.
2011		The government decides, following recommendations of the Committee for Economic and Social Change, on gradual unilateral tariff elimination for close to 400 tariff lines of non-food consumer goods, on which customs duties had been in the range of 6-12%.
2012	1)	There is a 25% reduction of customs duties revenues on all products, except for agricultural goods (and thus food), and car parts.
	2)	The government decides, following recommendations of a special committee on competitiveness and market prices of food and consumer products, to reduce gradually, until 2015, tariffs in agriculture and food (especially milk products).

2013	1)	The government signs a free trade agreement with Colombia.
	2)	The government decides to stop further implementation of reductions in tariffs, except for agricultural products (and thus food), because of budget deficit issues. Customs are still levied on appliances and cosmetics
2014		The government decided on full import taxes exemption on personal imports up to $ 75 as well as on duty-free up to $ 500.

Source: WTO TPR, Israel tax authority, Israeli state revenue division and Bank of Israel annual reports.

The Time Evolution of Tariffs and Sales Taxes in Israel

Taxes on imports include two main types: sales taxes and tariffs. The sales tax is an indirect tax levied on wholesale prices. It is currently levied on durable goods, including cars, appliances and electronics, as well as on fuel, cigarettes, alcohol and cosmetics.

Until the year the 2000 the sales tax was imposed also on a number of intermediary goods and raw materials. The tax is imposed at the same rate on both domestic production and imports, but most of the government sales tax revenues come from the taxation of imports.

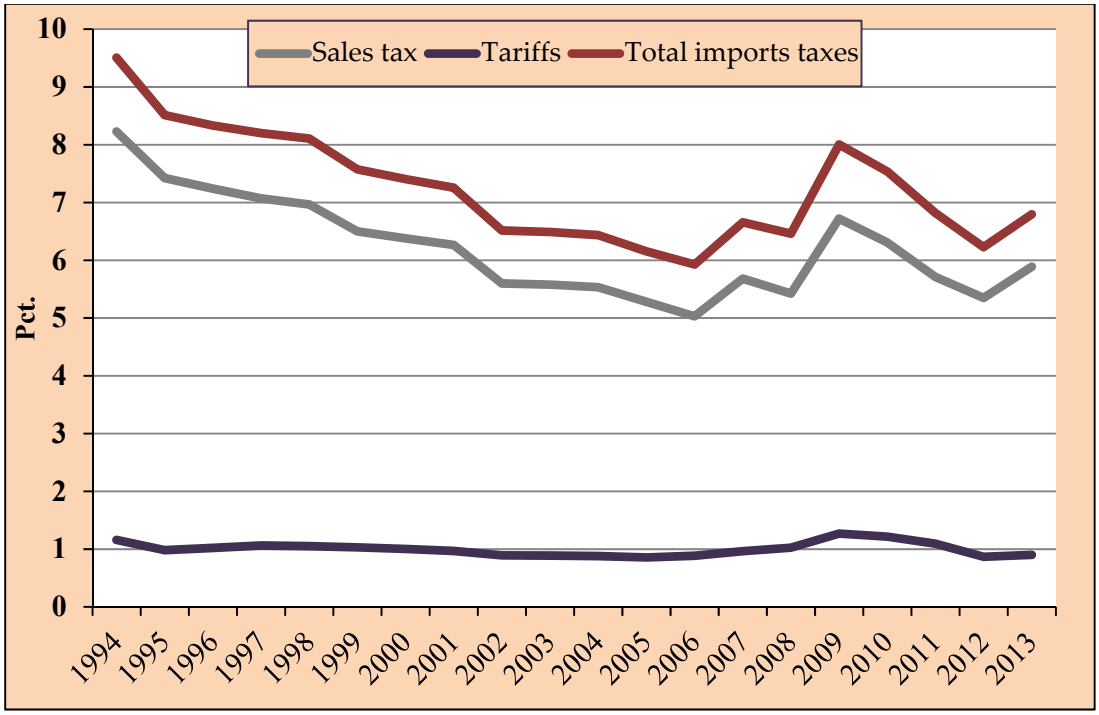
In the 1950s and 1960s tariffs were imposed on all imported good and rates were very high. Following the agreements signed with the EEC (1975), the US (1985) and EFTA (1993) tariff rates were gradually reduced (see Table 1 above), and by 1996 about 92% of imports were duty-free.[4]

The evolution over time *from the perspective of government revenues* is shown in Figures 1 and 2 and in Table 2. Figure 1 shows the change over time in tariffs and imports sales tax revenues as percentage of the total value of imports. Figure 2 shows tariffs and sales taxes on imports as a percentage of total

[4] Israeli state revenue division annual report 1996, p.192
http://ozar.mof.gov.il/hachnasot/

indirect taxes revenues. Table 2 shows the average revenue from tariffs on various goods in 1996, 2005 and in 2012. *WTO data on tariff rates* and the evolution of MFN tariffs in Israel over time are shown in Table 3.

Figure 1: Revenues from tariffs and sales taxes (on imports) as percentage of the total value of imports[1]

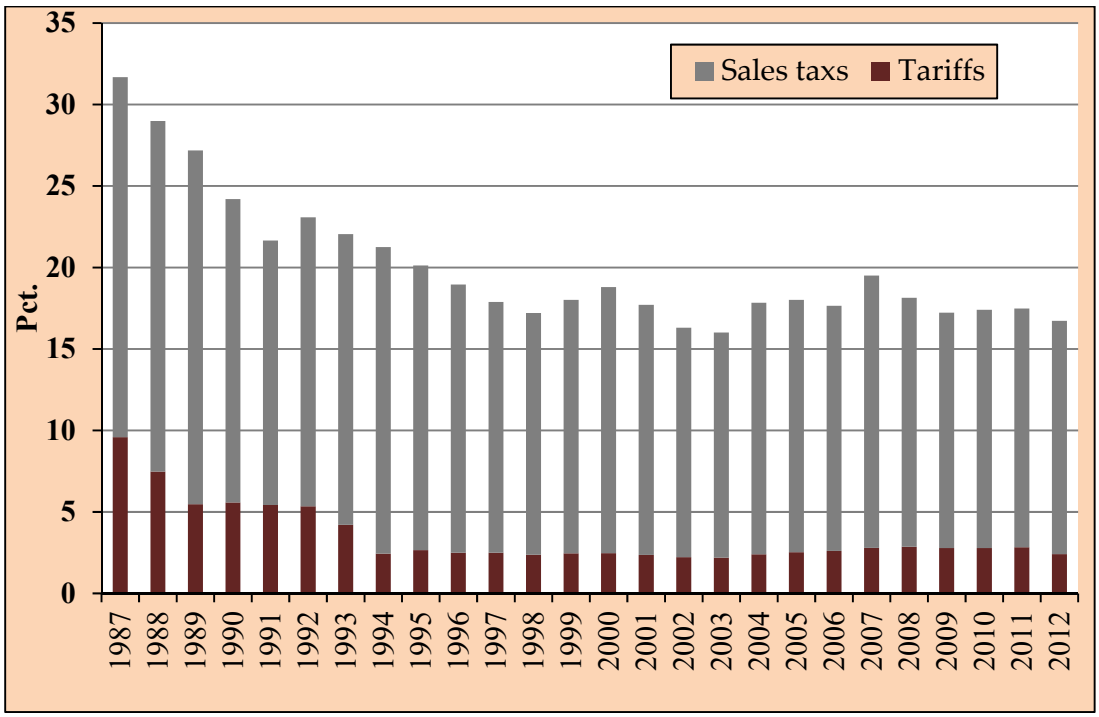


1) The increase in 2009-2010 is attributed to government decision to raise sales tax on cigarettes by 35%.

Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics. http://www.cbs.gov.il/reader/shnaton/shnatone_new.htm?CYear=2014&Vol=65&CSubject=30 #16

Figure 2: Revenues from tariffs and sales taxes on imports,

as percentage of total indirect tax revenues



Source: Israeli state revenue division annual reports.

http://ozar.mof.gov.il/hachnasot/

Table 2: Tariffs, 1996, 2005 and 2012

by groups of goods, percentage

Category	Imports shares			Average revenues from tariffs, rate (1)		
	1996	2005	2012	1996	2005	2012
Agriculture	6.8	5.9	8.2	3.4	1.9	2.3
Aircraft, vessels and transportation	1.3	0.9	1.3	0	0	0
Motor Vehicles	7.9	5.8	7.0	3.2	2.9	2.3
Machinery	16.1	9.4	11.6	0.9	0.7	1.1
Electronic devices	12.8	14.5	15.6	1.0	0.	0.6
Leather, textiles, and footwear	4.3	4.1	4.5	3.6	5.6	4.9
Wood and Furniture	2.2	3.2	3.2	1.3	1.9	1.9
Toys and Musical Instruments	0.4	0.3	0.4	7.2	7.6	2.4
Inputs and raw materials for manufacturing	29.0	55.4	47.0	0.5	3.1	4.6
Other	19.2	1.0	1.2	0.1	0.2	0.3
Total	**100**	**100**	**100**	**1.1**	**0.9**	**1.0**
Average effective tariff rate (2)				**11**	**3.5**	**4.0**

(1) The average rate of tariff revenues is calculated as government revenues from tariffs divided by the total value of imports (C.I.F prices).

(2) Average effective tariff rate is calculated as government revenues from tariffs divided by the value of taxable imports (C.I.F prices).

Source: Israeli state revenue division annual reports.

http://ozar.mof.gov.il/hachnasot/

Table 3: Overview of MFN tariffs in Israel, percentage

	2000	2005	2012
Duty-free tariff lines (% of all tariff lines)	45.1	48.5	54.6
Simple average tariff rate	10.8	8.9	7.0
Agricultural products [a]	42.8	32.9	24.5
Non-agricultural products [b]	5.9	5.1	4.2
Agriculture, hunting, forestry and fishing (ISIC 1)	52.2	41.0	29.6
Mining and quarrying (ISIC 2)	0.3	0.2	0.2
Manufacturing (ISIC 3)	8.4	7.3	5.8

a WTO definition. WTO agreement on agriculture.
b WTO definition. Exclude petroleum.
Source: Trade policy reviews on Israel, WTO.

The figures and the tables indicate the following:

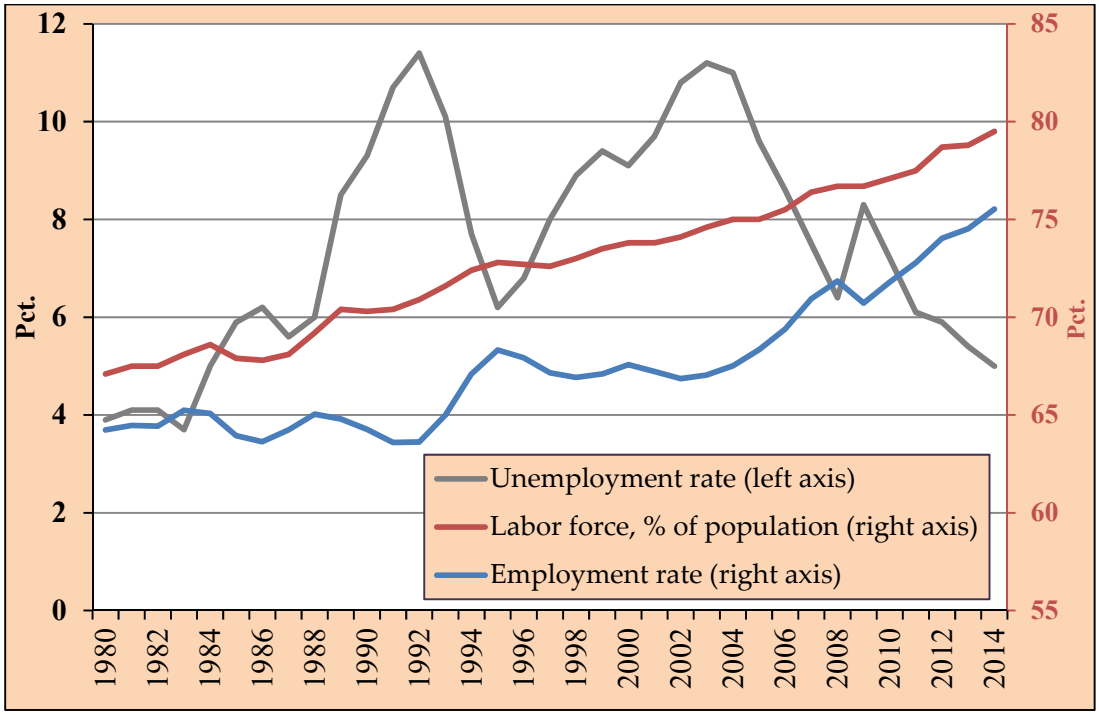
a. From the government revenues perspective, tariffs declined sharply from the late 1980s and stayed relatively flat from 1994 onward. The figures show their low level and relative stability. The average effective tariff rate declined from 11% in 1996 to about 4% by the mid-2000s. Tariff revenues became negligible, about 1% of the total value of imports and about 2% (about 2.3 billion NIS) of indirect tax revenues. Sales taxes on imported goods declined as well but revenues from them remain 6% of the total value of imports and almost 15% of indirect tax revenues.

b. From the WTO perspective, there was a reduction of tariff rates from 2000 to 2012, as well as an increase of duty-free tariff lines (of products).

Labor Market Developments

Figures 3-8 show key labor market indicators in the Israeli economy over time. Following each figure, key implications are delineated. Note that the mass immigration from the ex-USSR states, that mostly took place from 1990 to 1999 and increased the labor force by around 20%, is included in the data shown here.

Figure 3: The Israeli labor force (percentage of total population) and the unemployment rate[1], ages 25-64, 1980-2014

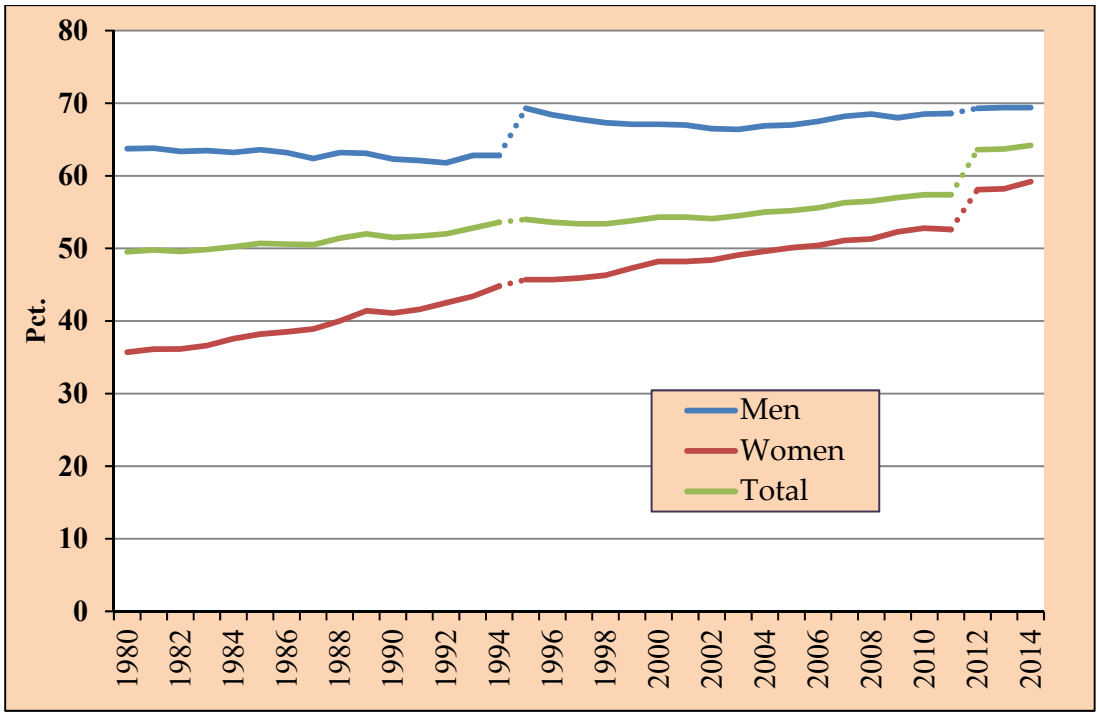


1) Data are chained according to changes in the Labor Force Survey.

Source: Bank of Israel, based on CBS LFS.

The figure shows that unemployment fluctuated between 4% and 12% and averaged around 7%. Its rise in the 1990s (in 1990-1992 and from 1995 till the early 2000s) is associated with the afore-cited mass immigration from the ex-USSR states, and its subsequent fall with the relatively fast absorption of these migrants into employment. There was a continual rise in labor force participation and employment rates, the latter rising from less than 65% in 1980 to more than 75% in 2014.

Figure 4: Israeli labor force as percentage of total population, by gender, 1980-2014[1]

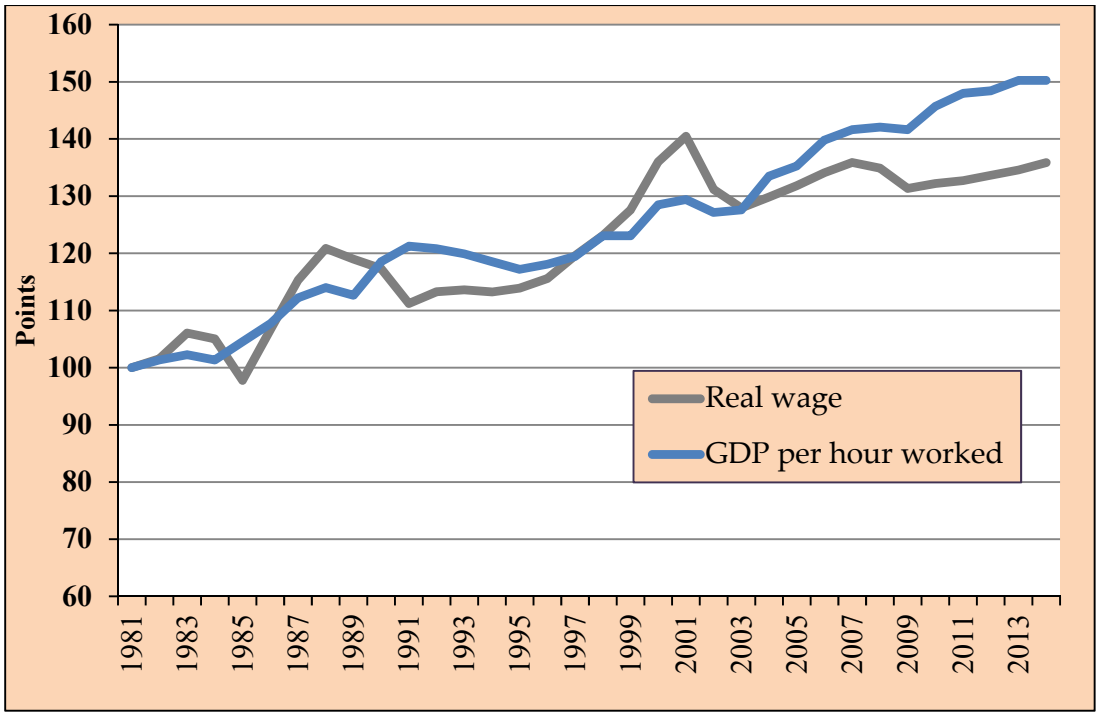


1) Data are chained according to changes in the Labor Force Survey. Significant changes were made in 1995 and 2012.

Source: Bank of Israel, based on CBS LFS.

The increase in labor force participation involved both men and women but it is the increase in women participation, which has dominated.

Figure 5: Average monthly real wages per employee post and GDP per hour worked, constant prices, indices (100=1981)



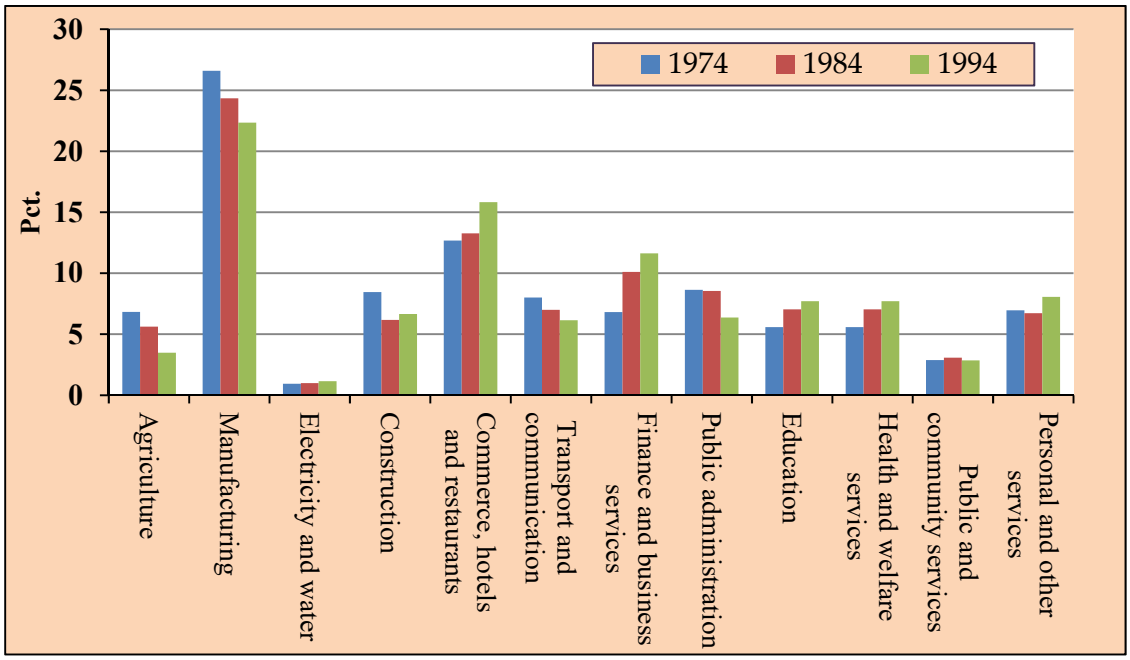
Source: Bank of Israel and OECD.Stast

While real wages move in tandem with labor productivity (GDP per hour worked), over the past decade productivity growth has outpaced wage growth.

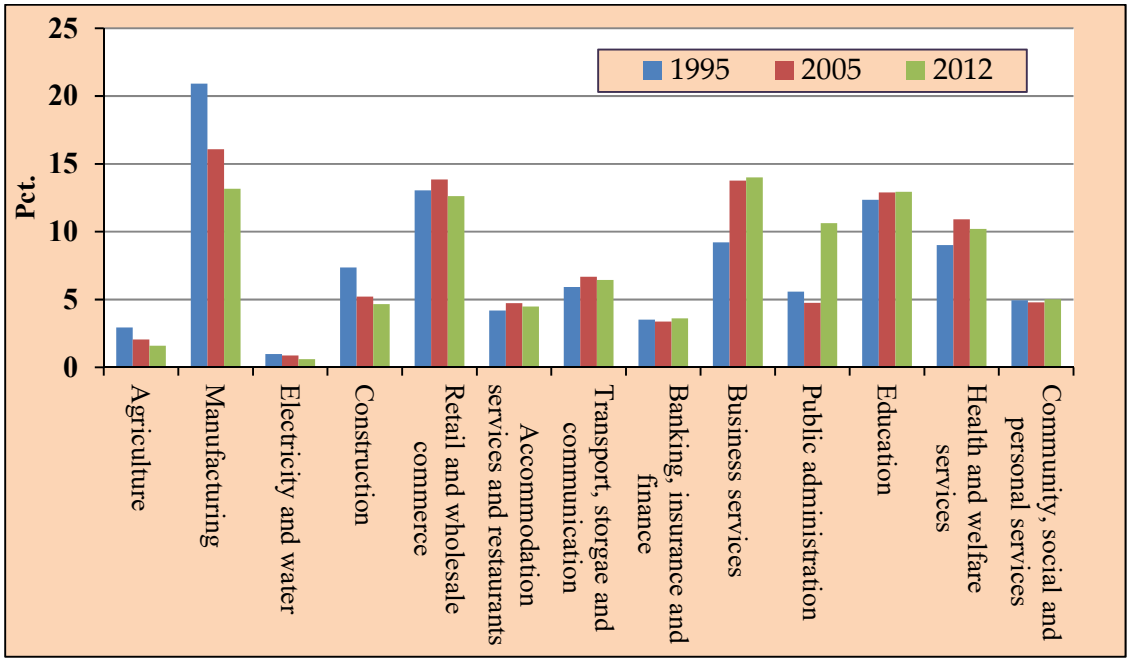
Figure 6: Employment share in principal industries,

percentages of total Israeli employess[1]

1974-1994 (1970 classification)



1995-2012 (1993 classification)

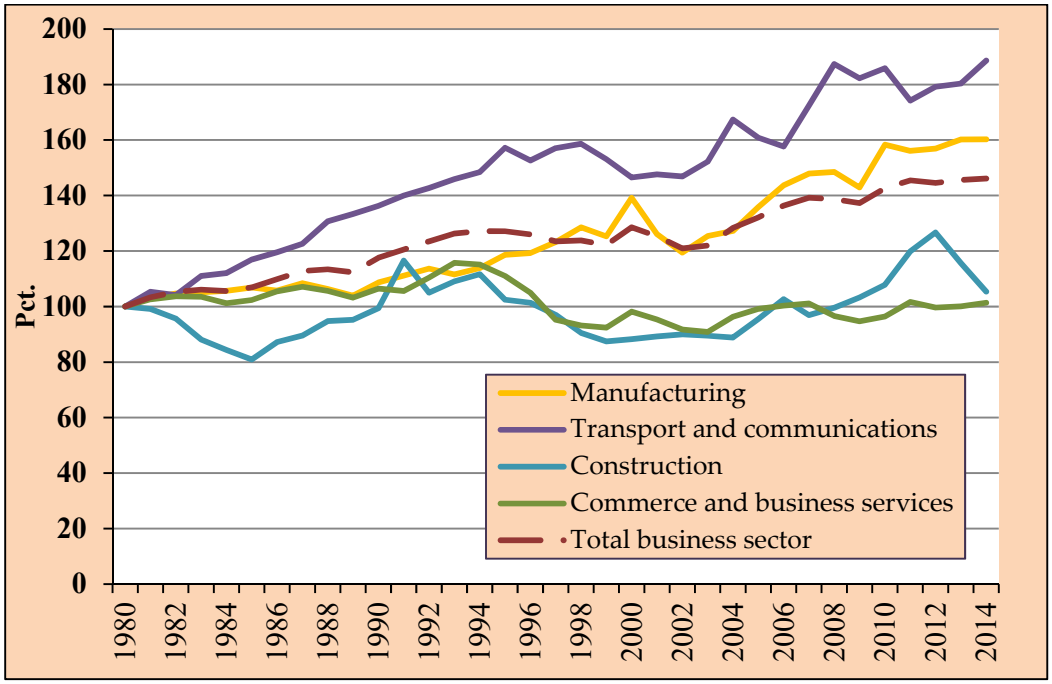


1) Data are not comparable after 2012 since the Industries classification has been changed in 2013.

Source: Bank of Israel, based on CBS LFS.

The figure shows that some sectors declined considerably in terms of shares out of employment, notably agriculture and manufacturing, some have increased, notably education and business services and finance, while the rest have fluctuated in terms of shares.

Figure 7: Total factor productivity in principal industries of business sector, 1980 – 2014, indices (1980=100)[1]

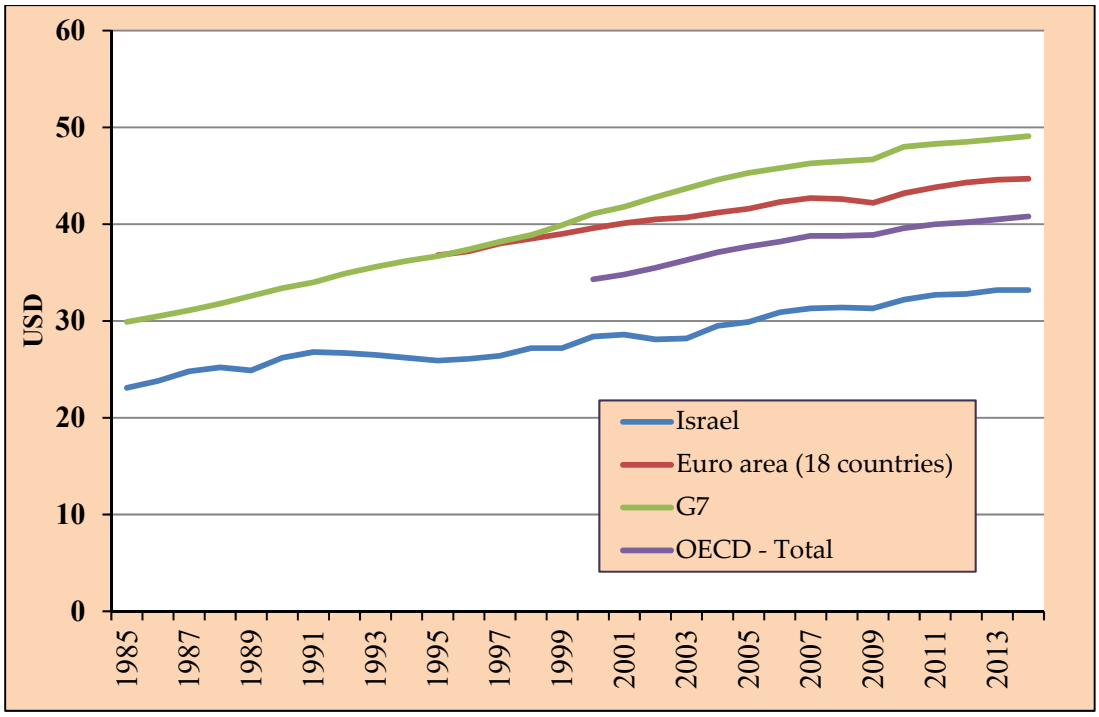


1) Total factor productivity by principal industries: The change in product by industry which cannot be attributed to the change in capital stock or a change in man-hours. Data until 2006 are classified according to the 1993 industry classification, and data from 2007 onward are classified by the 2011 industry classification.

Source: Bank of Israel, based on CBS.

The figure shows that there is substantial heterogeneity in TFP growth across industries. In particular, over a 34 year period there was very slow growth in TFP in construction (5.4% over 34 years) and in commerce and business services (1.4% over 34 years) while business sector average TFP rose by almost 46% over the same period.

Figure 8: GDP per hour worked (USD, constant prices, 2005 PPP's), 1985-2014[1]



1) Data are not available for Euro area before 1995 and for total OECD before 2000.
Source: OECD.Stat
https://stats.oecd.org/Index.aspx?DataSetCode=PDB_LV

The figure shows that labor productivity in Israel is relatively low and there seems to be no "catching up" with the OECD, Euro area or G7 averages.

In summary, while rates of participation and employment have followed positive growth trends and mass immigration from the ex-USSR states was quickly absorbed, labor productivity and TFP have been relatively low and slow-growing.

Another labor market phenomenon is worker migration. The canonical Heckscher-Ohlin model of trade implies that trade in goods and services and factor movements – including labor, i.e.. migrant workers – are substitutes, at least to some extent. Thus, in the absence of trade barriers, even when factors

are not mobile, there is a tendency toward factor price equalization, including wages (see for example the discussion in Chapter 5 of Krugman, Obstfeld and Melitz (2015)). Hence, it is pertinent to look at factor movements and in particular, in the labor context, flows of migrant workers into Israel.

Table 4 lists key events while Figure 9 shows key migrant worker series as a percentage of total business sector employment. One should note, however, the current limited availability of data, and, in particular, lack of sufficient data by sector. This constrains the current analysis.

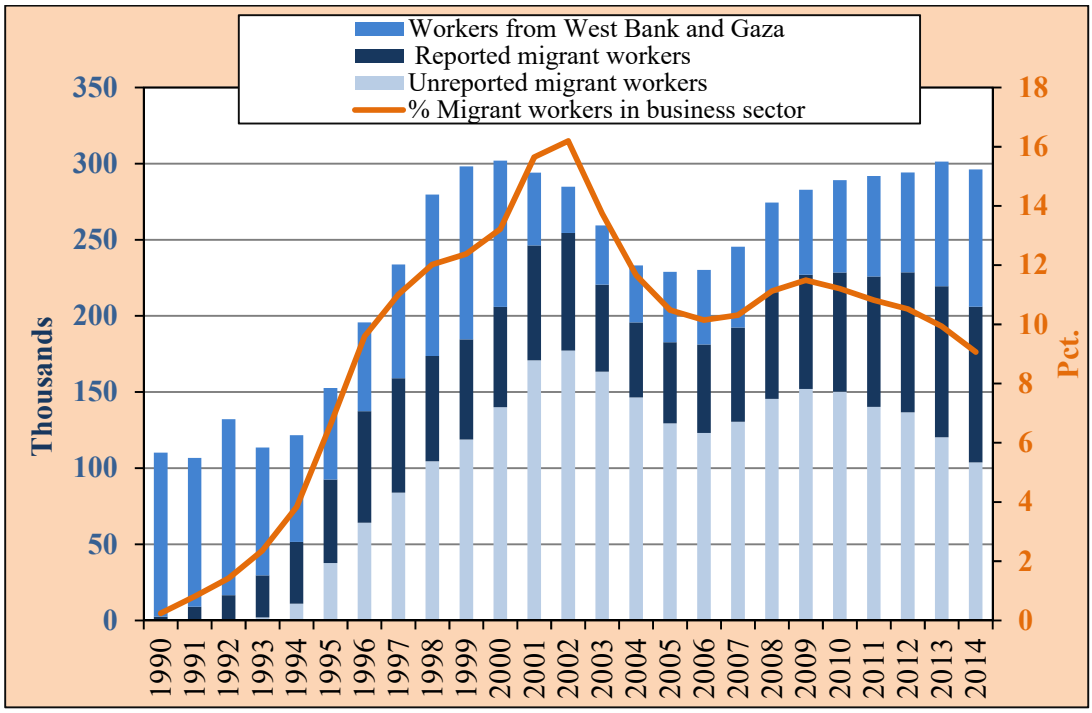
Table 4: Migrant workers, 1990-2014

1990		The government approves the entry of 8,000 migrant workers (3,000 of them for the construction industry).
1994		The government approves entry of 50,000 new migrant workers.
1996		The migrant workers make up 10% of business sector employment.
1997		The government stops issuing permits for new migrant workers.
2000-2001		The government issues new permits for migrant workers and their number rises significantly.
2003	1)	The government introduces a 'closed skies' policy in order to reduce the number of migrant workers.
	2)	The government raises fees and taxes on the employment of migrant workers.
	3)	The government establishes the immigration police.
2004	1)	The number of permits granted to migrant workers falls by 20,000 (mostly in construction).
	2)	The government decides on a new institutional arrangement for the supply of migrant workers based on human resources firms.
	3)	The government raises the minimum wages of migrant workers.
2006		The government resolution no. 446 cuts the number of permits for migrant workers in the construction industry.
2007	1)	A government committee report for non-Israeli workers recommends reducing gradually the number of legal and illegal migrant workers to 5,000 until 2014 (not including home-care workers) and to increase their employment costs to employers at the same time.
	2)	The ministerial committee on migrant workers decides on higher minimum wages for migrant workers and on gradual reduction of quotas.
2008	1)	The government decides on a program to replace home-care migrant workers with Israeli ones.

	2)	An increase in the number of asylum seekers and illegal aliens.
	3)	Government resolution no.3996 establishes annual goals for reducing the number of illegal foreign workers.
	4)	The government establishes The Population and Immigration Authority.
2009		Government resolution no.147 cuts the quotas and the number of permits for migrant workers in main sectors according to "The Non-Israeli Workers Policy" committee recommendations (2007).
2010	1)	The government decides to step up enforcement against employers of illegal migrant workers as well as to reduce the number of illegal aliens (resolution no.1274).
	2)	The government committee for the examination of employment policy recommends continuing the implementation of reducing the number of non-Israeli workers in order to act against poverty and to improve Israeli employment and wages.
2011		Agreements with the governments of Thailand and Bulgaria on flows of workers in agricultural and construction.
2012		A 40% reduction in asylum seekers and illegal aliens compared to 2011 due new immigration regulations.
2013-2014	1)	The entry of new asylum seekers and illegal aliens has almost completely stopped. In addition, the government is making efforts to make those who stay in the country leave voluntarily. In 2014 6,200 illegal aliens left voluntarily, and the number of illegal aliens was 46.4 thousand people (a reduction of 12% compared to 2013).
	2)	The government continues the implementation of bilateral agreements with Thailand, Bulgaria and Moldova for migrant workers in agriculture and construction.

Source: Bank of Israel and The Population and Immigration Authority annual reports.

Figure 9: Migrant workers in the business sector, 1990-2014[1]



1) Data before 1993 are estimates.

Source: Reported and unreported migrant workers data are taken from the Israeli Central Bureau of Statistics, while the rest of the data are taken from Bank of Israel statistics.

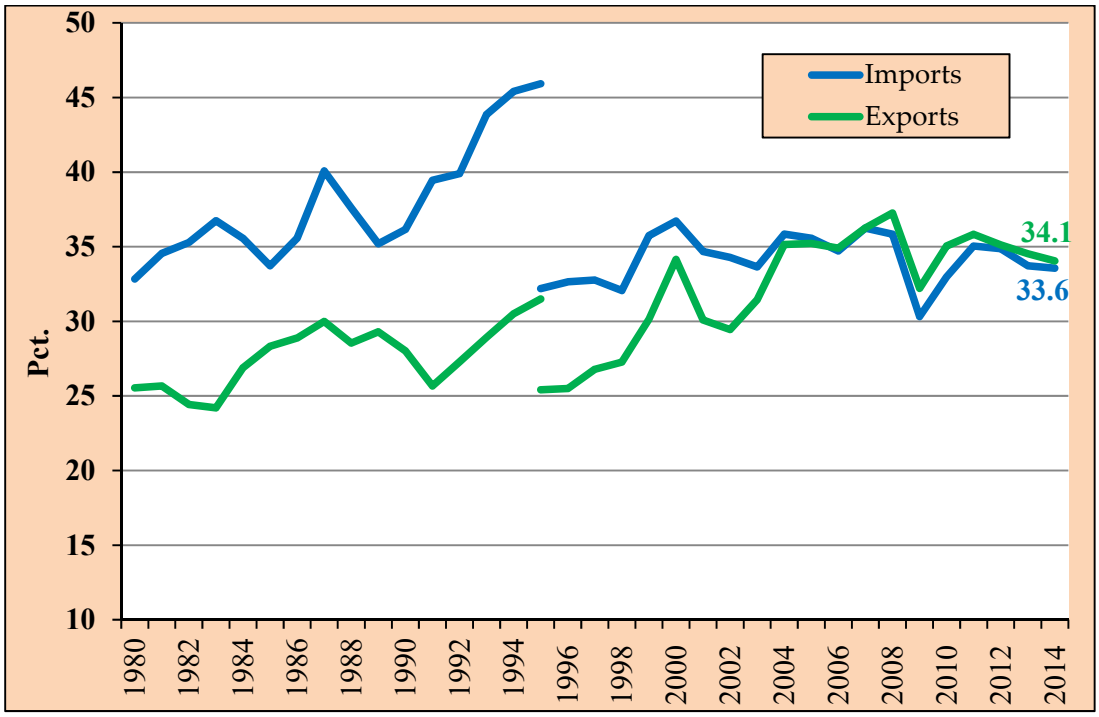
Table 4 and Figure 9 indicate that migrant workers have become a sizeable fraction of business sector employment, not less than 10% since the late 1990s, even reaching 16% in the early 2000s. Two governmental committees studied this issue and proposed policy changes (see Eckstein (2008, 2010)). These reports focus on the low-skill nature of these migration flows and their effects on the low-skill part of the wage and productivity distributions. The sectors in question are mostly construction, manufacturing, agriculture and home-care. The recommendations of these two committees were adopted by the government, with the view of limiting or reducing the number of migrant workers. But, in practice, government policy decisions fluctuated between allowing in more migrant workers and trying to curb their numbers by making their employment more costly.

Measures of Openness

Israel is a very open economy and ranks 9th in the OECD trade openness measure.[5] Figure 10 shows the measure for imports and exports penetration. Imports and exports shares of total GDP are based on constant prices data for each of the components, in order to control for the effects of price changes of foreign trade and GDP. The break in the series is explained in the notes to the figure; regrettably many reports on the economy, such as Bank of Israel publications, do not provide due reference to this break. For more information and discussion, see appendix B.

[5] See http://www.oecd-ilibrary.org/sites/sti_scoreboard-2011-en/06/06/g6-6-01.html?contentType=&itemId=%2Fcontent%2Fchapter%2Fsti_scoreboard-2011-60-en&mimeType=text%2Fhtml&containerItemId=%2Fcontent%2Fserial%2F20725345&accessItemIds=%2Fcontent%2Fbook%2Fsti_scoreboard-2011-en&_csp_=1e60f82daf0a9b7a7d78ad5e0374da93

Figure 10: Trade openness indicators - imports and exports of goods and services as percentage of GDP[1], constant prices, 1980-2014



1) National accounts for 1980 to 1995 were compiled according to the SNA 1968, while national accounts for 1995 to 2014 are based on the SNA2008 system. For more information see appendix B note No.9.

Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

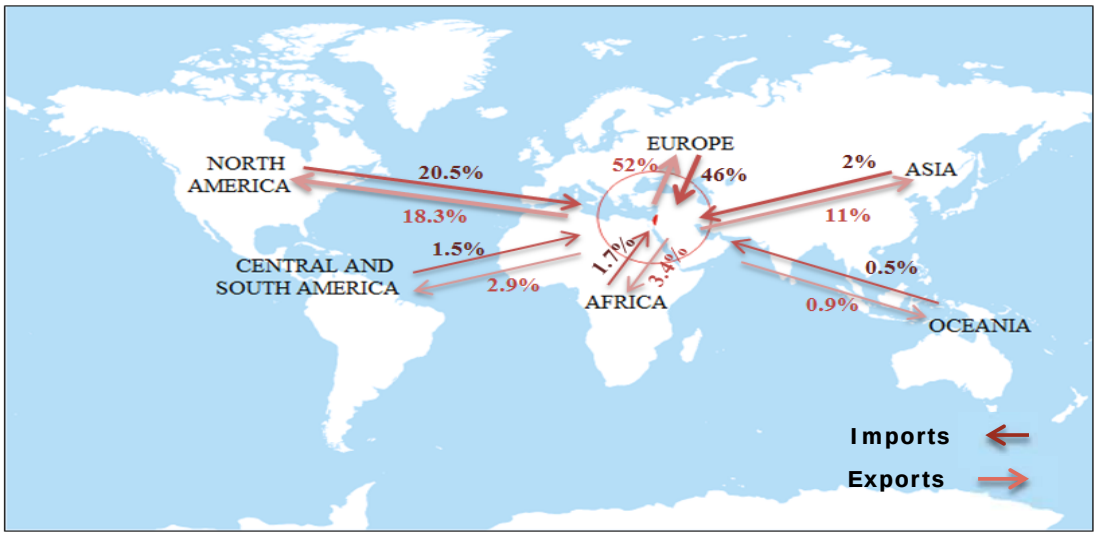
These aggregate openness measures rose since 1980; since the early 2000s they seem to fluctuate around 35% of GDP using the new data measures.

Geographical Distribution

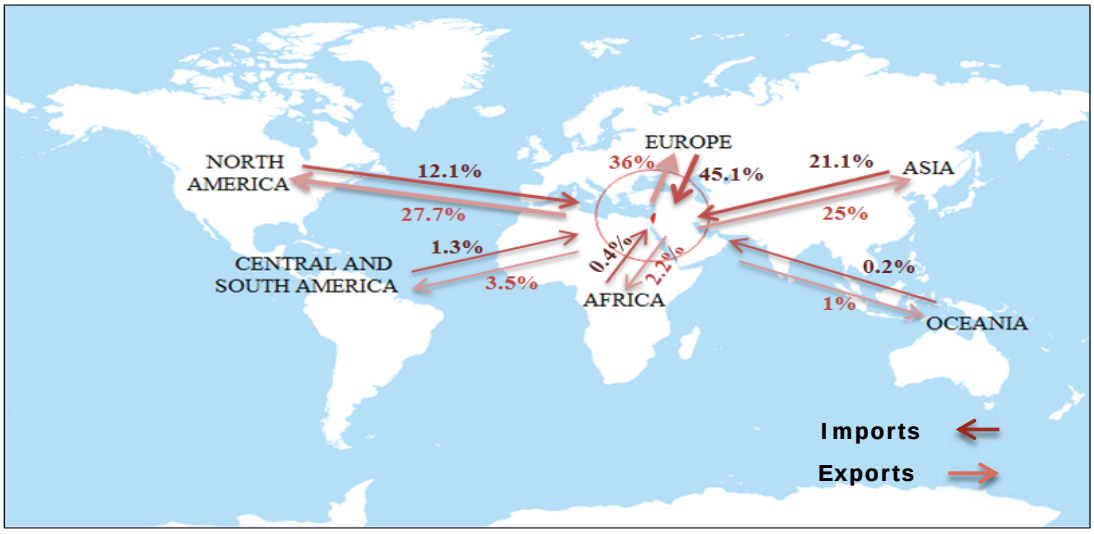
Figure 11 shows the geographical distribution of trade for 1980 and for 2013.

Figure 11: Israel's international trade flows[1]

A. 1980



B. 2013



1) The percentages do not sum up to 100% because there are flows of goods that have no geographical classification.

Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

http://www.cbs.gov.il/reader/shnatonenew_site.htm

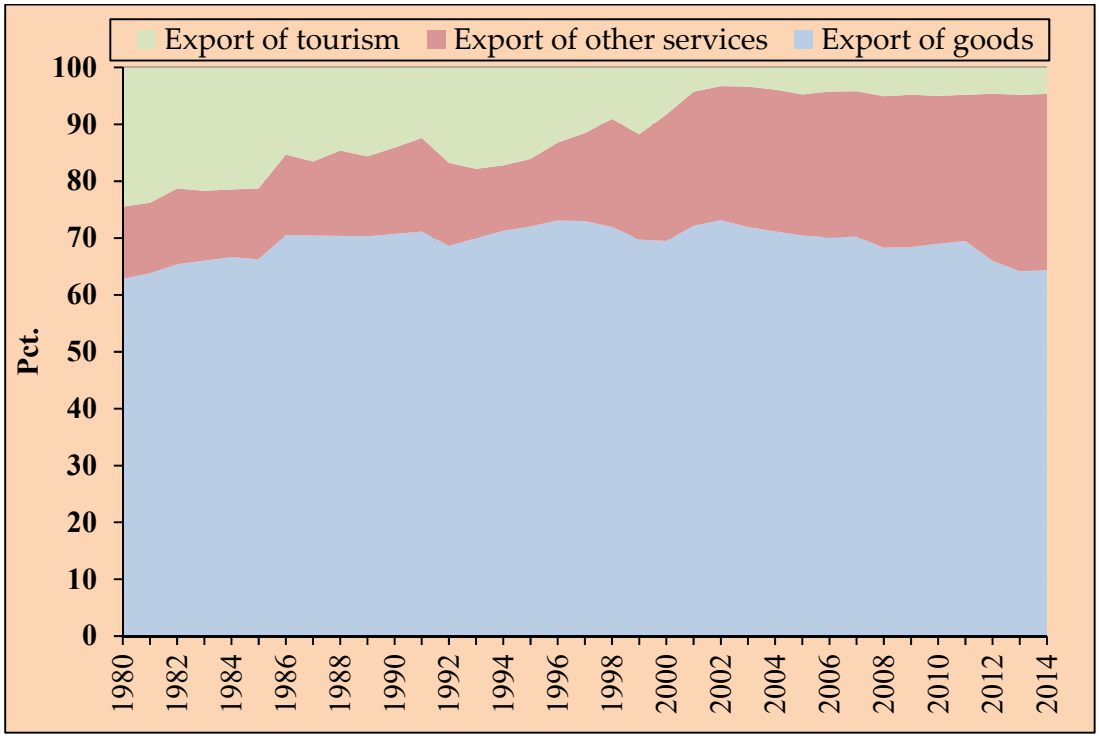
The biggest changes over time were the increase in trade with East Asia at the expense of trade with North America and Europe. The key changes included a decline in the share of imports from North America and a big increase in the share of imports from East Asia (from 2% to 21% of total imports); an increase in the export share to North America and to East Asia; and a decline in the European share.

The Time Evolution of Goods Exports and Imports

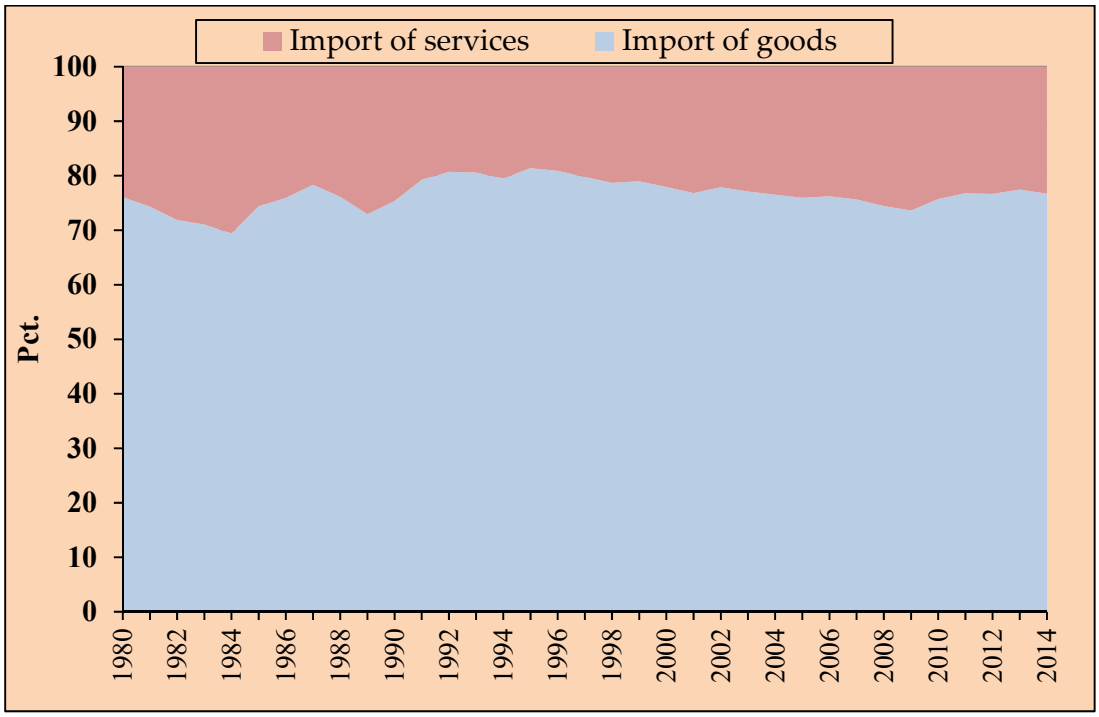
Figure 12 shows exports and imports composition, by goods and services, from 1988 to 2014. Table 4 presents the value of goods imports and exports in constant prices for five different years from 1990 to 2010 across different sectors and in total. Figure 13 shows the sectorial composition of imported and exported goods.

Figure 12: Exports and imports composition by goods and services, shares, 1980-2014

A. Exports composition



B. Imports composition



Source: Bank of Israel Annual Report, 2014.

Table 5: Imports and exports of goods

(constant 1990 prices, millions of US$)

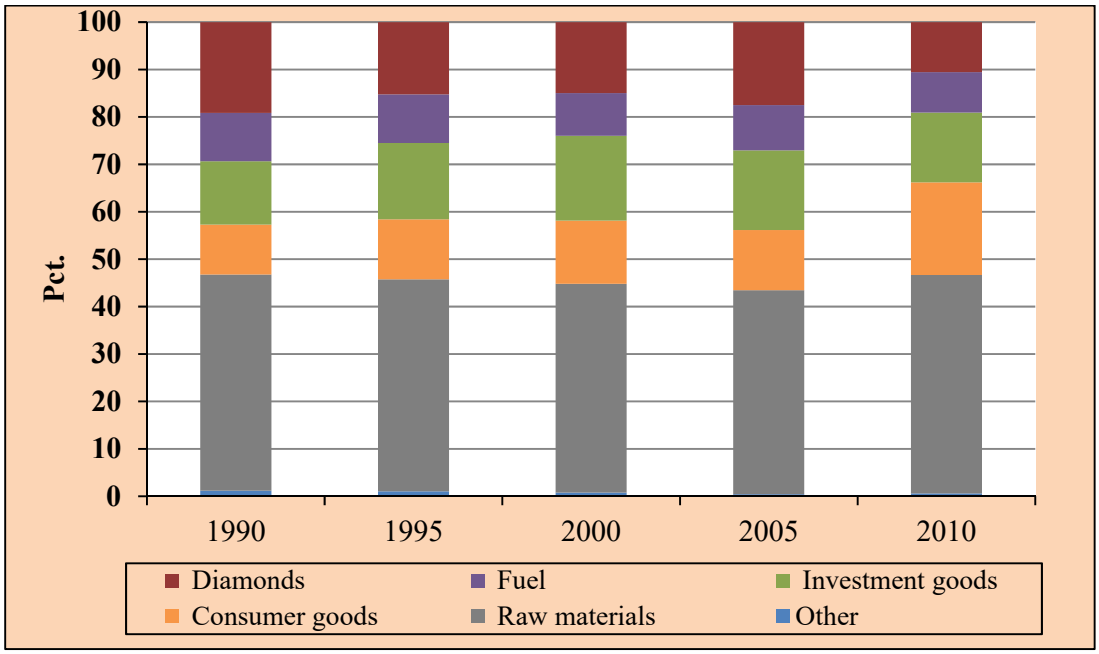
	1990	1995	2000	2005	2010
Total imports of goods	**15,107**	**27,716**	**38,714**	**40,472**	**46,813**
Consumer goods	1,585	3,504	5,163	5,129	9,163
Raw materials	6,888	12,400	17,052	17,425	21,538
Investment goods	2,022	4,458	6,914	6,809	6,878
Fuel	1,536	2,851	3,489	3,845	4,003
Diamonds	2,895	4,215	5,791	7,086	4,932
Ships and aircrafts	172	286	278	138	256
Other	10	3	27	40	44
Total exports of goods	**11,450**	**17,230**	**31,274**	**38,078**	**48,250**
Agricultural	**657**	**725**	**775**	**1,068**	**1,258**
Diamonds	**3,055**	**4,523**	**7,521**	**10,557**	**8,474**
Manufacturing	**7,673**	**11,944**	**22,939**	**26,287**	**38,509**
High Technology	2,278	4,451	12,346	12,238	19,088
Medium Technology[1]	3,903	5,708	8,594	11,879	17,429
Low Technology	1,492	1,784	1,999	2,170	1,992
Other[2]	65	39	39	165	9
Trade balance	**-3,657**	**-10,486**	**-7,440**	**-2,394**	**1,437**
Trade balance (excluding fuel imports)	-2,122	-7,635	-3,950	1,450	5,440

1) Medium technology industries include high-medium and medium-low technologies.
2) Includes used ships and aircrafts.

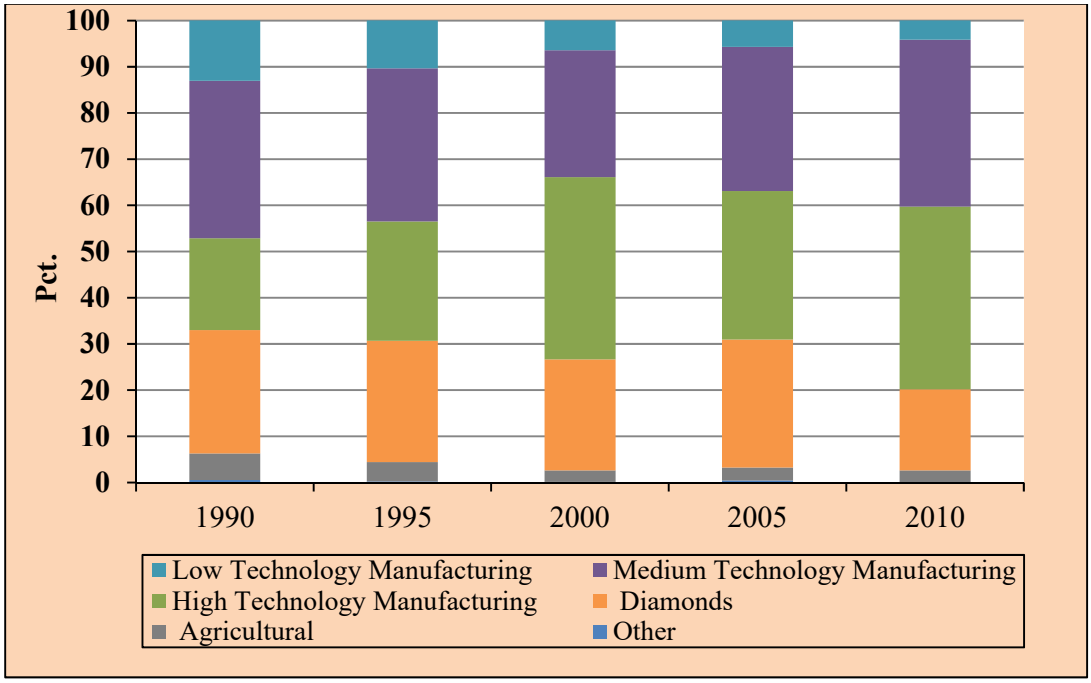
Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.
http://www.cbs.gov.il/reader/shnatonenew_site.htm

Figure 13: Sectorial shares of imports and exports of goods, 1990-2010

A. Imports



B. Exports



Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

http://www.cbs.gov.il/reader/shnatonenew_site.htm

Notable points that emerge from the table and figures:

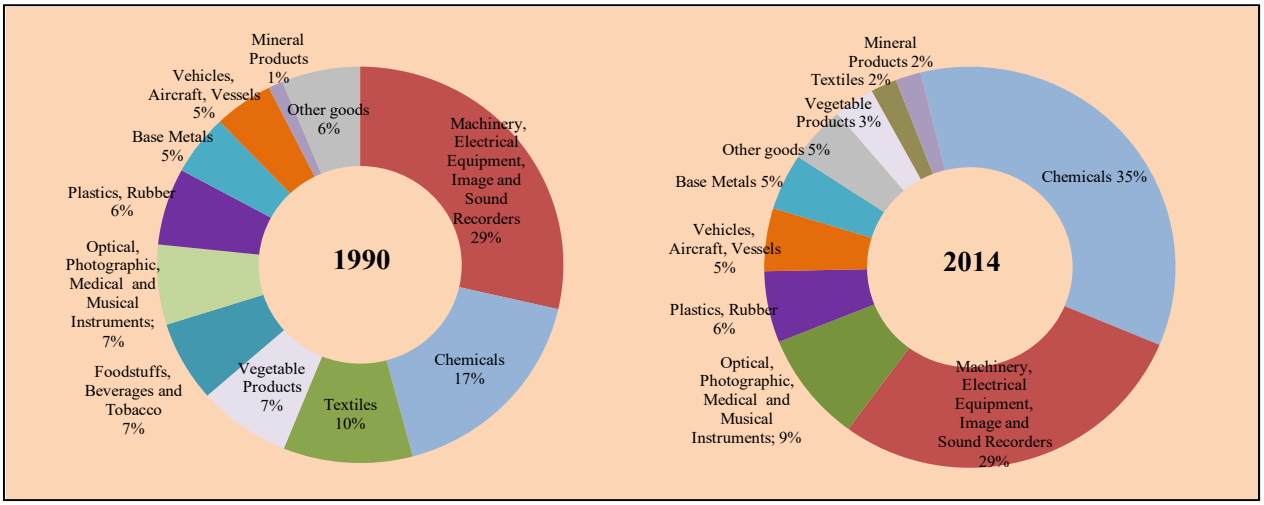
1. While consumer goods have increased over time as a share of imports they constitute less than 20% of total imports. The big share is taken by imports of raw materials at around 45%, with investment goods making up another 15%.
2. In exports the main changes are the rise in the share of high-tech exports at the expense of low-tech exports, in terms of goods, and the rise in exports of services which are not tourism, and which include high-tech services.

The following Figures 14-16 take a further look at the breakdown of exports and imports. I offer comments following each of the figures.

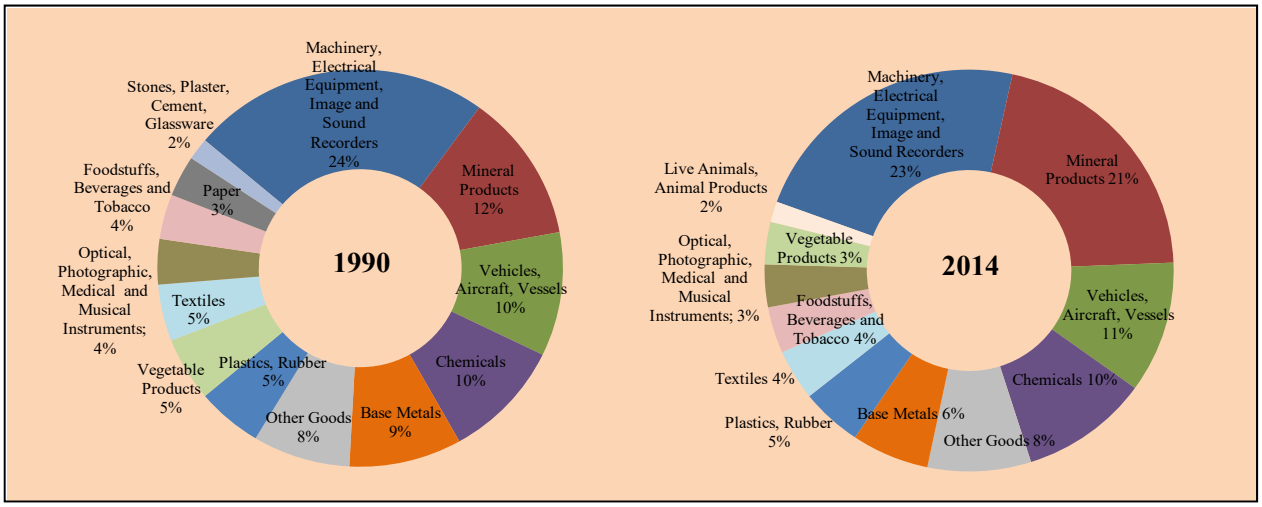
Figure 14: Exports and imports by merchandise groups, (excluding fuels and diamonds),

Shares, 1990 and 2014

A. Exports



B. Imports



Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

http://www.cbs.gov.il/reader/shnatonenew_site.htm

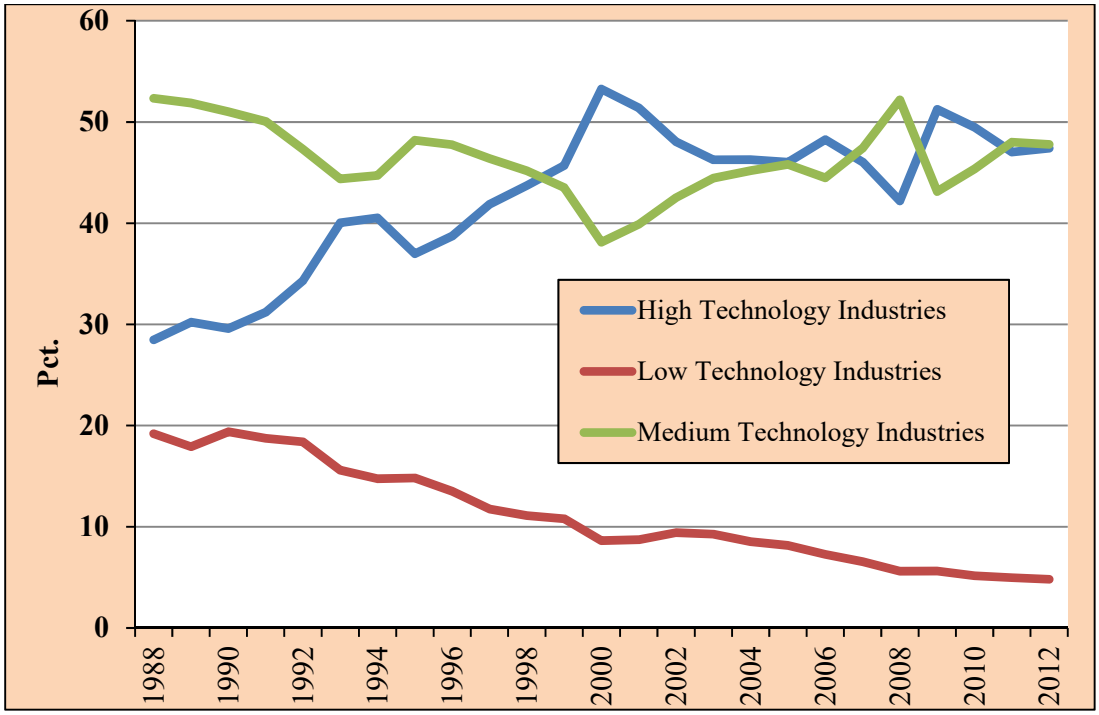
There were big changes in composition in exports of goods: big declines in textiles and vegetable products and a concurrent increase in chemicals. In

imports there was greater stability, with the notable exception of a big increase in the share of mineral products. The following figure shows another aspect of the exports dynamics: the rise in the share of high-tech exports at the expense of low-tech exports.

Figure 15

Exports shares by technological intensity[1], 1988-2012

(Original data, percentage out of total exports, excluding diamonds)



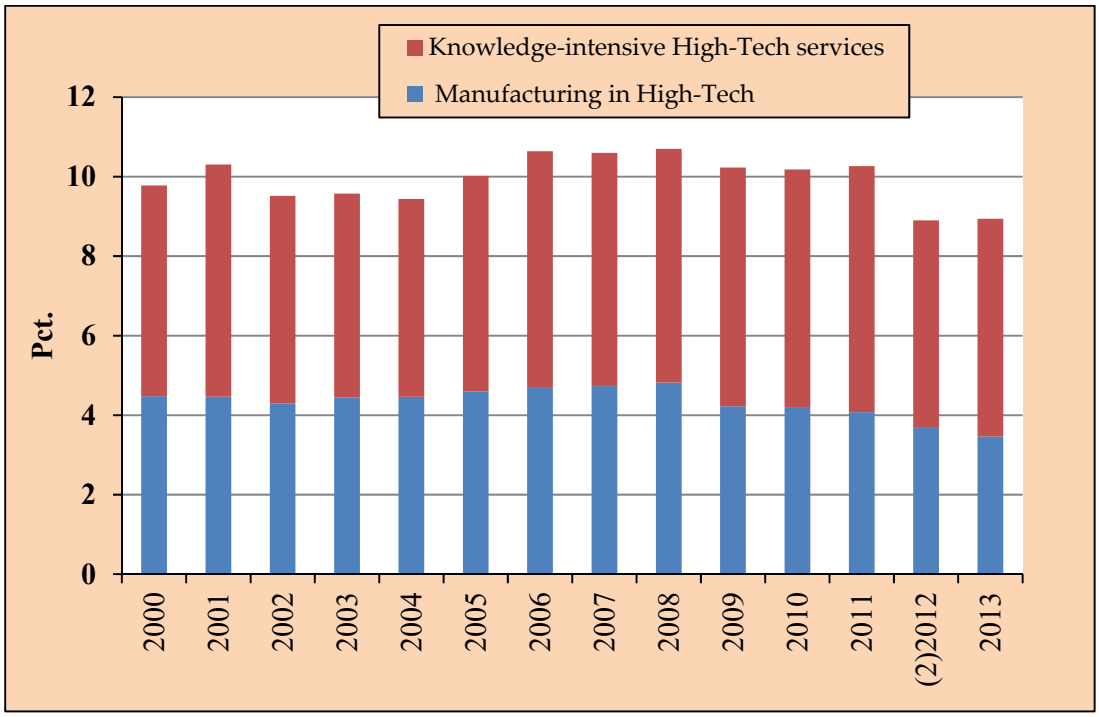
1) Medium technology industries include high-medium and medium-low technologies industries.

Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

http://www.cbs.gov.il/reader/shnatonenew_site.htm

Given the rising importance of high-tech exports, it is of interest to look at its employment stock. The following figure shows the share of high-tech employment in total employment in Israel, sub-divided into services and manufacturing goods.

Figure 16: Employment shares in high-tech sectors, percentage of total employment[1]



1) Data are based on Labor Force Surveys.
2) As of 2012-2013, data refer to the entire labor force (including compulsory or permanent military service) and based on monthly labor force survey.

Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

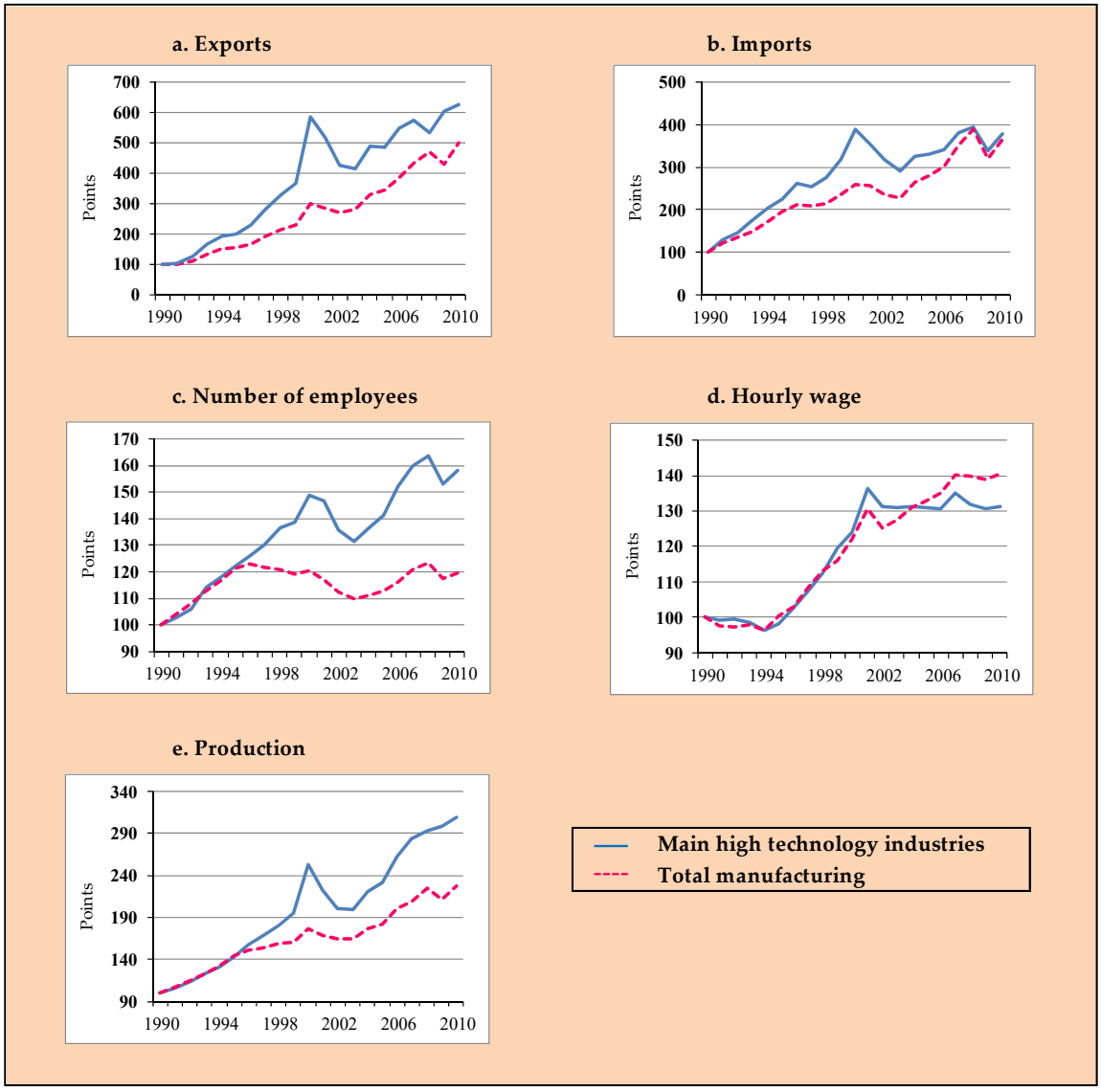
Despite the fact that high-tech manufacturing is almost 50% of total exports, employment in this sector is around just 4% of total employment and has been so since the year 2000. The share of service sector high-tech employment is just slightly bigger, so the total is less than 10% of total employment for most of the decade. These numbers put in perspective the hype that this sector often receives in both the public and policy discourse.

Evolution of Trade and Labor Market Outcomes

Figure 17 shows, in eight sectorial panels, the time path of trade (exports and imports), labor market outcomes (hourly wage and employment) and production since 1990. The data are taken from the CBS Manufacturing Survey. All data are in real terms and expressed as indices, with 1990 assigned the value of 100. As all variables typically trend upwards, in each graph the dashed, red line represents the average for total manufacturing so one can deduce the relative changes over time. Appendix A elaborates on the goods in each sector. Total manufacturing exports exclude diamonds. Total manufacturing imports exclude diamonds and fuels.

Figure 17: Trade, employment, wages and production by manufacturing sectors, 1990-2010, indices (100=1990)

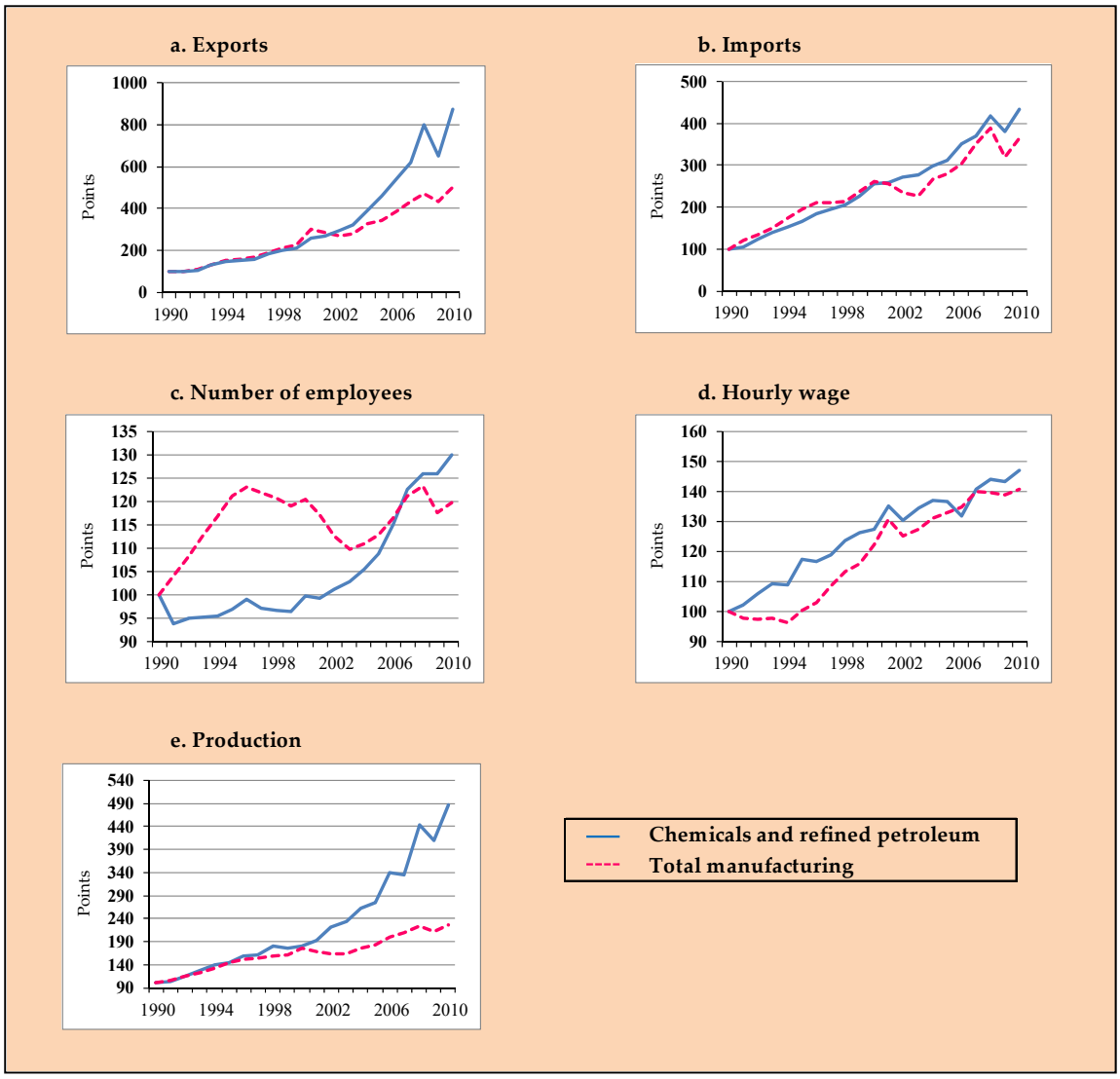
17.1 Main high technology industries[1]



1) Includes manufacture of office and accounting machinery and computers, manufacture of electronic components, manufacture of electronic communication equipment and manufacture of industrial equipment for control and supervision, medical and scientific equipment.

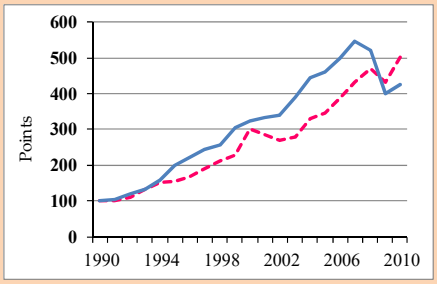
17.2 Chemicals and chemical products and refined petroleum

(medium-high technology industry)

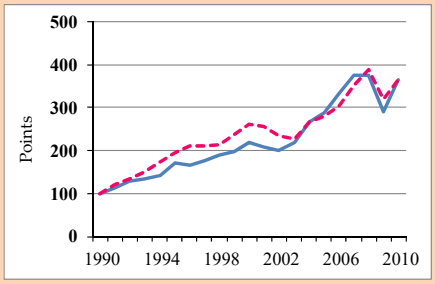


17.3 Plastic and rubber products (medium-low technology industry)

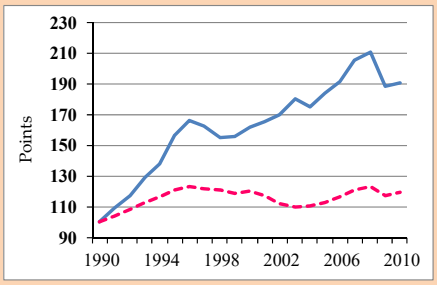
a. Exports



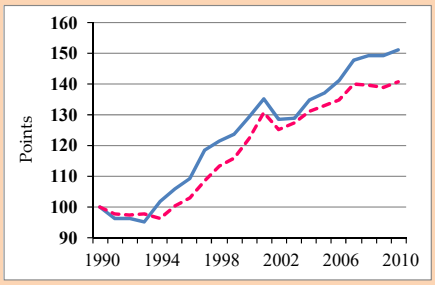
b. Imports



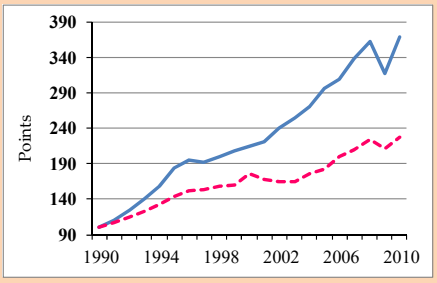
c. Number of employees

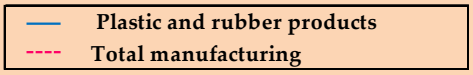


d. Hourly wage

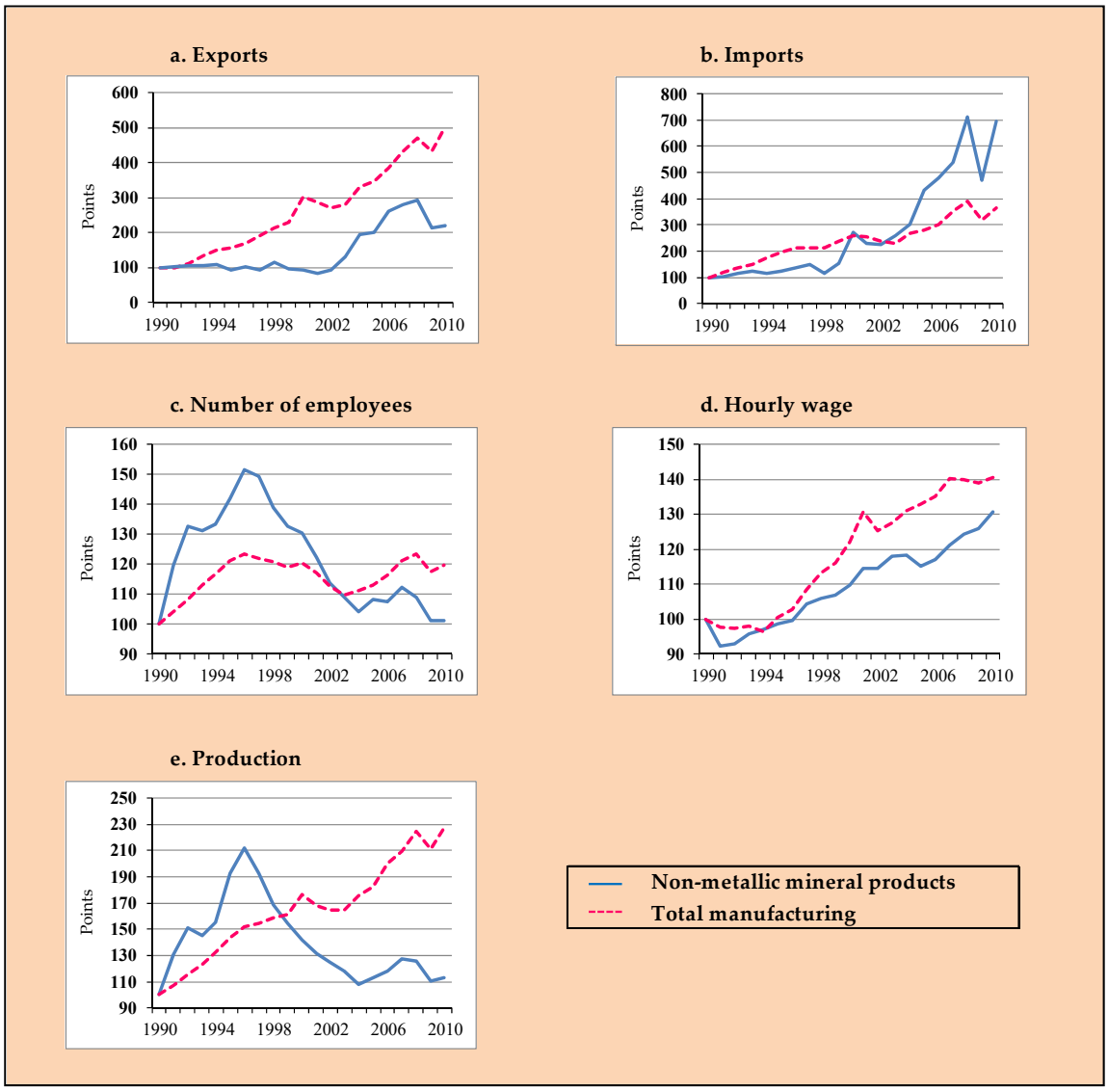


e. Production

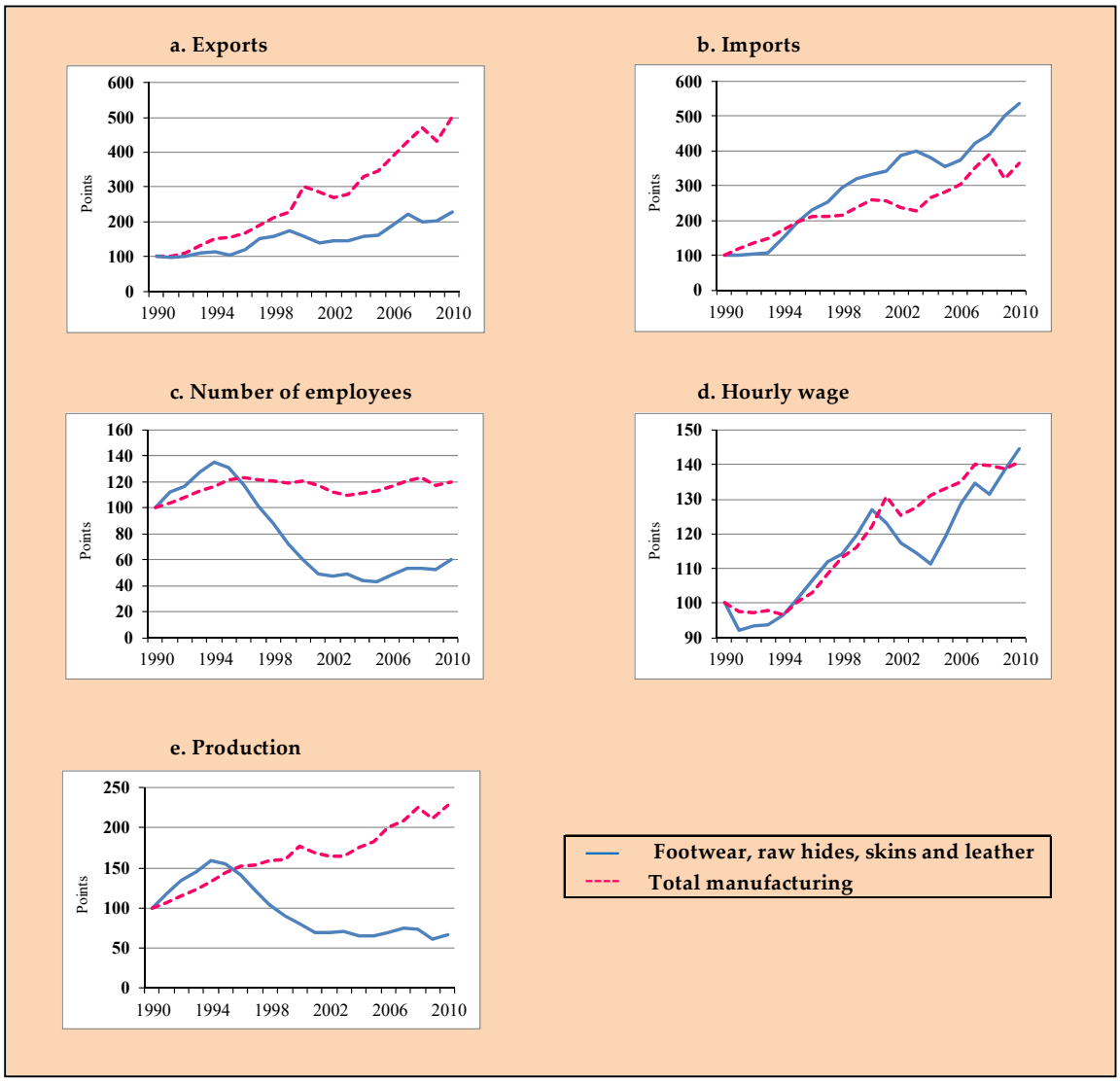




17.4 Non-metallic mineral products (medium-low technology industry)



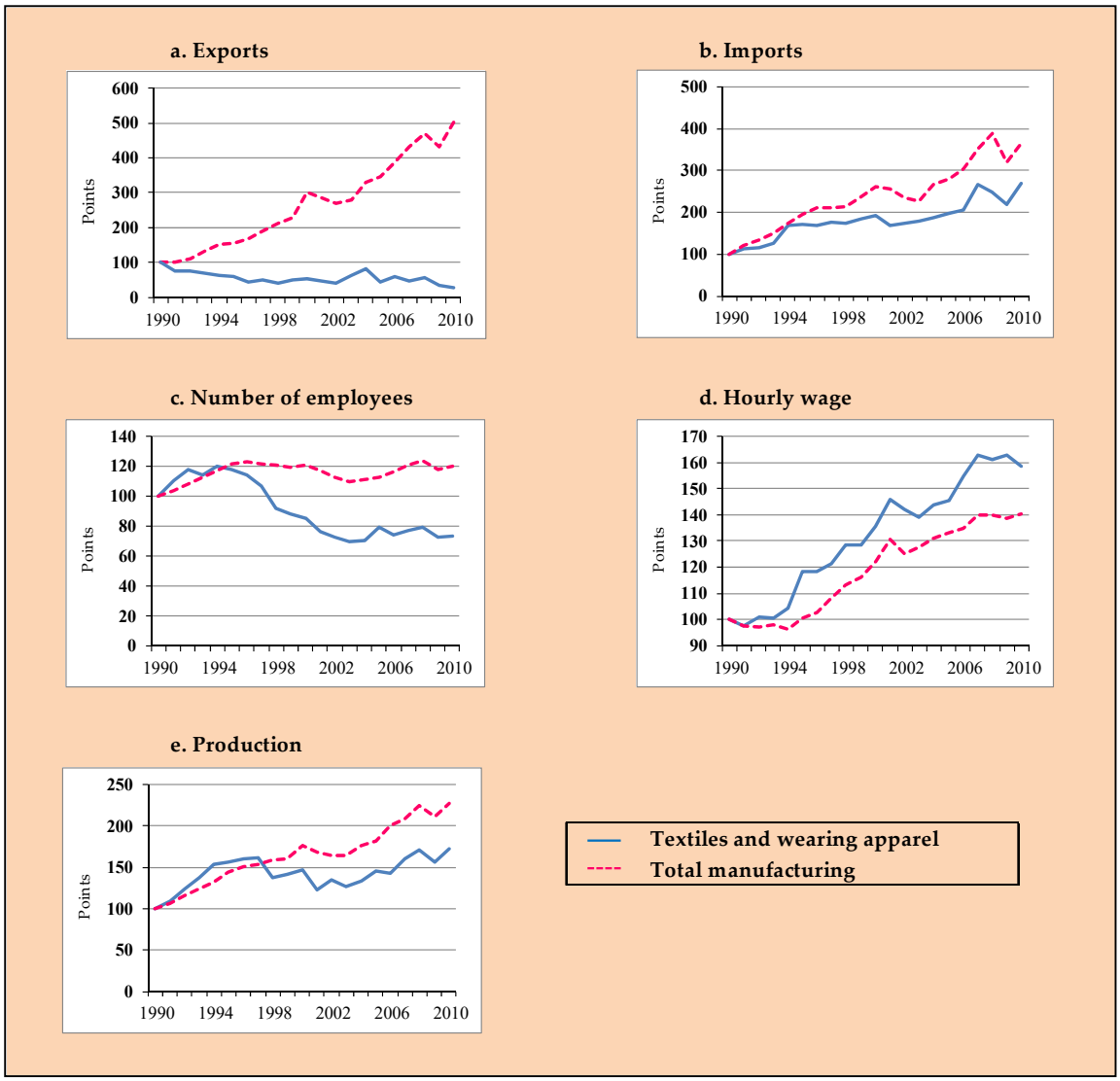
17.5 Footwear, raw hides, skins and leather (low technology industry)



17.6 Textiles and wearing apparel (low technology industry)

17.7 Wood and wood products, excluding furniture

(low technology industry)



Source: Statistical Abstract of Israel. The Israeli Central Bureau of Statistics.

http://www.cbs.gov.il/reader/shnatonenew_site.htm

The lessons from Figure 17 are as follows, noting that in none of what follows is there an explanation or a claim for causality but rather a description of the co-movement of aggregate variables.

(i) For the high technology sector there were very fast increases in trade as well as in employment and production. These have all progressed far more than the average. There is a hump in all these series around 2000, probably because of the build-up and then the bursting of the so-called dot.com bubble. The one puzzle is the fact that real hourly wages have been flat since the early 2000s. This data fact was reconfirmed with the CBS; my sense is that it may be due to data errors or to the special compensation structure in this sector.

(ii) For the medium-high technology sector there were fast increases in trade in the 2000s, and so too in employment and production but the real hourly wage did not progress as fast. Prior to this, in the 1990s employment growth was sluggish.

(iii) In the two medium-low technology sectors there was no clear pattern.

(iv) In the three low technology sectors there was a rise in imports but it was higher than average only in the footwear sector. Employment went down in all three sectors. Real hourly wages went up, though, faster than the average. Production initially rose in the 1990s but declined subsequently so that the gap from the average widened.

Summing Up

The emerging picture from the afore-going discussion is as follows:

(i) Israel has continued in the 1990s a policy of tariff-reduction and other trade liberalization measures. Consequently its trade has increased, and its high degree of openness had increased even further.

(ii) Labor market developments were marked by growth in the rates of participation and employment, and slow growth of labor productivity and wages, as well as TFP; migrant workers employment has been substantial for almost 25 years.

(iii) The geographical distribution of trade has changed, with a shift to more trade with East Asia.

(iv) Imported goods have been, and remain, dominated by raw materials and investment goods.

(v) Exports have seen a rise in high-tech exports at the expense of low-tech exports.

(vi) The high-tech sector has experienced high growth in trade (exports and imports), employment and production since 1990. Low-tech sectors have experienced a rise in imports, a fall in employment but a faster than average real hourly wage growth; their production initially rose in the 1990s but declined subsequently so that the gap from the average widened.

3. Lessons from Existing Studies

There is no comprehensive study of trade and employment in Israel. But a number of studies and research notes have touched upon related issues. Here is a selection of several such papers.

Gallo (2011) has estimated the relationship between exporting and productivity using data on Israeli manufacturing firms in the years 1996-2003. He found that total factor productivity (TFP) of exporting firms in Israel is higher than that of non-exporters. The export premium is higher before firms enter the export market, an indicator of a self-selection effect. He also found an additional premium for firms after they had entered the export market, suggestive of a learning-by-exporting effect. Using a matched differences-in-differences methodology, a significant positive learning effect was obtained. TFP growth in exporting firms was approximately 12% five years after they entered the export market. These results, though, did not hold true when using a system GMM methodology, whereby an insignificant negative effect of exporting on productivity was found.

Stone, Sourdin and Legendre (2013) have looked at Israel (among other economies) and used LFS data to estimate labor market outcomes as a function of imports penetration, export shares, and offshoring, interacted with skill levels, and using a vector of control variables (age, gender, education, skill, marital status, time, industry and occupation fixed effects). Their main findings are somewhat puzzling: at the occupation level exports are associated with potential increases in unemployment while imports may actually help reduce it. They conjecture that the export result may be a function of market frictions

which lead to a greater number of mismatches between available workers and those exporting firms looking to fill positions. Off-shoring outcomes are more traditional, with a slight increase in the probability of unemployment for medium skilled workers.

The Israeli Country Profile 2013 of The Enterprise Survey conducted by the World Bank, the EBRD and the EIB points to these trade-related features of Israeli firms:

(i) There is a very high share of firms using imports as inputs: almost 81%, as compared to 74% in the High Income OECD countries. The percentage of exporting firms is lower than their share in the High Income OECD countries: 20.3% vs. 36.3%.

(ii) It takes an average of 3.5 days to clear imports from customs, lower than the average of 5.9 days it takes in the High Income OECD countries. Only 0.1% of firms were found expected to give gifts to get an import license, as opposed to 1.8% in the reference group of countries.

(iii) It takes an average of 4.6 days to clear exports through customs, lower than the average of 5.7 days it takes in the High Income OECD countries. Only 0.1% of export value had a loss due to theft, same as in the reference group. The same amount was due to breakage or spoilage relative to 0.3% in the reference group of countries.

Overall, then, the performance of firms in the international trade environment of Israel seems good.

Other papers that can be briefly mentioned are as follows:

Pinto and Friedman (2003) survey developments of trade with the EU and the US from the mid-1990s to the early 2000s. Among other developments they note the fast growth of exports of electronic goods, leading Israel's export growth.

The dot.com crisis of the year 2000 and security-related concerns in Israel in 2001-2003 are cited as causes for the fall in export growth.

The Bank of Israel 2013 Annual report (Bank of Israel, 2014) examined the employment volatility of industries. It found that employment in export industries is more volatile (in terms of levels) than that of domestic market oriented industries. In contrast, it found that the personal employment state in those industries is more stable than in the rest of the business sector (lower probability to become unemployed).

The same report makes the forecast that the growth of the economy of China will lead to the doubling of its share in Israeli exports from 5% to 10% in 2035. The share of Israeli goods in Chinese imports is expected to stay at around 0.13%-0.14%. A downside risk to this forecast is the possibility that the composition of Chinese imports become more akin to that of developed economies imports, whereby the Israeli imports share will decline.

4. The Literature

The literature on trade and labor markets is huge. In what follows I focus only on papers that are pertinent to the issues examined in the current paper. I proceed in two steps: first, I briefly review the research frontier on the links between labor markets and international trade; second, I explain what lessons can be drawn for Israel. In the next sections it will become clear which aspects of the analysis require data that are currently unavailable, and therefore cannot be directly implemented in the current study, and what is implementable in the current context.

The Research Frontier

Survey Papers. I begin by noting that for recent reviews of the literature an excellent source is the new Handbook of International Economics, vol. 4, 2014, edited by Elhanan Helpman, Kenneth Rogoff and Gita Gopinath. Specifically, Chapter 1 by Melitz and Redding is particularly pertinent, as it reviews the literature that has emerged following the seminal model of Melitz (2003). Another good review is the paper by Melitz and Trefler (2012).

Theoretical Models. The Melitz (2003) model focuses on firm heterogeneity. The latter term implies that even within narrowly defined industries some firms are much larger and more profitable than others because they are much more productive. Globalization generates both winners and losers among firms within an industry and these effects are magnified by heterogeneity. Better-performing firms thrive and expand into foreign markets, while worse-performing firms contract and even shut down in the face of foreign competition. This generates a new source of gains from trade: as production is concentrated in better-performing firms, the overall efficiency of the industry improves. In this way, globalization raises average efficiency within an

industry. Why do only the better-performing firms grow? Globalization expands markets but also increases competition in those markets. This competition effect dominates for the worse-performing firms while the increased market access dominates for the better- performing firms. Also, a firm's international expansion – whether by exporting, by offshore outsourcing of intermediate components and assembly, or by building plants abroad (multinationals) – entails some up-front fixed costs; and only the best-performing firms have the sales volumes needed to justify these fixed costs.

This model engendered an important strand of literature, now labeled "new theories of trade" featuring heterogeneous firms in differentiated product markets. These theories are designed to account for features of disaggregated trade data: only some firms export, exporters are more productive than non-exporters, and trade liberalization induces intra-industry reallocations of resources between those different types of firms. These reallocations represent a new potential channel for the gains from trade.

Connections of this approach to the labor market were offered by Helpman and Itskhoki (2010), Helpman, Itskhoki and Redding (2010) and Helpman, Itskhoki and Redding (2011).

Helpman and Itskhoki (2010) study a two-country, two-sector model of international trade in which one sector produces homogeneous products and the other produces differentiated products. Both sectors are subject to search and matching frictions in the labour market and wage bargaining. As a result, some of the workers searching for jobs end up being unemployed. Countries are similar except for frictions in their labour markets, such as efficiency of matching and costs of posting vacancies, which can vary across the sectors. The differentiated-product industry has firm heterogeneity and monopolistic

competition. The authors study the interaction of labour market rigidities and trade impediments in shaping welfare, trade flows, productivity, and unemployment. They show that both countries gain from trade. A country with relatively lower frictions in the differentiated-product industry exports differentiated products on net. A country benefits from lowering frictions in its differentiated sector's labour market, but this harms the country's trade partner. Alternatively, a simultaneous, proportional lowering of labour market frictions in the differentiated sectors of both countries benefits both of them. The opening to trade raises a country's rate of unemployment if its relative labour market frictions in the differentiated sector are low, and it reduces the rate of unemployment if its relative labour market frictions in the differentiated sector are high. Cross-country differences in rates of unemployment exhibit rich patterns. In particular, lower labour market frictions do not ensure lower unemployment, and unemployment and welfare can both rise in response to falling labour market frictions and falling trade costs.

Helpman, Itskhoki and Redding (2010) also introduce standard Diamond–Mortensen–Pissarides search and matching frictions into the Melitz (2003) model. But in this set-up there is ex post match-specific heterogeneity in the worker's ability. Because a worker's ability is not directly observable by his employer, firms screen workers to improve the composition of their employees. Complementarities between workers' abilities and firm productivity imply that firms have an incentive to screen workers to exclude those with lower abilities. As larger firms have higher returns to screening and the screening technology is the same for all firms, more productive firms screen more intensively and have workforces of higher average ability than less productive firms. Search frictions induce multilateral bargaining between a firm and its workers, and since higher-ability workforces are more costly to replace, more productive firms pay higher wages. When the economy is

opened to trade, the selection of more productive firms into exporting increases their revenue relative to less productive firms, which further enhances their incentive to screen workers to exclude those of lower ability. As a result, exporters have workforces of higher average ability than non exporters and hence pay higher wages. This mechanism generates a wage-size premium and implies that exporting increases the wage paid by a firm with a given productivity. Both features of the model have important implications for wage inequality within sectors and within groups of workers with the same ex ante characteristics.

The first main result is that the opening of a closed economy to trade raises wage inequality. The intuition for this result is that larger firms pay higher wages and the opening of trade increases the dispersion of firm revenues, which in turn increases the dispersion of firm wages. The second main result is that once the economy is open to trade, the relationship between wage inequality and trade openness is at first increasing and later decreasing. As a result, a given change in trade frictions can either raise or reduce wage inequality, depending on the initial level of trade openness. The intuition for this result stems from the increase in firm wages that occurs at the productivity threshold above which firms export, which is only present when some but not all firms export. When no firm exports, a small reduction in trade costs increases wage inequality, because it induces some firms to export and raises the wages paid by these exporting firms relative to domestic firms. When all firms export, a small rise in trade costs increases wage inequality, because it induces some firms to cease exporting and reduces the wages paid by these domestic firms relative to exporting firms.

A key prediction of this framework is that these two results hold regardless of general equilibrium effects. To demonstrate this, the authors derive these results from comparisons across firms that hold in sectorial equilibrium irrespective of how the sector is embedded in general equilibrium. It follows

that the results for sectoral wage inequality do not depend on the impact of trade on aggregate variables and variables in other sectors. The authors derive closed-form expressions for the sectoral wage distribution. This distribution depends on an extensive margin of trade openness (the fraction of exporting firms) and an intensive margin of trade openness (relative revenue in the export and domestic markets).

Empirical Work. In terms of empirical work particularly noteworthy are the following.

An attempt to take the new trade theory to the data is Helpman, Itskhoki, Muendler and Redding (2017), using linked employer-employee data for Brazil. They show that much of overall wage inequality arises within sector-occupations and for workers with similar observable characteristics; this within component is driven by wage dispersion between firms; and wage dispersion between firms is related to firm employment size and trade participation. Extending the heterogenous-firm model of trade and inequality by Helpman, Itskhoki, and Redding (2010) discussed above, and estimating it with Brazilian data, the authors show that the estimated model provides a close approximation to the observed distribution of wages and employment. They then use the estimated model to undertake counterfactuals, in which sizable effects of trade on wage inequality are found.

Artuc, Chadhuri and McLaren (2010) address the following questions: what are the costs faced by workers who wish to move to a new industry in response to import competition? How long will the labor market take to adjust and find its new steady state? Will that steady state feature a lasting differential impact on workers in the import-afflicted sector, or will arbitrage equalize worker returns in the long run? The estimates show very high average moving costs, and a very high standard deviation of moving costs, both estimated to be several

times average annual wages for moving from one broadly aggregated sector of the economy to another. These surprisingly high estimated costs are actually in line with related findings by other authors using different techniques. In addition, simulations based on these patterns produce realistic aggregate behavior. The message conveyed by these findings is that US workers change industry a great deal, but those movements do not respond much to movements in inter-sectoral wage differentials. Thus, non-pecuniary motives such as are captured by idiosyncratic shocks must be driving a large portion of workers' movement. It suggests sluggish adjustment of the labor market to a trade shock, with the economy requiring several years to approach the new steady state. As a corollary, it implies a large drop in wages in the import-competing sector that is hit by the liberalization; indeed, the wages in that sector never fully recover.

Amiti and Davis (2011) present a model which predicts that a fall in output tariffs will lower wages at import-competing firms but will boost wages at exporting firms. Similarly, a fall in input tariffs raises wages at import-using firms relative to those at firms that only source inputs locally. Using highly detailed Indonesian manufacturing census data for the period 1991–2000, they found considerable support for the model's predictions.

Autor, Dorn and Hanson (2013) analyze the effect of rising Chinese import competition between 1990 and 2007 on US local labor markets, exploiting cross-market variation in import exposure stemming from initial differences in industry specialization and instrumenting for US imports using changes in Chinese imports by other high-income countries. Rising imports were found to cause higher unemployment, lower labor force participation, and reduced wages in local labor markets that house import competing manufacturing industries. In the main specification, import competition explains one-quarter

of the contemporaneous aggregate decline in US manufacturing employment. Transfer benefits payments for unemployment, disability, retirement, and healthcare also rise sharply in more trade-exposed labor markets.

Autor, Dorn, Hanson and Song (2014) analyze the effect of exposure to international trade on earnings and employment of U.S. workers from 1992 through 2007. Individuals who in 1991 worked in manufacturing industries that experienced high subsequent import growth garner lower cumulative earnings, face elevated risk of obtaining public disability benefits, and spend less time working for their initial employers, less time in their initial two-digit manufacturing industries, and more time working elsewhere in manufacturing and outside of manufacturing. Earnings losses are larger for individuals with low initial wages, low initial tenure, and low attachment to the labor force. Low-wage workers churn primarily among manufacturing sectors, where they are repeatedly exposed to subsequent trade shocks. High-wage workers are better able to move across employers with minimal earnings losses and are more likely to move out of manufacturing conditional on separation. These findings reveal that import shocks impose substantial labor adjustment costs that are highly unevenly distributed across workers according to their skill levels and conditions of employment in the pre-shock period.

Dix-Carneiro (2014) estimates a structural dynamic equilibrium model of the Brazilian labor market in order to study trade-induced transitional dynamics. The model features a multi-sector economy with overlapping generations, heterogeneous workers, endogenous accumulation of sector-specific experience, and costly switching of sectors. The model's estimates yield median costs of mobility ranging from 1.4 to 2.7 times annual average wages, but a high dispersion of these costs across the population. In addition, sector-specific experience is imperfectly transferable across sectors, leading to additional

barriers to mobility. Using the estimated model for counterfactual trade liberalization experiments, the main findings are: (1) there is a large labor market response following trade liberalization but the transition may take several years; (2) potential aggregate welfare gains are significantly reduced due to the delayed adjustment; (3) trade-induced welfare effects depend on initial sector of employment and on worker demographics such as age and education.

Cosar, Guner and Tybout (2016) explore the combined effects of reductions in trade frictions, tariffs, and firing costs on firm dynamics, job turnover, and wage distributions. It uses establishment-level data from Colombia to structurally estimate an open economy dynamic model that links trade to job flows and wages. Counterfactual experiments imply that Colombia's integration with global product markets increased its national income at the expense of higher job turnover and greater lifetime wage inequality. In contrast, these experiments find little role for this country's labor market reforms in driving these variables. The mechanisms in operation are as follows: by increasing the sensitivity of firms' revenues to their productivity and employment levels, openness makes firms more willing to incur the hiring and firing costs associated with adjusting their workforce. By itself, this sensitivity effect makes job turnover and unemployment higher when trade frictions are low. It also tends to create larger rents for the more successful firms and to thereby spread out the cross-firm wage distribution. But openness also concentrates workers at larger firms, which are more stable than small firms and less likely to exit. This distribution effect works against the sensitivity effect, tending to reduce turnover and wage inequality as trade frictions fall. In the paper's policy experiments, the sensitivity effect dominates.

Acemoglu, Autor, Dorn, Hanson, and Price (2015) explore the contribution of the swift rise of import competition from China to sluggish U.S. employment growth. They find that the increase in U.S. imports from China, which accelerated after 2000, was a major force behind recent reductions in U.S. manufacturing employment and that, through input-output linkages and other general equilibrium effects, it appears to have significantly suppressed overall U.S. job growth. They apply industry-level and local labor market-level approaches to estimate the size of (a) employment losses in directly exposed manufacturing industries, (b) employment effects in indirectly exposed upstream and downstream industries inside and outside manufacturing, and (c) the net effects of conventional labor reallocation, which should raise employment in non-exposed sectors, and Keynesian multipliers, which should reduce employment in non-exposed sectors. Their central estimates suggest net job losses of 2.0 to 2.4 million stemming from the rise in import competition from China over the period 1999 to 2011. The estimated employment effects are larger in magnitude at the local labor market level, consistent with local general equilibrium effects that amplify the impact of import competition.

Lessons for Israel

The common theme of the cited research is that trade liberalization affects heterogeneous firms and leads to worker reallocation and to wage changes. A number of papers have identified mechanisms whereby, over some range, trade liberalization increases wage dispersion. Exporting firms tend to be more productive and pay higher wages; non-exporting firms are less productive and pay lower wages. A key implication is that it is not sufficient to examine whether on average employment and wages change. Rather, the issue is whether employment reallocation and wage dispersion have changed and in which directions. The opening to trade affects a country's rate of unemployment differentially under different relative labour market frictions so cross-country differences in rates of unemployment exhibit rich patterns.

The work by Amiti and Davis (2011) gives another mechanism for higher wage dispersion: a fall in output tariffs lowers wages at import-competing firms but boosts wages at exporting firms. Similarly, a fall in input tariffs raises wages at import-using firms relative to those at firms that only source inputs locally.

From the empirical work by Autor, Dorn, Hanson and co-authors on the US economy one can draw these key conclusions:

(i) Individuals who worked in manufacturing industries that experienced high subsequent import growth garner lower cumulative earnings, face elevated risk of obtaining public disability benefits, and spend less time working for their initial employers, less time in their initial two-digit manufacturing industries, and more time working elsewhere in manufacturing and outside of manufacturing.

(ii) Low-wage workers churn primarily among manufacturing sectors, where they are repeatedly exposed to subsequent trade shocks.

(iii) High-wage workers are better able to move across employers with minimal earnings losses and are more likely to move out of manufacturing conditional on separation.

This means that import shocks impose substantial labor adjustment costs that are highly unevenly distributed across workers according to their skill levels and conditions of employment in the pre-shock period.

In the empirical work that follows these themes will show up when looking at the labor market effects of trade liberalization in Israel.

5. Data and Methodology

The empirical work links trade developments, particularly changes in export shares and import penetration, to labor market outcomes, including employment (levels and changes), unemployment, labor market transitions, and moments of the wage distributions. I discuss the data, including data lacunae, and then the empirical methodology.

Data

The data used pertain to individuals in two digit sectors, usually available as repeated cross-sections. This data set enables me to use, in most of the regressions, both individual and sectorial data over time. These are indexed by i, j and t, respectively.

Specifically, I use data on:

(i) Labor market outcomes – hours worked, employment changes, unemployment, transitions across labor market states (employment, unemployment and out of the labor force), and wages (mean and dispersion).

(ii) Trade variables – export shares and import penetration.

(iii) Individual worker data – education, gender, age ,marital status

(iv) Other variables, as needed, such as the capital stock, macroeconomic variables, and the stock of migrant workers.

The following are the data sources:

- The Labor Force Survey (LFS) and the Income Survey (IncS).
- Balance of Payments data.
- The Manufacturing Survey

- Bank of Israel data

The first three data sets are produced by the Israeli Central Bureau of Statistics (CBS).

There were two major updates of the LFS – in 1995 and in 2012, with some revisions in 1998 and 2009. In the IncS there were changes in 1997 too. There was a major update of the National Accounts in 1995. Hence some regressions are limited by these dates.

Appendix B gives a detailed account of the data series used and their sources, including methods of construction and classification, and "data cleaning."

The sectorial data used here, at the two-digit level, were created by matching CBS data on the sectors as classified by the Standard Industrial Classification of All Economic Activities 1993 (ISIC 1993) to the sections classifications of import data publications. There are 23 such sectors. In some cases I had to classify them into 12 grouped sectors. For detailed information see Appendix B.

Note that the explanatory variables of most regressions include education, which is the main skill variable used in the literature, again at the individual and sectorial level

Sample statistics of the key variables are presented in the next two tables.

Table 6

Sample Statistics –Labor Force and Manufacturing Surveys

Means and Standard Deviations

Notes:

	Export share	Import penetration	Hours worked	Education (years)	Age (years)	% male	% married
1995	0.28	0.38	46	12	39	72%	76%
	(0.19)	(0.19)	(10.1)	(3.3)	(11.9)	(0.5)	(0.4)
1996	0.28	0.40	46	12	39	71%	76%
	(0.19)	(0.19)	(10.2)	(3.2)	(11.8)	(0.4)	(0.4)
1997	0.26	0 .39	45	12	39	71%	76%
	(0.18)	(0.19)	(9.8)	(3.2)	(11.8)	(0.5)	(0.4)
1998	0.30	0.40	46	13	39	71%	75%
	(0.21)	(0.18)	(9.8)	(3.0)	(11.7)	(0.5)	(0.4)
1999	0.32	0.40	45	13	40	71%	77%
	(0.22)	(0.18)	(9.9)	(3.0)	(11.8)	(0.5)	(0.4)
2000	0.33	0.41	46	13	40	71%	77%
	(0.22)	(0.20)	(9.9)	(3.5)	(12.1)	(0.5)	(0.4)
2005	0.39	0.47	46	13	41	72%	76%
	(0.259)	(0.22)	(10.5)	(3.0)	(12.0)	(0.5)	(0.4)
2010	0.36	0.42	45	13	43	71%	77%
	(0.250)	(0.22)	(8.7)	(2.9)	(12.6)	(0.5)	(0.4)

See Appendix B for full sources and definitions.

Table 7

Sample Statistics – Income survey

Means and Standard Deviations

	Export share	Import penetration	Wages	Hours worked	Education (years)	Age (years)	% male	% married
1995	0.28 (0.19)	0.37 (0.19)	4,401 (4,188)	47 (10.4)	12 (3.3)	38 (11.8)	70% (0.46)	73% (0 .44)
1996	0.27 (0.19)	0.40 (0.19)	4,932 (4,056)	47 (9.8)	12 (3.3)	39 (12.1)	70% (0.46)	73% (0.44)
1997	0.26 (0.18)	0.39 (0.19)	5,541 (4,680)	46 (9.7)	12 (3.4)	39 (12.1)	68% (0.46)	71% (0.45)
1998	0.30 (0.21)	0.40 (0.19)	6,045 (4,642)	46 (9.3)	13 (3.0)	39 (11.1)	70% (0.45)	74% (0.44)
1999	0.31 (0.22)	0.39 (0.18)	6,773 (5,698)	46 (9.5)	13 (3.0)	40 (11.6)	69% (0.46)	73% (0.44)
2000	0.31 (0.23)	0.42 (0.18)	6,717 (6,246)	45 (9.4)	13 (2.7)	38 (12.6)	72% (0.45)	68% (0.47)
2005	0.39 (0.26)	0.47 (0.22)	8,521 (7,274)	46 (11.2)	13 (3.0)	40 (11.6)	71% (0.45)	76% (0.43)
2010	0.36 (0.25)	0.42 (0.22)	9,632 (8,113)	46 (9.5)	13 (2.9)	42 (12.5)	71% (0.45)	72% (0.45)

Notes:

See Appendix B for full sources and definitions.

Data Lacunae

It is important to note some crucial lacunae in data availability, as these limit the empirical work in important ways. The following data are unavailable:

(i) Panel data of workers allowing for the study of labor market outcomes and transitions over an extended period of time (such as the NLSY panel in the U.S.). I do use short LFS panels in what follows.

(ii) Matched employer-employee data, with both individual characteristics (such as demographic and economic data) and firm characteristics, including trade. Such data allow the study of how firms and workers are influenced by trade policy and trade shocks, including the processes of reallocation. The new trade literature makes major use of such data.

An example of such a data set can be found in the afore-cited study by Helpman, Itskhoki, Muendler and Redding (2017), which uses linked employer-employee data for Brazil. In particular, this data set includes worker demographics -- age, education, gender, and experience (tenure) and trade transactions data for every firm. See http://scholar.harvard.edu/files/helpman/files/himr_supplement_18apr15.pdf for details.

The existing Israeli CBS matched employer-employee data set crucially does not have these worker characteristics and firm trade data. See http://www.cbs.gov.il/www/shnaton63/st_eng12.pdf (pages 103-105).

(iii) Data on exports *services*, including important high-tech exports. Foreign trade data published by the Israel's Central Bureau of Statistics relate only to imports and exports of goods. Data on imports and exports of services are derived from the national accounts, but had not been

classified by economic sectors until 2009. Therefore, regressions data include only imports and exports of goods.

(v) Detailed data on migrant workers, say sector, occupation, arrival dates, skills, etc.

Moreover, existing data sets suffer from problems such as changes in the survey framework, which limit the time span when they can be used.

Methodology

The empirical work consists of a variety of tests. The common theme is to look at the effects of export share and import penetration on labor market outcomes, controlling for individual worker characteristics and the level of capital, as elaborated below.

Macroeconomic Regressions

I look at the rate of unemployment as a function of the trade openness measures given certain controls, running the following regression.

$$u_t = u_{t-1} + \boldsymbol{\beta}\mathbf{X}_t + t_1\frac{I_t}{Y_t} + t_2\frac{X_t}{Y_t} + t_3\frac{M_t}{N_t} + \varepsilon_t$$

where

u_t is the rate of unemployment

$\mathbf{X}_t$ is a vector of macroeconomic variables including the output gap and the labor force participation ratio

$\frac{I_t}{Y_t}$ is the import share of GDP, $\frac{X_t}{Y_t}$ is the export share of GDP and $\frac{M_t}{N_t}$ is the share of migrant workers in business sector employment

Microeconomic Regressions

I look at various labor market outcomes in annual repeated cross-sections and in short panels at the quarterly frequency. The key explanatory variables of interest are the export share and import penetration. Control variables include the level of capital and individual worker characteristics (education, age and age squared, gender and marital status).

The following regressions are run annually using repeated cross-sectional Labor Force Survey, Income Survey, and Manufacturing Survey data. In what follows I shall use indices i for a worker, j for an industry and t for a quarter or a year.

Wage Inequality

I look at three measures of dispersion of the log wage distribution.

$$\text{dispersion}_{jt}(\ln \widetilde{w}_i) = \alpha_t + \beta_j + t_1 IP_j^{t-1} + t_2 EX_j^{t-1} + \delta \ln k_j^{t-1} + \text{dispersion}_{jt}(\ln educ_i) + \varepsilon_j$$

where:

dispersion is one of the following

(i) the variance of log labor income (second moment)

(ii) the skewness of log labor income (third moment)

(iii) the Gini coefficient of log labor income (prevalent measure of inequality)

and the same measure for the log of education is a right hand side variable

The other variables are lagged import penetration (IP_j^{t-1}), export share (EX_j^{t-1}) and capital levels (k_j^{t-1}). To cater for simultaneity IV methods are used.

Wage Regressions

The following regression looks at log wages of worker i in sector j ($\ln w_{ij}$) as a function of individual characteristics ($\mathbf{Z}_{ij}$), lagged import penetration (IP_j^{t-1}) export share (EX_j^{t-1}), and capital levels (k_j^{t-1}), and allowing for a sector-specific effect (β_j).

$$\ln w_{ij} = \beta_j + \boldsymbol{\gamma}\mathbf{Z}_{ij} + t_1 IP_j^{t-1} + t_2 EX_j^{t-1} + \delta \ln k_j^{t-1} + \varepsilon_{ij}$$

where w_{ij} is real hourly wage or real monthly wage and $\mathbf{Z}_{ij}$ is a vector of person attributes -- age, age squared, gender, education, and marital status.

Hours Regressions

The following regression looks at log hours worked of worker i in sector j ($\ln h_{ij}$) as a function of individual characteristics ($\mathbf{Z}_{ij}$), lagged import penetration (IP_j^{t-1}), export share (EX_j^{t-1}), and capital levels (k_j^{t-1}), and allowing for a sector-specific effect (β_j).

$$\ln h_{ij} = \beta_j + \boldsymbol{\gamma}\mathbf{Z}_{ij} + t_1 IP_j^{t-1} + t_2 EX_j^{t-1} + \delta \ln k_j^{t-1} + \mu_{ij}$$

where h_{ij} is number of hours worked.

Employment Change

The following regression looks at log employment changes ($\Delta \ln e_{jt}$) across sectors j and time t as a function of lagged import penetration ($IP_{j,t-1}$), export share ($EX_{j,t-1}$), and capital levels ($k_{j,t-1}$), and allowing for a sector-specific effect (β_j) and a time fixed effect (α_t).

$$\Delta \ln e_{jt} = \alpha_t + \beta_j + t_1 IP_{j,t-1} + t_2 EX_{j,t-1} + \delta \ln k_{j,t-1} + \varepsilon_j$$

Transition Logit Regressions

The following logit regressions look at transitions across two consecutive quarters $t-1, t$ using the panel aspect of the LFS. These are then repeated annually.

Initially Employed

Suppose a worker i is initially employed in sector j at time t, a state to be denoted E_{ijt}. The worker has four possible transitions:

a. S/he can stay put.
b. S/he can move to another industry, to be denoted C_{ijt+1}.
c. S/he can become unemployed U_{ijt+1}.
d. S/he can move out of the labor force N_{ijt+1}.

Hence the following transition probabilities are relevant, using a logistic formulation. Denote:

$$\begin{aligned}
\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj} &\equiv \boldsymbol{\Omega}'_{iC}\mathbf{Z}_{it} + t_{1C} IP_{jt-1} + t_{2C} EX_{jt-1} + \delta_C \ln k_{jt-1} \\
\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj} &\equiv \boldsymbol{\Omega}'_{iU}\mathbf{Z}_{it} + t_{1U} IP_{jt-1} + t_{2U} EX_{jt-1} + \delta_U \ln k_{jt-1} \\
\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj} &\equiv \boldsymbol{\Omega}'_{iN}\mathbf{Z}_{it} + t_{1N} IP_{jt-1} + t_{2N} EX_{jt-1} + \delta_N \ln k_{jt-1}
\end{aligned}$$

where $\boldsymbol{\Omega}'_i$. is a vector of parameters and $\mathbf{Z}_{ijt}$ vector of person attributes.

Then I estimate, using multinomial logit, the following:

$$\Pr(C_{ijt+1} \mid E_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}$$

$$\Pr(U_{ijt+1} \mid E_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}$$

$$\Pr(N_{ijt+1} \mid E_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}$$

Initially Unemployed or Out of the Labor Force

When the worker is initially in U_{ijt+1} or N_{ijt}, logit regressions are run for the probability to get a job E_{ijt+1}, i.e.,

$$\Pr(E_{ijt+1} \mid U_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iUE}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iUE}\mathbf{X}_{itj})}$$

$$\Pr(E_{ijt+1} \mid N_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iNE}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iNE}\mathbf{X}_{itj})}$$

6. Results

Macroeconomic Regressions

I start with the macroeconomic regression, reported in Table 8.

Table 8

$$u_t = u_{t-1} + \boldsymbol{\beta}\mathbf{X}_t + t_1\frac{I_t}{Y_t} + t_2\frac{X_t}{Y_t} + t_3\frac{M_t}{N_t} + \varepsilon_t$$

Dependent variable: the unemployment rate

1980-1994

Lag	GDP gap	Labor force participation	Exports share		Imports share		Adjusted R squared	Durbin Watson
L=0	0.033 (0.054)	0.878*** (0.282)	-0.135 (0.104)		-0.041 (0.079)		0.88	1.81
L=1	-0.009 (0.043)	0.914*** (0.319)	-0.108 (0.104)		0.031 (0.072)		0.87	1.97
L=2	-0.024 (0.045)	1.319*** (0.286)	0.161 (0.114)		0.163*** (0.071)		0.83	2.06
L=0-2	0.006 (0.058)	0.742*** (0.294)	L=0	-0.205*** (0.110)	L=0	-0.001 (0.080)	0.88	1.85
			L=1	-0.058 (0.086)	L=1	0.090 (0.058)		
			L=2	-0.028 (0.078)	L=2	0.114*** (0.052)		

1995-2011

Lag	GDP gap	Labor force participation	Exports share		Imports share		Migrant workers share		Adjusted R squared	Durbin Watson
L=0	-0.321*** (0.112)	-1.176*** (0.394)	0.157 (0.144)		-0.193 (0.133)		-0.064 (0.161)		0.60	1.33
L=1	-0.217*** (0.113)	-0.957*** (0.381)	-0.179 (0.117)		0.065 (0.128)		-0.169 (0.151)		0.70	1.31
L=2	-0.299*** (0.123)	-0.964*** (0.393)	0.002 (0.143)		0.005 (0.141)		0.014 (0.161)		0.64	1.40
L=0-2	-0.318*** (0.141)	-0.558 (0.501)	L=0	0.228*** (0.121)	L=0	-0.150 (0.117)	L=0	0.175 (0.384)	0.70	1.36
			L=1	-0.020 (0.087)	L=1	-0.090 (0.089)	L=1	-0.458 (0.462)		
			L=2	0.062 (0.083)	L=2	-0.042 (0.090)	L=2	0.430*** (0.241)		

Notes:

1. The table reports estimated coefficients and their standard errors in parentheses, using TSLS.
2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.
3. Constant and AR terms included but not reported. Adding quarterly dummies did not change the results.
4. The following instrument set was used: four lags of the GDP gap, labor force participation, exports share, and imports share.

The regression is run over two sub-samples, 1980-1994 and 1995-2011 to cater for CBS data changes. To allow for differential effects over time, I run the exports, import and migrant shares using four alternative lag specifications (no lag, one lag, two lags and 0 to 2 lags). It turns out that these dynamic specifications matter for the results. The control variables are the GDP gap (computed as the Hodrick Prescott filter on ln GDP), which significant in the second sub-period, and the rate of labor force participation, which for the most part has a significant effect over both sub-periods (but switches sign).

The results indicate that the exports share of GDP has a significant effect only in the most general lag specification (0 to -2) However, it is a negative effect in the first sub-period (lowers the rate of unemployment) and a positive one in the second sub-period (raises unemployment). The imports share of GDP has a significant effect at two lags in the first sub-period and this effect is positive (raises unemployment). Likewise for the migrant share of business sector employment in the second sub-period (there are insufficient migrants data for the first sub-period).

Generally, the trade effects of imports and migrants are to be expected from the literature surveyed above. They both displace domestic workers, as will be shown below in transition regressions. Less clear is the result with respect to exports, which switches sign across sub-periods. In terms of the literature discussed above, the explanation may be that exports lower unemployment when exporting firms recruit workers in an export expansion, and raise unemployment, when these firms screen workers and implement productivity enhancement strategies.

Microeconomic Regressions

I start with the wage dispersion regressions.

Table 9

$$\text{dispersion}_{jt}(\ln \widetilde{w}_i) = \alpha_t + \beta_j + t_1 IP_j^{t-1} + t_2 EX_j^{t-1} + \delta \ln k_j^{t-1} + \text{dispersion}_{jt}(\ln educ_i) + \varepsilon_j$$

Dependent variables: Wage dispersion measure

Wage dispersion measure	Export share	Import penetration	Capital $x10^{-10}$	Dispersion of education	F-statistic	N
Variance	0.106 (0.290)	0.56** (0.23)	-8.65 (0. 21)	0.51** (0.24)	0.002***	192
Skewness	-0.093 (1.264)	-2.23** (1.00)	7.83 (0.93)	-0.05 (0.05)	0.074***	192
Gini	-0.002 (0.012)	0.02** (0.01)	-1.05 (85.1)	0.10** (0.05)	0.003***	192

Notes:

1. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.
2. Sectorial fixed effects were included but not reported.
3. N is the product of 12 two-digit (grouped) sectors (indexed j) multiplied by the number of years (indexed t, 1995-2010). The underlying number of worker observations (indexed i) is 2,000 on average.

Import penetration has a positive and significant coefficient in the variance and Gini regressions and a negative and significant coefficient in the skewness regressions. The former two imply that wage inequality rises with imports. The skewness finding needs further analysis but it may be associated with an increase in inequality in the wage distribution below the mean. These results

are consistent with the predictions of the new trade models, discussed above (for example the theoretical and empirical results of Helpman and co-authors).

Overall, then, the key finding up to here, is that import penetration, ceteris paribus, raises unemployment (Table 8 but only in first sub-sample) and wage inequality (Table 9 effects on variance and skewness).

I now look at (log) wages themselves.

Table 10

$$\ln w_{ij} = \beta_j + \boldsymbol{\gamma}\mathbf{Z}_{ij} + t_1 IP_j^{t-1} + t_2 EX_j^{t-1} + \delta \ln k_j^{t-1} + \varepsilon_{ij}$$

a. *Dependent variable: ln wages*

	Export share t-1	**Import penetration t-1**	**Capital t-1 $x10^{-10}$**	**Education**	**Adjusted R squared**	**N**
1995	0.436*** (0.012)	0.083*** (0.012)	130*** (4.9)	0.062*** ($3.3x10^{-4}$)	0.40	1,549
1996	-0.361*** (0.013)	0.601*** (0.012)	250*** (4.3)	0.062*** ($3.1x10^{-4}$)	0.39	1,546
1997	-0.160*** (0.018)	0.701*** (0.016)	72*** (3.1)	0.060*** ($4.2x10^{-4}$)	0.38	1,492
1998	-0.154*** (0.018)	0.712*** (0.018)	103*** (3.2)	0.066*** ($4.8x10^{-4}$)	0.35	1,441
1999	0.310*** (0.016)	0.085*** (0.017)	82*** (2.4)	0.060*** ($4.5x10^{-4}$)	0.39	1,390
2000	1.405*** (0.014)	-0.842*** (0.015)	97*** (2.0)	0.066*** ($5.3x10^{-4}$)	0.49	1,629
2005	0.084*** (0.009)	0.225*** (0.009)	47*** (0.884)	0.080*** ($3.5x10^{-4}$)	0.36	2,370
2010	0.330*** (0.008)	0.146*** (0.008)	5*** (0.5)	0.086*** ($3.5x10^{-4}$)	0.35	2,487

Notes:

1. The table reports estimated coefficients and their standard errors in parentheses.
2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.
3. Control variables − age, age squared, gender and marital status, as well as the constant – are included but are not reported.
4. N is the number of workers (indexed i) in 23 two- digit sectors (indexed j).

b. Dependent variable: ln hourly wage

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education	Adjusted R squared	N
1995	0.352*** (0.011)	0.129*** (0.010)	228*** (4.4)	0.053*** ($3.0x10^{-4}$)	0.36	1,519
1996	-0.151*** (0.012)	0.508*** (0.011)	255 *** (4.0)	0.054*** ($2.9x10^{-4}$)	0.33	1,509
1997	-0.287*** (0.016)	0.686*** (0.014)	90*** (2.8)	0.052*** ($3.8x10^{-4}$)	0.35	1,470
1998	-0.041*** (0.017)	0.581*** (0.017)	98*** (3.0)	0.060*** ($4.5x10^{-4}$)	0.3	1,421
1999	0.165*** (0.014)	0.159*** (0.016)	96*** (2.2)	0.055*** ($4.2x10^{-4}$)	0.29	1,370
2000	0.072*** (0.015)	0.481*** (0.016)	56 *** (1.9)	0.070*** ($4.9x10^{-4}$)	0.25	1,511
2005	0.059*** (0.008)	0.207*** (0.008)	49 *** (0.8)	0.076*** ($3.2x10^{-4}$)	0.33	2,330
2010	0.426*** (0.007)	-0.042*** (0.007)	-2*** (0.4)	0.081*** ($3.0x10^{-4}$)	0.35	2,312

Notes:

1. The table reports estimated coefficients and their standard errors in parentheses.
2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.
3. Control variables – age, age squared, gender and marital status, as well as the constant – are included but are not reported.
4. N is the number of workers (indexed i) in 23 two- digit sectors (indexed j).

The sectorial wage equations, either total wages or hourly wages, both in logs, have the expected results with respect to the level of capital and of education – both variables operate to increase wages and are significant. The estimated schooling return is in the order of 5%-6% in the earlier part of the sample and around 8% in the later part.

The results with respect to the export share variable are inconsistent across cross-sections – exports have both positive and negative effects across years. This may be related to the idea, espoused by the new trade literature, whereby trade engenders reallocation, so effects on average outcomes, such as these wage outcomes, are ambiguous.

Imports, for the most part, have a positive impact on wages. When workers are displaced by import penetration in the sector, the leftward shift in the supply curve has wages rise and employment decline. This is also consistent with the data facts, shown in Figure 17 above, relating to the low-tech sectors, as well as with the results of the unemployment regression (see Table 8).

I turn now to look at the other key labor market outcome, i.e., employment. I look at (log) hours and then at the net change in employment.

Table 11

$$\ln h_{ij} = \beta_j + \boldsymbol{\gamma}\mathbf{Z}_{ij} + t_1 IP_j^{t-1} + t_2 EX_j^{t-1} + \delta \ln k_j^{t-1} + \mu_{ij}$$

Dependent variable: ln hours

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education	Adjusted R squared	N
1995	-0.003 (0.005)	-0.025*** (0.005)	-36*** (2.1)	0.007*** ($1.5x10^{-4}$)	0.19	7,671
1996	0.055*** (0.006)	-0.066*** (0.006)	-31*** (2.1)	0.004*** ($1.5x10^{-4}$)	0.16	7,523
1997	0.070*** (0.006)	-0.066*** (0.005)	-15*** (1.0)	0.005*** ($1.5x10^{-4}$)	0.15	7,075
1998	-0.010*** (0.006)	0.015*** (0.006)	-2*** (1.1)	0.004*** ($1.6x10^{-4}$)	0.16	7,063
1999	0.058*** (0.006)	-0.019*** (0.006)	-12*** (0.8)	0.004*** ($1.6x10^{-4}$)	0.14	6,880
2000	0.046*** (0.005)	-0.002*** (0.005)	2*** (0.7)	0.007*** ($1.6x10^{-4}$)	0.15	6,620
2005	0.124*** (0.004)	-0.017*** (0.004)	-5*** (0.4)	0.005*** ($1.7x10^{-4}$)	0.13	5,612
2006	0.056*** (0.004)	-0.014*** (0.004)	-3*** (0.4)	0.004*** ($1.6x10^{-4}$)	0.13	5,645
2010	0.022*** (0.004)	0.044*** (0.003)	1*** (0.2)	0.004*** ($1.5x10^{-4}$)	0.11	5,600

Notes:

1. The table reports estimated coefficients and their standard errors in parentheses.
2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.
3. Control variables – age, age squared, gender and marital status, as well as the constant – are included but not reported.
4. N is the number of workers (indexed i) in 23 two- digit sectors (indexed j).

The results with respect to the trade variables are again inconsistent -- exports and imports have both positive and negative effects across years. But, again, one can interpret the results regarding imports, which often operate to decrease employment in these regressions, as representing the reduced supply effect: workers, displaced by import penetration, make for a leftward shift in the supply curve, with wages rising and employment declining. Noting that these regressions are undertaken at the individual (i) and sectorial (j) level, one needs to understand this leftward shift in sectorial terms: import penetration moves

workers to other sectors or to out of employment (see the analysis around Table 13 below); hence the supply and demand curves in question are not the economy-wide ones but rather the sectorial ones.

Table 12

$$\Delta \ln e_{jt} = \alpha_t + \beta_j + t_1 IP_{j,t-1} + t_2 EX_{j,t-1} + \delta \ln k_{j,t-1} + \varepsilon_j$$

Dependent variable: log employment changes

	Export share	Import penetration	Capital $x10^{-10}$	F-statistic	N
Model 1	0.122 (0.250)	0.342* (0.195)	-8.05 (0. 212)	0.18	168
Model 2	-0.016 (0.259)	0.162 (0.205)	-0.16 (0.207)	0.38	180
Model 3	0.116 (0.234)	0.27 (0.182)	-9.83 (0.17)	0.13	180
Model 4	0.078 (0.25)	0.373* (0.192)	-0.13 (-0.192)	0.04	168

Notes:

1. The table reports estimated coefficients and their standard errors in parentheses.
2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.
3. **Model 1:** export shares, import penetration and capital were set at period t-1. Time (year) and sectorial fixed effects were included but are not reported. **Model 2:** export shares, import penetration and capital were set at period t. Time (year) and sectorial fixed effects were included but are not reported. **Model 3:** export shares, import penetration and capital were set at period t. Time (year) fixed effects were not included. Sectorial fixed effects were included but not reported. **Model 4:** export shares, import penetration and capital were set at period t-1 Time (year) fixed effects were not included. Sectorial fixed effects were included but not reported.
4. N is the number of 12 grouped sectors multiplied by the number of years which the regression considers (1995-2010). The number of years depends on the lag used in the regression.

The log employment changes panel regression has only imports as significant, under some specifications. It is positive, indicating, again, that imports engender re-allocation.

Given the reallocational aspects of the new trade literature, and the results above pointing in that direction, it is of great interest to examine worker

transitions across labor market states. Note that re-allocation, by definition, involves outflows from some sectors and inflows into others. The regressions in Table 12 pertain to net changes in the stock of employment at the sectorial level. The transitions, to be examined below, are the constituents of the afore-cited outflows and inflows and pertain to gross worker flows, as opposed to net changes in the stock. This is done in the following logit and multinomial logit regressions using short LFS panels. I start with multinomial logit regressions of transitions from the position of employment in a given sector to another sector, unemployment or out of the labor force.

Table 13

$$\Pr(C_{ijt+1} \mid E_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}$$

$$\Pr(U_{ijt+1} \mid E_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}$$

$$\Pr(N_{ijt+1} \mid E_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}{1 + \exp(\boldsymbol{\Psi}'_{iC}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iU}\mathbf{X}_{itj}) + \exp(\boldsymbol{\Psi}'_{iN}\mathbf{X}_{itj})}$$

a. Dependent variable: probability of transition to another sector

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education $x10^{-4}$	Pseudo R squared	N
1995	-0.266***	0.333***	109***	5.075	0.036	916
	(0.014)	(0.013)	(5.9)	(3.936)		
1996	0.044***	0.078***	47***	-21.438***	0.042	844
	(0.016)	(0.015)	(5.4)	(3.963)		
1997	-0.228***	0.234***	87***	-10.070***	0.033	782
	(0.016)	(0.014)	(2.8)	(4.021)		
1998	-0.470***	0.570***	116***	10.853**	0.041	862
	(0.016)	(0.017)	(2.9)	(4.455)		
1999	-0.331***	0.440***	69***	70.673***	0.041	791
	(0.014)	(0.015)	(2.1)	(4.186)		
2000	-0.095***	0.077***	73***	-82.308***	0.038	820
	(0.014)	(0.014)	(1.8)	(4.120)		
2005	-0.105***	0.227***	26***	-33.289***	0.034	756
	(0.011)	(0.011)	(1.1)	(4.416)		
2010	-0.150***	0.219***	24***	-71.647***	0.037	716
	(0.010)	(0.010)	(0.6)	(4.321)		

Notes:

1. The table reports the average marginal effect and its std. error in parentheses.

2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.

3. Control variables, age, age squared, gender and marital status as well as the constant were included but are not reported.

4. N is the number of observation of workers who are in the status of the dependent variable. Each year included 2,300 observations of workers in a total of 23 two digit sectors.

b. Dependent variable: probability of transition to unemployment

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education $x10^{-4}$	Pseudo R squared	N
1995	0.010** (0.005)	-0.050*** (0.005)	-31*** (2.1)	0.837 (1.437)	0.036	78
1996	0.002 (0.005)	-0.041*** (0.005)	-12*** (1.9)	-6.464*** (1.440)	0.042	79
1997	-0.046*** (0.006)	0.040*** (0.005)	-2* (1.2)	-12.697** (1.754)	0.033	103
1998	-0.019*** (0.006)	0.002 (0.006)	11*** (1.1)	-24.498*** (1.596)	0.041	72
1999	-0.002 (0.005)	-0.029*** (0.006)	5*** (0.9)	-27.471*** (1.516)	0.041	82
2000	0.042*** (0.005)	-0.054*** (0.005)	-8*** (0.6)	-16.169*** (1.432)	0.038	67
2005	-0.018*** (0.003)	-0.005 (0.003)	0.3 (0.4)	-2.932** (1.257)	0.034	41
2010	-0.009*** (0.003)	$0.004x10^{-2}$ (0.003)	1*** (0.2)	-15.330*** (1.275)	0.037	40

Notes:

1. The table reports the average marginal effect and its std. error in parentheses.

2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.

3. Control variables, age, age squared, gender and marital status as well as the constant were included but are not reported.

4. N is the number of observation of workers who are in the status of the dependent variable. Each year included 2,300 observations of workers in a total of 23 two digit sectors.

c. Dependent variable: probability of transition to out of the labor force

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education $x10^{-4}$	Pseudo R squared	N
1995	0.071*** (0.007)	-0.080*** (0.007)	-41*** (2.7)	-55.399** (1.810)	0.036	163
1996	0.065*** (0.007)	-0.063*** (0.007)	-31*** (2.5)	-64.630*** (1.988)	0.042	161
1997	0.009 (0.007)	-0.016* (0.006)	-22*** (1.4)	-51.078*** (1.903)	0.033	148
1998	0.029*** (0.008)	-0.059*** (0.008)	-19*** (1.4)	-63.627*** (2.185)	0.041	139
1999	0.014** (0.007)	-0.001 (0.008)	-7*** (1.1)	-82.064*** (2.016)	0.041	156
2000	0.055*** (0.006)	-0.068*** (0.007)	-11*** (0.8)	-39.770*** (1.913)	0.038	143
2005	0.032*** (0.004)	-0.034*** (0.005)	-4*** (0.4)	-70.141*** (1.637)	0.034	80
2010	-0.008** (0.004)	0.012*** (0.003)	-1*** (0.3)	-33.201*** (1.717)	0.037	81

Notes:

1. The table reports the average marginal effect and its std. error in parentheses.

2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.

3. Control variables, age, age squared, gender and marital status as well as the constant were included but are not reported.

4. N is the number of observation of workers who are in the status of the dependent variable. Each year included 2,300 observations of workers in a total of 23 two digit sectors.

The picture emerging from these tables, which report average marginal effects, is the following:

(i) Results are often not uniform across years so there are few unambiguous conclusions.

(ii) Higher exports do not have uniform effects but are generally associated with less transitions to other sectors and more transitions to the out of the labor force pool. Higher imports have the opposite effects, i.e., more transitions to other sectors and less transitions to the pool outside the labor force.

The explanation of these results in light of the new trade literature is as follows: workers in export firms are more skilled and better paid so are less likely to move to other sectors; but the turnover and reallocation processes which are greater in these sectors would lead to more transitions to out of the labor force. These transitions include workers who move from firm to firm and spend the time between jobs in the out of the labor force pool. Workers in imports sectors, on the other hand, suffer more displacement by imports and move to other sectors.

The following regressions measure worker transitions in the opposite direction.

Table 14

$$\Pr(E_{ijt+1} \mid U_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iUE}\mathbf{X}_{itj})}{1+\exp(\boldsymbol{\Psi}'_{iUE}\mathbf{X}_{itj})}$$

$$\Pr(E_{ijt+1} \mid N_{ijt}) = \frac{\exp(\boldsymbol{\Psi}'_{iNE}\mathbf{X}_{itj})}{1+\exp(\boldsymbol{\Psi}'_{iNE}\mathbf{X}_{itj})}$$

a. Dependent variable: probability of transition from unemployment to employment

Notes:

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education	Pseudo R squared	N
1995	-0.255*** (0.084)	0.346*** (0.081)	-473*** (33.3)	0.023*** ($24.052x10^{-4}$)	0.058	126
1996	0.109 (0.084)	0.252*** (0.076)	252*** (28.1)	-0.004* ($25.927x10^{-4}$)	0.092	113
1997	0.301*** (0.059)	-0.289*** (0.057)	-63*** (13.5)	0.019*** ($17.967x10^{-4}$)	0.048	168
1998	-1.115*** (0.064)	0.727*** (0.068)	69*** (13.5)	0.011*** ($18.616x10^{-4}$)	0.052	177
1999	-0.165*** (0.069)	0.179*** (0.072)	166*** (11.2)	0.015*** ($24.038x10^{-4}$)	0.045	147
2000	0.740*** (0.056)	-0.478*** (0.058)	-34*** (10.2)	0.004* ($22.410x10^{-4}$)	0.096	150
2005	-0.780*** (0.069)	0.802*** (0.072)	49*** (5.9)	0.008*** ($28.983x10^{-4}$)	0.033	103
2010	-0.581*** (0.050)	-0.042 (0.047)	45*** (3.9)	-0.002 ($21.588x10^{-4}$)	0.113	86

1. The table reports the average marginal effect and its std. error in parentheses.

2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.

3. Control variables, age, age squared, gender and marital status as well as the constant were included but are not reported.

4. N is the number of observation of workers who are in the status of the dependent variable. Each year included 2,300 observations of workers in a total of 23 two digit sectors.

b. Dependent variable: probability of transition from out of the labor force to employment

Year	Export share t-1	Import penetration t-1	Capital t-1 $x10^{-10}$	Education	Pseudo R squared	N
1995	-0.547*** (0.055)	0.646*** (0.053)	261*** (22.6)	-0.023*** ($17.146x10^{-4}$)	0.033	287
1996	0.118** (0.056)	-0.285*** (0.054)	-41** (19.3)	-0.013*** ($17.075x10^{-4}$)	0.025	270
1997	0.583*** (0.061)	-0.416*** (0.058)	-51*** (11.2)	0.004** ($17.174x10^{-4}$)	0.013	253
1998	-0.241** (0.081)	0.306*** (0.079)	-22* (12.3)	0.002 ($18.531x10^{-4}$)	0.017	215
1999	-0.019 (0.063)	-0.071 (0.071)	-20** (8.7)	0.008*** ($16.374x10^{-4}$)	0.019	246
2000	-0.139*** (0.049)	0.571*** (0.057)	-6 (7.2)	-0.014*** ($16.847x10^{-4}$)	0.024	245
2005	-0.018 (0.046)	0.042 (0.045)	48*** (5.3)	-0.033*** ($20.212x10^{-4}$)	0.047	166
2010	-0.137** (0.061)	0.223*** (0.052)	-23*** (3.5)	0.006** ($23.560x10^{-4}$)	0.042	120

Notes:

1. The table reports the average marginal effect and its std. error in parentheses.

2. Significance is indicated as follows: ***p<0.01 **p<0.05 *p<0.10.

3. Control variables, age, age squared, gender and marital status as well as the constant were included but are not reported.

4. N is the number of observation of workers who are in the status of the dependent variable. Each year included 2,300 observations of workers in a total of 23 two digit sectors.

While there is no uniform outcome – across years – in terms of the effects of imports or exports on transition into employment, the dominant results are a negative effect for exports and a positive effect for imports. This means that a higher export share is associated with less transition into employment in a given sector, while higher import penetration is associated with more transitions into employment.

7. Policy Implications

I delineate two sets of policy implications. In the first I list implications for policy that may be directly derived from the afore-cited facts on trade and labor markets, the insights provided by the new trade literature, and the results of the econometric analysis. In the second I present more subjective and speculative implications, based on my reading of the results.

Implications of the Analysis

a. The new trade literature emphasizes firm heterogeneity, and, therefore, for workers, the reallocation processes following trade changes, higher wage dispersion, and ambiguous outcomes in terms of average employment and average wages. These general themes are echoed by the results of the econometric work. Policymakers need to be aware of the fact, then, that second moments rather than first moments are important for trade related labor market outcomes. This means, for example, that assistance for labor market transitions – from employment to non-employment and back, and from sector to sector – is a first order issue. This can take the form of job matching centers, of targeted training programs, and of benefits programs. A serious drawback to a successful implementation of such policy plans is the lack of relevant data. Important data sets, such as panels and the relevant matched employee-employer data sets, are unavailable. One possibility is to increase CBS budgets to cater for such missing data sets.

Note that such programs are not implemented on a big scale in Israel. These policy measures come under the heading of active labor market policy (ALMP) and the budget allocated to these has been relatively small (the Bank of Israel has been noting this fact for some time now). Hence, this kind of policy is not a foregone conclusion, all the more so in the context of trade policy. In brief, the key concept here is worker and job reallocation. Trade liberalization engenders

such reallocation and this connection should be recognized and addressed by policymakers.

b. The microeconomic regressions reported above examined multiple labor market outcomes: two alternative wage series, hours worked, net employment changes, dispersion statistics of wages and transitions from state to state. While education always had the expected sign, as well as reasonable parameter estimates, the effects of the export share and import penetration were not uniform across years. This is an expression of the idea that average outcomes are ambiguous. While it is not something policymakers can act on, it also means that policy should not operate to set agendas such as aggregate employment promotion in these circumstances.

c. The results of the transition equations show that the higher the export share, the lower was the worker probability to reallocate to another sector, and the higher was the probability to exit the labor force. The higher the import share, these results were reversed. These reallocation effects of trade are significant. The results are consistent with models which have workers of higher ability in exporting firms and with models whereby imports displace workers in domestic industries. Policymakers need to take into account the fact that reallocational effects are key and less clear cut than "promoting employment" or "enhancing welfare." In practical terms this means considering use of policy targeted at worker groups, such as those displaced by import penetration. For an example of an empirically-based policy analysis along those lines, using relevant data on the Brazilian economy, see Cosar (2013).

Subjective Policy Implications

d. While trade liberalization, in terms of removal of barriers and reduction in tariffs, was quite extensive, there are sizeable sales taxes levied on both domestic and imported goods. This means that imports are taxed, as other

goods are taxed, even though liberalization took place. In terms of consumer welfare this may lead in many cases to similar outcomes. This issue of imported goods taxation evidently needs to be addressed within an examination of the tax system, which tends to rely heavily on indirect taxation. It is the latter reliance, which leads to significant taxation of imported goods (among other goods). The Israeli government does not have the institutional bodies able to undertake a fully-informed, extensive review, bodies like the CBO or OMB in the US, nor does it have a fiscal council or fiscal watchdogs, such as the IFS in the UK. Current practice is to make ad hoc decisions, typically under political pressure and often under tight time constraints. Unlike the "exposure plan" and the associated international agreements, this does not make for a planned path of fiscal decisions, including trade liberalization. Creation of institutions, such as the afore-cited ones, will be very helpful in this context. The IMF has been making a similar point for some time now in its annual reports on Israel.

e. The size of the migrant worker population is high and needs to be taken into account in the current context. The macroeconomic regressions of Table 8 indicate significant effects on the rate of unemployment. Here, too, policy lacks the data necessary to make fully informed decisions. The recommendations of two governmental committees on this topic, headed by Zvi Eckstein, then deputy Governor of the Bank of Israel, were adopted by the government but not fully implemented. Even more than taxation policy, migration policy is subject to significant political pressure.

f. Israel is a highly open economy. This makes it vulnerable to world crises, both economic (such as the 2007-8 global crisis or the 2010-2012 Euro crisis), and political (such as the possibility of sanctions being imposed on it). There are several responses to this situation; the very dynamic nature of the geographical distribution of its trade is one; the substantial changes in trade composition, in particular in exports, is another. Policy can provide responses, or reinforce existing ones, through the following means: better research on

possible external shocks; developing methods to inform firms about them; the operation of trade delegations, both on an ongoing basis and on big, ad-hoc scales; the encouragement of hedging and insurance practices among firms and households, using global financial markets; the latter would involve better financial education of these agents and the opening of the Israeli banking and capital markets to relevant financial institutions, a task made more difficult given the afore-cited global crisis.

g. The high-tech sector is a dominant part of Israeli exports and has been on a rising trend, especially in the 1990s. However one should note the fact that it makes for less than 10% of total employment, and this share has been flat over the years since 2000. Analyses of the Israeli economy need to be wary of over-playing the high-tech employment card when considering trade policy.

8. Conclusions

The paper presents a comprehensive picture of trade and labor market developments. There are two sets of key conclusions:

One is that trade expansion was not associated with simple increases in export sector employment and wages or declines in import sector employment and wages. The outcomes are much more complex and in some cases run counter to these simplistic scenarios. For example, displacement of workers in import sectors led to less employment and higher wages. The major effects of trade are reallocational effects on the labor market leading to worker transitions across sectors and employment states and to increases in wage inequality.

The other is that the results have bearing on policy. The relevant implications were elaborated in the preceding section, and touch upon fiscal, labor market, migration, and social assistance policies. All the while, major lacunae in data availability limit the possibilities to formulate more specific and evidence-based policy plans.

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Appendix A: Manufacturing Sectors by Technological Intensity

Israeli CBS classification by technological intensity follows the classification recommended by the OECD, based on R&D investment as a share of output.[6] In this paper, high technology industries were grouped into one big sector, since import classification methods allow no subdivisions. As a consequence, this big sector is composed of the following four high technology industries: electronic communications equipment, office machinery and computers, electronic components, and equipment for control and supervision. It also includes manufacturing of machinery and equipment, which is a medium-high technology industry. The sector excludes aircraft and pharmaceuticals.

HIGH TECHNOLOGY INDUSTRIES	**MEDIUM-HIGH TECHNOLOGY INDUSTRIES**
Office and computing equipment	Chemicals and petroleum refining
Electronic components	(excl. pharmaceutical products)
Aircraft	Machinery and equipment
Electronic communications equipment	Electrical equipment and electric motors
Equipment for control and supervision	Transport equipment
Pharmaceutical products	Transport equipment not classified elsewhere
MEDIUM-LOW TECHNOLOGY INDUSTRIES	**LOW TECHNOLOGY INDUSTRIES**
Mining and quarrying	Food products, beverages and tobacco
Rubber and plastic products	Textiles, wearing apparel and leather
Non-metallic mineral products	Paper, printing and paper products
Non-ferrous and precious metals	Wood and furniture
Iron and steel foundries	
Metal products	
Ships and boats	
Jewelry and silversmithing	
Articles not classified elsewhere	

[6] http://www.cbs.gov.il/publications10/1387/pdf/intro_e.pdf, p.26; see also: http://www.oecd.org/sti/ind/48350231.pdf

Appendix B: The Data

Variable	Definition	Survey
w_{ijt}	Hourly wage of a worker (1)	LFS; IncS
h_{ijt}	Weekly hours of a worker (2)	LFS; IncS
$\mathbf{Z}_{ijt}$		
	Age (3)	LFS; IncS
	Age squared	LFS; IncS
	Gender	LFS; IncS
	Years of education (4)	LFS; IncS
	Marital status	LFS; IncS
$\mathbf{Z}_{jt}$	Average of variable in industry j at time t	LFS; IncS
k_{jt-1}	The sector's gross capital stock, annual (5)	BOI data
IP_{jt-1}	The sector's import penetration, annual (6)	CBS Foreign Trade Statistics Monthly
EX_{jt-1}	The sector's export share, annual (7)	CBS Annual Manufacturing Survey
$C_{ijt+1} \mid E_{ijt}$	Dummy for workers who change industry	LFS
$U_{ijt+1} \mid E_{ijt}$	Dummy for workers who become unemployed	LFS
$N_{ijt+1} \mid E_{ijt}$	Dummy for workers who go out of the labor force	LFS
$E_{ijt+1} \mid U_{ijt}$	Dummy for unemployed who become employed	LFS
$E_{ijt+1} \mid N_{ijt}$	Dummy for out of the labor force who become employed	LFS

Notes:

(1) The bottom 3% of observations were dropped.

(2) The top 2% of observations were dropped.

(3) Observations of people over 80 years old were dropped.

(4) Observations of workers with more than 23 years of education were dropped.

(5) The capital stock series by industrial sectors is based on Bank of Israel calculations which are as follows: gross capital stock at the beginning of

a year plus gross investment during the year minus yearly depreciation. The sectors gross capital formation data are based on the CBS Annual Manufacturing Survey.[7] Depreciation calculation is based on the OECD method.[8]

(6) Foreign trade data published by the Israel's Central Bureau of Statistics relate only to imports and exports of goods. Data on imports and exports of services are derived from the national accounts, but had not been classified by economic sectors until 2009. Therefore, regressions data include only imports and exports of goods. The trade data do not include transactions with the residents of the Palestinian Authority.

The main sources for imports and exports data are the forms submitted to the Customs authorities by importers and exporters. Imports data are classified according to the details included in the Customs and Purchase Tax Tariff ordinance[9], and its value is represented at C.I.F. prices (Cost, Insurance and Freight). Based on the Harmonized Commodity and Coding System, imports data classification is built hierarchically at 2, 4 and 6 levels that represent significant groups of commodities both from a logical and a statistical perspective. The highest level, "chapter", is composed of two positions and comprises ninety seven groups. "Chapters" are organized in twenty one "sections".[10] In this paper the division of the "sections" into industrial sectors is based on the description of the goods in each section.

Annual imports penetration was calculated for each sector as follow:

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[7] This publication presents data on manufacturing industries, which are the results of an annual survey of all industries in the economy. See: http://www.cbs.gov.il/webpub/pub/text_page_eng.html?publ=48&CYear=2010&CMonth=1

[8] "Method Used by OECD Countries to Measure Stocks of Fixed Capital", National Accounts: Sources and Methods, Nu.2, OECD (1993).

[9] Customs Tariff and Exemption Ordinance for 2000, edited according to H.S. - 1996, Kovetz Hatakanot No. 1121, 25 December 1997. For HS Imports Israeli Classification 2012, see: http://ozar.mof.gov.il/ita2013/eng/mainpage.htm

[10] http://www.cbs.gov.il/reader/fr_trade/ftmenu_e_v1_new.htm

total imports of goods at current prices divided by the sector's GDP plus imports of goods minus the sector's exports at current prices. The sector's GDP is based on the CBS Annual Manufacturing Survey, as well as sector's exports[11] (see comments No.7 and No.8 respectively).

(7) In order to allow consistency with the sector's GDP and capital stock series, exports data are based on the CBS Annual Manufacturing Survey. The survey is based on a sample, which is drawn from the Business Register established in recent years by the Central Bureau of Statistics. The Business Register is based primarily on combined administrative files – the VAT files of firms, and the National Insurance Institute's employers file. Financial statements for the tax year and their attachments served as the source of the survey data. Exports shares are calculated in a given sector as the total revenue of the establishments from exports sales, less exports commissions at current prices. [12] The sector's exports share is calculated as the total sector's exports divided by the sector's GDP (see comment No.8).

(8) Since CBS National Accounts publications do not include GDP data by two digit sectors, this paper uses GDP data from the CBS Annual Manufacturing Survey. The data are classified by two digit industrial sectors and relate to gross output, which is defined as follows: total income plus growth in the stock of finished and unfinished goods, less the value of goods that were not processed.[13]

(9) Imports and exports shares of total GDP in the economy are based on CBS national accounts. Over the years, the national accounts system was subjected to changes, in such a way that data from 1995 cannot be comparable to previous years. National accounts for 1950 to 1995 were

[11] http://www.cbs.gov.il/webpub/pub/text_page_eng.html?publ=48&CYear=2010&CMonth=1
[12] http://www.cbs.gov.il/publications10/1387/pdf/intro_e.pdf, p.24
[13] http://www.cbs.gov.il/publications10/1387/pdf/intro_e.pdf, p.24

compiled according to the recommendations of the UN Statistical Office in 1968 (SNA 1968).[14] National accounts for 1995 to 2014 are based on the SNA2008 system.[15] In addition until 1995, the definition of exports included the components of compensation received by exporters and the definition of imports of goods and services included net taxes on imports. As consequence, until 1995 gross domestic product did not include net taxes on imports, but included revenue components received for the exports. [16]

The CBS also publishes input-output tables, which describe the relationships between industries and between them and the final-uses (private consumption, government consumption, investment, exports). Input-output tables are an integral part of the national accounts as recommended by the SNA, and their form ensures consistency with other data sources. Therefore, exports and imports data from input-output tables should be similar to those of the national accounts. However, the national accounts data had been subjected to updates over the years, while input-output data had not. Moreover, input-output data are available only for 1995 and 2006. Therefore, imports and exports data from national accounts are more accurate and accessible. [17]

Imports and exports shares of total GDP in the economy calculations were based on constant price data for each of the components, in order to control for the effects of price changes of foreign trade and GDP. Otherwise, changes in imports or exports prices compared to domestic

[14] United Nations: A System of National Accounts, Studies in Methods, Series F, No. 2, New York, 1968.

[15] System of National Accounts, 2008, Commission of the European Communities, International Monetary Fund, Organization for Economic Cooperation and Development, United Nations, World Bank, New York, 2009.

[16] http://www.cbs.gov.il/shnaton65/st_eng14.pdf, p.117

[17] http://www.cbs.gov.il/reader/?MIval=cw_usr_view_SHTML&ID=966

product, may lead to inflated shares and vice versa (see table of comparison below). CBS imports and exports of goods in constant prices are obtained by multiplying the value of imports or exports in US dollars in constant prices using the exchange rate in effect during the base year. Data are calculated in US dollars at constant prices, according to dollar indices specified for the main goods. Imports and exports of services in constant prices are computed by deflating current price estimates using price indices specified by type of service. [18] The following table shows the difference between imports and exports shares at constant and at current prices in 1995 and in 2006:

	GDP	Imports	% GDP	Exports	% GDP
millions of NIS, constant prices, 100=2010					
1995	484,031	155,841	32%	123,015	25%
2006	734,722	255,091	35%	256,445	35%
millions of NIS, current prices					
1995	299,081	106,420	36%	83,027	28%
2006	678,312	277,738	41%	278,392	41%

Source: calculations based on CBS national accounts data.

(10) Data are classified by the Standard Industrial Classification of All Economic Activities 1993 (ISIC 1993).[19] In order to be compatible with import data publications, which are classified by sections and not by industrial sectors, some of the sectors were grouped together. Several sectors were not included in the calculations since imports penetration could not be extracted from CBS publications: Furniture (ISIC code No.36), diamonds, jewellery, goldsmiths' and silversmiths' articles (ISIC codes No.37-38) and manufacturing n.e.c. (ISIC codes No.39). The empirical work relates to the following industrial grouped sectors:

[18] http://www.cbs.gov.il/shnaton65/st_eng14.pdf, p.123-124

[19] For more information and for comparison to ISIC 2011, see:
http://www.cbs.gov.il/webpub/pub/text_page_eng.html?publ=94&CYear=2011&CMonth=1

Grouped sectors	Economic branch codes (2 digits)
Mining of minerals and quarrying of stone and sand	13
Food products, beverages and tobacco products	14+15+16
Textiles and wearing apparel (excl. knitted)	17+18
Footwear, leather and leather products	19
Wood and wood products (excl. furniture)	20
Paper and paper products, publishing and printing	21+22
Chemicals and chemical products and refined petroleum	23+24
Plastic and rubber products	25
Non-metallic mineral products	26
Basic metal and Metal products	27+28
Machinery and equipment, electric motors and electrical distribution apparatus, electronic components, electronic communications equipment and industrial equipment for control and super-vision, medical and scientific equipment (for more information about high technology industry see appendix no.2)	29+30+31+32+33+34
Transport equipment	35