

The comparative advantages of the Israeli economy

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The Economic theory holds that the comparative advantages of a country in certain areas are arising from a comparative abundance of production factors relevant to that area. Comparative abundance of production factors relevant to products or services in specific sector will result in that the prices of these factors (compared with other countries) would be lower, and hence production cost in that sector will be comparatively cheaper. Despite the stringent assumptions of this theory, such as the lack of mobility of production factors between countries (which should make the price of factors of production per country non-relevant) do not always take place, a comparative abundance of production factors such as cheap labor, skilled labor, capital, natural resources and climate conditions tend to better explain the areas where countries enjoy a "revealed" comparative advantage. Revealed comparative advantage is an index that measures the relative weight of any export's sector in that country vs. the total global export's sector in relation to the relative weight of the total country exports vs. the total global exports. This index allows neutralizing the size of the country when one examines its comparative advantages. Sectors in which the revealed comparative advantage index is greater than 1 are the sectors that the country expected to have a comparative advantage in.

In examining the revealed comparative advantage of Israel, two areas stand out: high-tech industries (products and services), and the chemicals industry. Particularly noticeable is the high-tech sector in Israel which has a revealed comparative advantage over 2 and second only to that of Ireland! (Of all the developed countries). Moreover, the exports of high technology products and services constitute about 50% of Israeli exports when the Israeli production of high technology products and services stands at about 1% of the total global production, while the weight of Israel's population relative to

that of industrialized countries is only half a percent. High-tech industries require primarily skilled workforce (engineers and scientists). The quality training of technical workforce in Israeli institutions of higher education, the investments in security technologies Israel was required to do, and still does, the massive increase of immigrants with technology training, especially from the former Soviet Union, all helped to create this comparative abundance. In fact, Israel is a country with the world's highest ratio of researchers engaged in research and development to the population and the country in which the percentage of investments in research and development in relation to the national product is the highest in the world (about 4.7%). Therefore, the explanation based on conventional economic theory would be that Israel's comparative endowment of labor of this kind is the source of such comparative advantage in high technology products and services. The revealed comparative advantage index of Israel's chemical industry is more than 1.5. Similarly, the ability to successfully export various chemicals and products based on chemical raw materials, such as drugs, will be explained by the comparative abundance of relevant minerals of bromine, potash, etc. (especially in the area of the Dead Sea) that exist in Israel, which combined with the comparative abundance of skilled workforce in the chemistry field form the basis for Israel's comparative advantage in the field.

However, in both cases, closer examination of the details shows that a comparative abundance of production factors is not the whole story. In the context of high-tech industries another major production factor that allowed the development of comparative advantage was capital. In the past, capital was considered a major production factor influencing the comparative advantages of countries. However, the liberalization of capital markets of many countries in recent decades, omitted, largely, the logical rationale for the analysis of the comparative abundance of capital. The reason is that if capital is a mobile production factor between countries then it should not have a crucial influence on the development of comparative advantage, since one can raise capital in one country and use it in another country. However, specifically in case of high technology industries

that require specific knowledge, in order to assess the economic attractiveness of technological innovation, the availability of capital specific to this industry in Israel has been a significant catalyst for the development of the industry's comparative advantage and perhaps was also a crucial production factor in the formation of this comparative advantage. The sources of such specific capital usually are not the financial markets where the investors do not have the ability to evaluate the economic potential of new technologies, only after one or another company could show any level of sales or business success. The sources of these specific capitals are mainly venture capital funds and multinational companies which have a higher capability of evaluating the economic potential of innovative technological ideas and take advantage of their knowledge for early investments in promising technologies. In the case of Israeli technology sectors, the "Yozma" fund that was initiated by the government of Israel at the beginning of the 1990th has been the catalyst for the entry of other venture capital funds from Israel and the U.S. into investing in high-tech sectors in Israel. These venture capital funds were one source of a specific capital enabling the development of comparative advantage in high technology industries. Israel's capital market reforms, along with the trend of globalization of the venture capital industry (particularly the U.S. one) were another catalyst for a specific flow of foreign venture capital funds that specialize in certain areas and for the investments of multinational technological companies in establishing research and development centers, setting up production centers and purchasing start-up technology companies. All of these were another key factor in the formation of the comparative advantage in the high-tech field. In Israel, where the economy is relatively small and the financial capital market is still not developed enough, a massive flow of specific capital based on the unique knowledge of the entities bringing that capital in (as opposed to capital that can be raised directly from the public) was a necessary condition for the formation of a comparative advantage in high technology industries. In fact, the total direct foreign investment in Israel grew from about \$ 4.5 billion in 1990 to more than \$ 71 billion in late 2009, largely as a result of investments of venture capital funds and multinational companies in high-tech firms.

Israel's comparative abundance in minerals also does not constitute the entire explanation for the comparative advantage of Israel's chemicals field, which includes the central sub-field of pharmaceutical industry. This advantage is, to a large extent, based on the performance of one Israeli company, Teva, which is one of the world's leading pharmaceutical companies. With annual sales of about \$ 16 billion and a net profit of about \$ 4 billion by 2010, there is no doubt that this huge company (in Israeli terms) affects the entire industry's performance. Indeed, as a global company not all of the production activity of Teva is located in Israel, but since most research and development of this company is located in Israel and since much of its raw materials are produced in Israel, Teva's impact on the development of the pharmaceutical industry's comparative advantage is large. The pharmaceutical field itself also has developed due to the comparative abundance in skilled workforce from mainly scientists, engineers and laboratorians trained in various universities, which together with legislation that facilitates the imitation of drugs has enabled the development of a significant comparative advantage (even if most of the sales of this industry are channeled to a single firm). In Teva's case, another significant resource to note is the managerial resource that was able to create a rare combination of long-term strategic planning, operational efficiency, legal and marketing strength and great success in self growth along with international mergers and acquisitions.

It is important to remember that analysis of Israel's comparative advantages fifty years ago would have yield quite different results. Back then, areas such as agriculture (oranges, flowers and various vegetables) or the diamond industry had a high revealed comparative advantage index. Israel has lost its comparative advantage in these areas that have almost disappeared nowadays from the industrial landscape, and in practice, the ability to capitalize the potential of comparative advantage in alternative areas such as high technology and chemicals derived from the combination of directed government policy (such as - creation of the "Yozma" fund, investing in technological education, investments in security technologies or legislation that facilitates the imitation of drugs), availability



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of specific capital in different industries (coming from venture capital funds and from multinational companies) and managerial ability of transferring a business idea into a global company with sales of billions of dollars worldwide. Therefore, the obvious questions are: How can Israel maintain its current comparative advantages? What are the future areas which may develop comparative advantages in Israel? And how should we capitalize the development potential of comparative advantages in these areas?.

As stated above, preservation of existing comparative advantages and development of comparative advantages in new fields is first of all the product of the comparative abundance of production factors that Israel will succeed in creating. In the context of high technology industries one should remember that the field of Information and Communication Technologies, which most of the Israeli technology companies deal with, is just one of the emerging high-tech areas in the world. Other technological areas such as Cleantech (products and services that reduce energy consumption, waste and pollution) or security technology products (both the for the military sector and the civil sector) can become areas of comparative advantage given two basic conditions - creating a comparative abundance of labor with specific skills in these areas and the existence of specific capital for these areas (i.e. - capital flows by entities having understanding and familiarity of the relevant areas). Israel has a greater comparative advantage in software components and services of high-tech areas than in the areas of hardware technology. In fact, the revealed comparative advantage of Israel high technology *services* is close to 3. Thus, for example, Israel is a leading technology provider of processors, but a less significant player in the world of production of processors. This is because the relative weight of the skilled workforce of the total costs is higher when it comes to intangible products (e.g., software) or services. This fact indicates that, apparently, Israel's comparative advantage is larger in the contexts of developing technology, software and services in the areas mentioned above and is lower in hardware-based products.



In the context of the chemical industry we have to distinguish between two sub-fields – the chemicals field and the pharmaceutical field. Since the abundance of chemical raw materials is largely a given natural resource, the emphasis in this area should be on improving the industry's ability to produce products with higher added value. In this area, as in many other areas, the profits of the producers are strongly influenced by their ability to produce products upstream the value chain (i.e., products consumed by final consumers or wholesalers and not basic raw materials). This can be done by investing in research and development that would allow creation of such products. Given, the increasing competition in the chemicals industry in various emerging countries (for example - China and India), the only way to preserve the comparative advantage is by climbing up the value chain and creating sophisticated products for final customers. Israel, which has plenty of workforce with specific skills for this field, should take advantage of this comparative abundance.

In the context of the pharmaceutical area, there is a need for the generation of an abundance of skilled workforce that will enable development of ethical drugs with the assistance of specific capital for that industry. There already exist many Israeli start-up companies in this field. Many of these companies operate in a more promising field that is very close to the drugs field - the field of biotech (producing products based on life processes in biological systems). In addition, the relevant departments of chemistry and biology in many Israeli universities are quite strong. Along with this industry-specific capital, which can be derived from multi-national pharmaceutical companies (many of which forming operations in Israel in recent years just for this purpose), there is great potential for the formation of an industry with long-term comparative advantage. Israel's Teva Pharmaceuticals, which is expanding its ethical drugs development activities in recent years, is also an available source of such specific capital. The Pharmaceutical field certainly can develop, and combined with the field of biotech can be an area where Israel enjoys a strong comparative advantage.

A country's comparative advantage is often the result of the presence of relatively abundant factors of production, while directed government policy not always has the ability to influence this comparative abundance. This is true when it comes to unique natural resources or climatic conditions. The same is true when any country is comparatively abundant with unskilled labor, whose very existence leads to the formation of comparative advantages in unskilled labor fields. Nevertheless, in the context of Israel's the two main production factors that are (and are expected to continue to be) the main sources of comparative advantage are the comparative abundance of skilled workforce in specific areas and the presence of a specific capital in these areas. Because of this, largely, directed government policy can assist in developing, pooling and strengthening these important production factors. Investments in technological education, both in general education and in higher education systems, encouraging student enrolment in these areas (for example by subsidizing tuition in specific areas), and encouraging industrial and academic research while strengthening their relationships and focusing on selected areas are, a necessary condition for the formation of skilled workforce in the high technology and chemicals and drugs fields. It is important to remember that many emerging countries are investing in creating skilled workforce in recent years and largely reduce the gaps between them and Israel. In fact, in various indexes, such as student achievement in math and science, Israel ranks only in the 19 world position, far away after Singapore, South Korea and Hong Kong. Therefore, maintaining a comparative abundance of skilled workforce compared to other countries is critical in preserving Israel's competitive position in the above areas and building a competitive position in other knowledge-intensive fields. In the context of a specific capital available to these areas, since foreign venture capital funds and many multinational companies already are active in Israel, most government involvement should be removing obstacles in investing in Israeli start-ups, removing barriers to the entry and the creation of capital in Israel and reducing barriers of releasing Israeli technological know-how to encourage availability of such capital.

Despite the existing differences regarding the relative contribution of different capital sources for the Israeli economy, especially in the context of the acquisition of Israeli start-up companies in early stages of their operations, it is imperative to keep in mind that probably there is no "right" generic prescription to all companies in various fields. Without going into the roots of the argument above, one must remember that every one of the sources of capital has advantages and disadvantages. Entrepreneurs selling their companies at an early stage, often turn to new initiatives. Many multinational companies leave their main development centers and part of the production, taking advantage of their international dispersion for distributing Israeli technologies rapidly around the world and continue to contribute to the presence and development of skilled workforce in specific areas. In the context of resource management, many Israeli multinational companies (Teva, Amdocs, Ormat, Check Point, Israel Chemicals, etc.) continue to contribute disproportionate weight to Israel position in their R&D and production activities (both in direct operations and through subcontractors) and are ensuring that a significant share of the added value they create will be in Israel, which contributes strongly to the growth of multiple business activities of companies in Israel. All these cumulatively reinforce Israel's comparative advantages in different high-knowledge fields.