The Shoresh Handbook

Education and its Impact in Israel

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SHORESH
Institution for Socioeconomic Research
SHORÉSH  שורֶש
n. root, source, basis, core, primary
Foreword

“It must be our people’s country of choice”

Theodore Herzl

While Israel is the home – and, when necessary, the safe haven – of the Jewish People, its continued survival in the most dangerous region on the planet ultimately depends on what Herzl foresaw so many years ago.

The beginning was promising. Israel became not only a beacon of hope and a sanctuary for those who had lost everything, but also a beacon of inspiration and ideas for others abroad. With one of the youngest populations in the developed world, Israel created some of the best universities. Its ingrained culture of going against the grain and its can-do spirit have made Israel a leader in research and in hi-tech, attracting venture capital at a rate – relative to its size – that no other country even approaches. Living standards are higher today than they ever were. Literally, living Herzl’s dream.

And yet, as Yogi Berra once quipped, “The future ain’t what it used to be.” The country that had been closing gaps with the world leaders during its first couple of decades, has changed its mindset, its national priorities, and its direction since the seventies. While it is currently reaping what its founders sowed during those first decades, the decisions that Israel makes today will determine the fate of its children and grandchildren.

Not unlike other countries, Israeli society is finding it increasingly difficult to distinguish between populism and policies based on facts and knowledge. But in Israel’s case, knowing the facts and understanding their implications, or not, can mean the difference between physically existing – or not. Over the past several decades,
Israel has moved to socioeconomic trajectories that will not be sustainable in the long run.

Roughly half of Israel’s children are receiving a Third World education, and they belong to the fastest growing parts of the population. Israel’s productivity levels – which determine incomes and economic growth – are among the lowest in the developed world, and have been falling further and further behind for decades. Its rates of poverty and income inequality are among the highest in the developed world. Already today, half of Israel’s population does not even reach the bottom rung of the income tax ladder and they pay no income tax at all – while 90% of the country’s entire income tax revenue comes from just 20% of the population.

For highly skilled and educated Israelis, opportunities in countries that are pulling away become ever more beckoning. As the burden on their shoulders rises, there is an increasing danger that a critical mass of the persons Israel most needs to maintain its First World economy may decide that Israel is no longer their country of choice. The catalyst may be a major crisis, either external or internal, accompanied by a loss of hope that Israel’s leadership will internalize the gravity of what is at stake – or lack the wherewithal do anything about it.

That is not the situation today. Israel still has a large majority with a strong sense of commitment to the dreams of its founders. The young generation not only places its lives and limbs at risk for years to defend Israel, they are also volunteering in record numbers – delaying college and personal careers even further – to spend a year or more helping the less fortunate in some of Israel’s poorer communities. There is an urgent need to stop arguing incessantly about the placement of deck chairs on the Titanic and to begin focusing on that iceberg straight ahead. This Handbook, and all of Shoresh’s activities, are intended to provide a mirror for Israeli society, its leaders, and all those who care about the country’s future. Our objective is to separate the wheat from the chaff and provide independent, non-partisan, analyses of the root (shoresh) issues at the highest professional levels in a language and format accessible to all.
While there are many issues requiring attention, none is more important than education. Measures enacted today will take years to percolate socially and economically. For our ship to survive the stormy waters surrounding it when our children reach adulthood, this is the area requiring the most immediate attention—and is, therefore, the focus of this Shoresh Handbook. Outlined below is a broad perspective of Israel’s primary socioeconomic challenges, education’s impact, the state of education in Israel, and some of the key misconceptions about the system’s underlying problems. Getting the facts straight is the key first step in turning things around—and that is the purpose of this Shoresh Handbook.

I am indebted to my colleague, Professor Ayal Kimhi, for his contributions, advise, counsel and suggestions that helped make this Handbook happen. Some of the analyses here were undertaken for a chapter that we wrote together on the economics of education for a forthcoming volume on Israel’s economy by the Maurice Falk Institute in the Department of Economics at the Hebrew University of Jerusalem. Ayal and I thank the volume’s editors, Professors Avi Ben-Bassat, Reuven Gronau, and Asaf Zussman, as well as the other authors and collaborators in the volume for their comments. We also thank Anbar Aizenman, David Caro, Moty Citrin, Michael Crystal, Oren Tiros, Ira Yaari and Noam Zontag for their research assistance.

While some of the findings shown below are analyzed more fully in the academic chapter published by the Falk Institute, a comprehensive non-academic analysis of nearly all the Handbook’s findings may be found in the Shoresh Institution policy paper “An overview of Israel’s education system and its impact” that Ayal and I coauthored.

Professor Dan Ben-David
President and founder
The Shoresh Institution for Socioeconomic Research
Israel needs Shoresh
– and Shoresh needs you

The Shoresh Institution is entirely dependent on support from individuals and organizations who understand how important it is for Israel to have a venerable independent policy research institution with the kind of gravitas that policy-makers from across the political spectrum listen to and cite – an institution that provides all those who care about the future of Israel with evidence-based foundations at the highest professional levels.

To maintain its independence, the Shoresh Institution does not accept funding from any governmental bodies in Israel or abroad. It relies instead on dedicated supporters who make it possible for Shoresh to fulfill its mission of providing professional analyses of Israel’s fundamental underlying socioeconomic challenges in formats accessible to all.

If you believe that the kind of material contained in this handbook provides a unique and important contribution, please support the Shoresh Institution and ensure that we will be able to continue doing this kind of work for years to come.

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**Summary**

**References**

**Shoresh Leadership**

**Shoresh Academic Advisory Council**

**Shoresh Board of Governors**

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Israel’s root (shoresh) underlying socioeconomic problems

Israel faces twin socioeconomic challenges. The productivity that determines its living standards is not only below that of most developed countries, it has been falling further and further behind (in relative terms) the leading countries since the 1970s. The other challenge is the large gap around the average standard of living and the high share of persons under the poverty line. Education has played a key role in both of these outcomes – and it is vital for any future changes in direction to occur. As a result of significant cutbacks in welfare benefits to cope with Israel’s major Intifada-related recession in the early 2000s, Israel underwent a major “natural experiment” that served to highlight the important role of education and skills in determining productivity, poverty and income inequality.
In its first decades, Israel was catching up – since the late 1970s, it’s been falling behind

While greater numbers of workers and machines increase output, it is improvement in the quality of the workers and machines, as well as in the way that they are used, that raises GDP per capita, the common measure for living standards. Total factor productivity reflects these qualitative improvements and is considered the primary engine underlying the economic growth of nations.

In the first years after its birth, Israel’s population increased exponentially, as it absorbed immigrants – many, with just the clothes on their backs. Though there were lean years in which food had to be rationed, with Israel’s very survival being tested in all-out wars, the country found the wherewithal to build towns, roads, universities and hospitals. It spent the meager resources that it had on key ingredients that put it on a path of convergence with the US, and other developed countries.

The 1973 Yom Kippur War was followed by several years of productivity decline and a subsequent change in the national priorities that moved the country to a new path in 1977, one that Israel has been on ever since. It is a path that is causing the country to fall further and further behind the developed world leaders.

 Israel’s root (shoresh) underlying socioeconomic problems

The Shoresh Handbook
The gap between the leading countries and Israel has risen over three-fold since the 70s

While GDP per capita provides an indication of a country's average living standards, not all working-age adults actually work. A more accurate measure of the amount produced per worker in an economy is GDP per employed person. But some work full-time and some work part-time, so an even more precise gauge of a worker's productivity is the amount produced per hour worked – or what is referred to as labor productivity. Hourly wages cannot be high if labor productivity is low.

By the mid-1970s, Israel had managed to reduce the labor productivity gap between itself and the leading developed countries, the G7 (the US, Canada, the UK, Germany, France, Italy and Japan), to $5.40. Since then, the gap has grown over three-fold, with Israel steadily falling further behind in relative terms. This means that the gap between what an average Israeli could earn abroad versus the possibilities in Israel has been exceeding the emigrate/remain thresholds of a growing number of Israelis.

The underlying reason for the increasing gap is that there are two Israels in one. The first is the “Start-up Nation”, led by the research universities, hi-tech, medical and bio-tech foundations, and so on. However, there is another Israel, one that is not receiving either the tools or conditions to work in a modern economy. This part of Israel is huge, and its share in the total is rising – becoming an ever-increasing burden that has been pulling Israel down for decades.
Wages and labor productivity are positively linked

To enable payment of high hourly wages, it is necessary for the amount produced in an hour (labor productivity) to be high. While low wages may sometimes occur despite high productivity, there tends to be a relatively strong positive relationship between productivity and wages. This is true over time and it is true across nations.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Israel’s productivity is below most developed countries

The average Israeli produces $41 in an hour of work. The average American produces a full two-thirds more in an hour. This tends to translate into higher wages and incomes in countries that an increasing number of Israelis are currently obtaining passports to.

While most Israelis prefer to remain at home, the dual citizenship option provides an insurance policy that may yet be activated if the country’s horizon doesn’t begin to show bluer skies ahead.

![Diagram showing labor productivity in 2016 for 35 OECD countries, in current PPP dollars.](image)

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Low capital investments are related to low labor productivity

Though the focus in this Shoresh Handbook is on the socioeconomic impact of education, it is important to state that while investment in human capital is vital for productivity growth, it is not the only important ingredient.

Investment in physical capital is crucial. There exists a strong link between the scale of capital investments and labor productivity. The lower the investment, the lower the productivity tends to be – and in Israel’s case, both are relatively low compared to the developed world.

One area in particular (not shown here, but covered in other Shoresh publications) is the insufficient state of investment in Israel’s transportation infrastructure, which has a considerably detrimental effect on the country’s productivity, poverty and income inequality outcomes.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Israel’s natural experiment: welfare benefits slashed during Israel’s deep recession

In the early 2000s, Israel experienced its most severe recession in decades. To deal with burgeoning budget deficits and sharply rising debts, the government introduced massive cuts to its budget. Among the deepest cuts were to welfare benefits. Income supplements per recipient fell by over 20%, while child benefits per household today are less than half of what they were in 2001.

These massive reductions in welfare assistance turn out to have provided a major “natural experiment.” They were enacted because of a major fiscal crisis rather than as a result of any strategic governmental decision to move the country to new, sustainable, long run socioeconomic trajectories. Hence, while these policy changes had a major effect on employment rates (as shown in the next page) – and, in some cases, birth rates – there was no accompanying effort to upgrade the skill levels of the new workers.

The unique outcomes of this natural experiment highlight just how important education and skills are in determining productivity, wages, employment, poverty, inequality and a host of additional socioeconomic indicators.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s National Insurance Institute
Israel’s natural experiment: welfare cuts force less educated Israelis into the job market

Those most affected by the deep cuts in welfare benefits were the less educated. In the dozen years prior to the welfare reductions, every annual increase of 100 prime working age adults (ages 35-54) with 16 or more years of education was accompanied by an employment increase of 87 such adults (in lieu of data on academic degrees for the country’s earlier years, the 16+ category represents a fairly good substitute). In the years following the depths of the recession, this increased to 95 employed adults per 100 additional adults in the population with 16+ years of education.

Among those with lower levels of education, every increase of 100 prime working age adults prior to the recession was accompanied by an increase of 69 employed persons with similar education levels. After the deep cuts in welfare, there was a major increase in this group’s employment. Specifically, for every 100 additional persons in this lower education level, there was an increase of 270 employed persons per year since 2002.

* For example, 69% means that for every increase of 100 persons in the population with 0-15 years of education there was an increase of 69 employed persons with 0-15 years of education.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics

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1 While 25-54 is generally considered to be the prime working age, Israelis delay full entry into the labor market because of their military service. Hence the focus on 35-54 year olds in this study.
Israel’s natural experiment: welfare cuts unaccompanied by active labor market policies

The sharp increase in employment among the less educated could be considered a welcome outcome of the extraordinarily large cuts in welfare assistance. However, this effectiveness of this outcome – and its impact on worker’s incomes – was considerably diminished by a lack of accompanying programs designed to upgrade the abilities of these new workers.

Active labor market programs in Israel have always been funded at considerably lower levels than developed country averages. In 2000, for example, public expenditure on such programs in Israel (relative to GDP) was under one-half of the average OECD expenditure. By 2013, a decade after the plunge in welfare benefits that induced large swathes of the population to enter the labor force, this expenditure fell to almost a quarter of the OECD average – and half of its previous level in Israel.

If the education that most of these Israelis received in primary and secondary schools was at a higher level than in most OECD countries, then one could possibly make the case that they require less of an investment as adults for successful entry into the labor market. But as shown below, good primary and secondary schooling is not one of the hallmarks of Israel’s education system. As such, one might expect Israel to understand that it not only needs to match the OECD average, it needs to exceed it as compensation for what these adults did not receive as children.

That said, it’s important to note that simply throwing money at an issue such as vocational training can result in a huge waste of public resources, if it is not part of a strategic program containing adequate measurement and assessment tools to help guide and improve it.
Market income inequality places Israel in middle of the developed world

On the one hand, the forced entry of many Israelis into the labor market for the first time, as a result of the massive cuts in welfare benefits, served to further dampen the country’s labor productivity, as many were not provided with the necessary tools and conditions to enter a modern economy.

On the other hand, the entry of these individuals into the labor market caused a major turnaround in market income inequality (that is, prior to the deduction of taxes and addition of welfare benefits to incomes) since 2002. Many individuals who had never worked before began to earn an income – which in turn, reduced the gaps in gross incomes that had existed between them and others who had worked in the past. As a result, income inequality in Israel fell towards the middle of the OECD.

*Income before taxes and transfers.
1 2012; 2 2011; 3 2010

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Disposable income inequality within Israel is second highest in the developed world

Though gaps in gross incomes fell as more individuals entered the labor market, the gap in disposable, or net, incomes (after taxes and welfare payments are taken into account) is roughly where it was a decade and a half ago. While the loss of benefits forced many individuals to begin working, the extensive lack of adequate skills and education led to wages that did not necessarily compensate for the loss of benefits.

As a result, disposable income inequality in Israel remained one of the highest in the developed world – second only to the United States.
Israel has one of the lowest rates of poverty in market incomes in the developed world.

When people who had not worked before, and had no salaries, were forced to enter the labor market as benefits were slashed, they also began to earn salaries. As more Israelis began to earn salaries, the share that remained below the poverty line according to their market incomes fell to one of the lowest levels in the OECD – below even that of Scandinavian countries.

* Income before taxes and transfers. Poverty line 50% of median income.

1 2014; 2 2012

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Israel has the highest rate of poverty in disposable incomes in the developed world

While many Israelis began to receive salaries after entering the labor force for the first time, their insufficient level of skills and education did not enable many to overcome their loss in benefits to an extent that could raise them above the poverty line in disposable incomes. In fact, Israel’s poverty rate in disposable incomes is slightly above its poverty rate in 2001, prior to the cut in benefits.

Consequently, the share of Israelis living under the poverty line is higher than in any other developed country.
The quantity of education and its labor market impact

Israeli society has become one of the most educated on the planet, at least in terms of quantitative indicators. Both the average years of schooling per person and the share of Israelis with academic degrees is one of the highest in the world. As Israel’s economy has grown, so has the demand for educated and skilled workers, alongside a relative decline in the demand for the less educated and poorly skilled. Though there has been a marked decline in the share of less educated Israelis in the population, the fall in demand for them has been even sharper than the fall in supply, leading to lower and lower employment rates over time for the less educated. While awareness of the importance of an academic education has increased, there still exist disproportionate differences in the rate of attainment among various population groups within Israel. Education plays a major role in determining wages – and wage gaps – with substantial differences due not only to the quantity of education, but also its quality.
Israel’s population has become more educated

The past four and a half decades have seen a marked change in the educational composition of Israeli society. In 1970, over half of Israel’s prime working age adults did not have more than eight years of education. Today, such adults account for less than 10% of this population.

At the opposite end of the education spectrum, the group with 16 or more years of education has exhibited the fastest and most steady growth in its relative share of the prime working age population. Today, the group with 16+ years of education has become the largest, representing over a third of the prime working age population.

The years of schooling metric is not relevant for Haredi (ultra-Orthodox Jewish) men. Nearly all of them do not study a core curriculum (and even this is only a partial core) beyond 8th grade. Instead, they study Torah, sometimes for dozens of years – which results in their being listed in the 16+ group, despite not having studied anything approaching an academic education. For this reason, the Haredim are listed separately here.
Education is increasingly vital in determining male employment

As Israel’s economy developed and matured over the past four and a half decades, this growth process has impacted employment among prime-working age Israeli men. The lower the education level, the lower the demand for such workers. While the supply of workers with low levels of education has declined, the demand for such workers has fallen even more precipitously. In general, the lower the level of education, the lower the employment rates.

While the cut in welfare benefits a few years ago led to increases in the employment of the least educated, the overall trend for these groups is downward.

As previously discussed, one population group with exceedingly low levels of education are the Haredi men. While men with a maximum of an 8th grade education could find work in the late 1970s (Haredi employment then exceeded 80%), this has become considerably more difficult today. While other groups with low levels of education are steadily falling in size, the Haredi population is the fastest growing in Israel. Though they are barely more than one twentieth of the adults, they comprise nearly one fifth of all first graders – with all of the attendant economic implications that this has for Israel’s future.

* As of 2012, the Central Bureau of Statistics changed the estimation methodology in labor force surveys.
** Data by school years in 1970-1978 includes Haredim. Since 1979, the Haredim are shown separately.

Source: Dan Ben-David and Oren Tirosh, Shoresh Institution
Data: Israel’s Central Bureau of Statistics
The higher the education level of women, the higher their rates of employment

Employment rates of women are highly correlated with their levels of education. Not only do women with 16 or more years of education have the highest employment rates, these employment rates have risen by 20 percentage points since 1970.

As women have become increasingly more educated in Israel, the impact on female employment has been substantial. While only a third of all prime working age women were employed in 1970 (compared to an average of over 45% in the G7 countries that year), nearly 75% of these women are employed today – just above the G7 average.

*As of 2012, the Central Bureau of Statistics changed the estimation methodology in labor force surveys.

Source: Dan Ben-David and Oren Tirosh, Shoresh Institution
Data: Israel’s Central Bureau of Statistics
Substantial impact of education on employment of men and women, Arabs and Jews

Among prime working age Arab-Israeli women who did not complete more than 11 years of schooling (that is, did not complete high school), only 12% are employed. While the number is higher, around two thirds, for Arab-Israeli men, as well as for non-Haredi Jewish women and men, these pale in comparison to the employment rates of those with academic degrees.

Over 9 in 10 Israeli men (Arab and Jewish) and Jewish women with an academic degree are employed. The employment rate for Arab-Israeli female academics is lower, but at 80%, it provides a sense of what is possible if the share of women with such education levels increased. The low overall employment rates of Arab women are simply an indication of the relatively low levels of education that most of these women possess.

Whether women or men, Arabs or Jews, the choice of a higher education institution and discipline of study have a huge impact on subsequent wages, and on the likelihood that future employment will be in a desired occupation. But even without taking these factors into account, individuals with academic degrees can at least find a job, which is more than can be said for many of those with lower levels of education.

Source: Dan Ben-David and Oren Tirosh, Shoresh Institution
Data: Israel’s Central Bureau of Statistics
Large and rising wage gaps between the more and less educated

The economic growth process is one of structural change, as new and more advanced industries and technologies replace older and outdated ones. This evolution entails a steadily increasing demand for educated and skilled workers, alongside a falling relative demand for less educated and unskilled workers.

As such, gaps in educational attainment have become the primary source of wage inequality in Israel. The rising demand for better educated and more skilled workers has outpaced the large increases in the supply of such workers. The result has been further increases in the already large wage gaps between those with 13+ years of schooling and those with 0-12 years of schooling.

A decade ago, workers with 13+ years of schooling earned just over 50% more than those with less education. Today, they earn nearly double.

Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Israel’s Central Bureau of Statistics
The higher the education level, the higher the wages

Occupational choices, areas of study, experience and other factors play a role – sometimes a major one – in determining wages. Underlying all of these are the educational foundations that a person possesses.

As a general rule, wages tend to rise with the level of education. Individuals with little or no education earn barely more than the minimum wage. Completion of high school leads to a major wage increase. Attainment of an academic education provides another major step up on the wage ladder.

* high school matriculation

Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Israel’s Central Bureau of Statistics
Quality of higher education and academic field of study have major effect on wages

The choice of what to study in higher education, and where, plays a critical role in subsequent earnings. According to the Ministry of Economy and Industry, there is only one person available for every three open positions in the field of computers. With such excess demand, it is no wonder that graduates with degrees in computer science make so much more than graduates in other fields with lower – or no – excess demand.

The quality of academic studies also has a major impact on wages, since not all academic institutions were created equal. The highest quality of academic studies is provided in Israel’s research universities. This fact is recognized by the business sector and rewarded accordingly.

Accounting students at universities receive offers for internships following graduation while still in their first year of studies. Many students in non-research colleges have difficulty finding internships even after graduation. Evidence of the large discrepancy between law students in the various institutions is provided in another section below, dealing with issues of quality versus quantity of education. Bental and Peled (2016) find that the quantity of graduates with science and technology degrees actually equals the demand for these in Israel. The fact that the business sector does not consider many such graduates as relevant candidates for open positions is indicative of the relatively low quality of education provided by a large number of Israel’s academic institutions.

Source: Dan Ben-David, Ayal Kimhi and Moty Citrin, Shoresh Institution
Data: Israel’s Central Bureau of Statistics
Occupational choice has major effect on wages

What one studies and the quality of those studies determines the kind of job opportunities available in the job market. Managerial positions, as well as those requiring academic degrees and relatively high skill levels, pay more than other occupations. While Arab-Israelis hold 22% of the lower paying jobs, they hold just 5% of the higher paying positions.

**Average Hourly Wages by Occupation, 2015**

Full-time employees, ages 35-54

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Average Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unskilled workers</td>
<td>30</td>
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<tr>
<td>Agents, sales and services workers</td>
<td>38</td>
</tr>
<tr>
<td>Skilled workers in agriculture, forestry and fishing</td>
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</tr>
<tr>
<td>Machine operators and drivers</td>
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<tr>
<td>Manufacturing, construction and other skilled workers</td>
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<tr>
<td>Clerical workers</td>
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<td>Managers</td>
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<tr>
<td>Technicians and associate professionals</td>
<td>95</td>
</tr>
<tr>
<td>Academic professionals</td>
<td>63</td>
</tr>
</tbody>
</table>

Source: Dan Ben-David and Ayal Kimhi, Shoresh Institution for Socioeconomic Research
Data: Israel's Central Bureau of Statistics
Education’s impact on wages of women and men, Arabs and Jews is extensive

As shown above, the higher the level of education, the higher the wages. This holds regardless of gender or religion, applying to females and males, Arab-Israelis, Haredi Jews and non-Haredi Jews.

That said, the education boost for wages differs between groups since education quality and occupational choice matter greatly. Part of the reason that non-academic Arab-Israelis have such low wages is that 33% of all non-academic Arab-Israeli females and 46% of all non-academic Arab-Israeli males have no more than a primary school education. This compares with single digits for both groups of non-academic Jewish Israelis.

Among the academically educated women, over 80% of Arab and Haredi women have no more than a BA (and a majority of these are teachers with degrees from teaching colleges), compared to 54% among non-Haredi Jewish women. Very few of the Haredi men with academic degrees received them from research universities. As shown on the previous page, occupational choices play a major role in the wages received by Arab-Israeli women and men.

### Hourly Wages by Education, Gender and Sector

Full-time employees ages 35-54, by highest attained level of education

<table>
<thead>
<tr>
<th></th>
<th>Arab Israelis</th>
<th>Haredi Jews</th>
<th>non-Haredi Jews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-academic</td>
<td>27</td>
<td>40</td>
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</tr>
<tr>
<td>academic</td>
<td>62</td>
<td>58</td>
<td>81</td>
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<td>Males</td>
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<td></td>
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<tr>
<td>non-academic</td>
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</tr>
<tr>
<td>academic</td>
<td>62</td>
<td>83</td>
<td>109</td>
</tr>
</tbody>
</table>

Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Israel’s Central Bureau of Statistics
Wage increases of the more educated match productivity increases while wages of the less educated are stagnant

During Israel’s major recession after the turn of the millennium, wages fell for both of the education groups, those with 13+ and those with 0-12 years of education. Following the recession, the paths of the two groups diverged. Demand for the better educated group rose and their wages almost completely caught up with the cumulative increase in Israel’s overall labor productivity.

The situation among the less educated was quite different. Although the growth process steadily reduces demand for these workers, the significant cuts in welfare benefits (noted above) drove many of the less educated into the labor market for the first time, driving up supply. Between 2006 and 2011, the resultant excess supply drove down wages of those with 0-12 years of schooling by more than 10%. Since 2011, the wages of the less educated have recovered, almost returning to their levels in 1999.
The importance of emphasizing education quality

While the quantitative measures of education (such as years of schooling, population shares with academic degrees) are easier to measure and receive considerably more public attention, it is the quality of education that matters most with regard to personal wages and national income. Israel is one of the world’s most vivid cases in point on this issue. While the country has a seemingly educated population according to the standard quantitative measures, the qualitative level of its primary and secondary education is at the developed world trough – with all of the ramifications that this has on the country’s future ability to initiate a turnaround in its productivity, poverty and income inequality.
Israeli society is ostensibly one of the most educated in the world

The average prime working age Israeli has 13.4 years of schooling. Only the populations of the United States and Switzerland are more educated.

So how does this square with Israel’s very low productivity levels – that have been falling further and further behind (in relative terms) the leading developed countries?

As will be shown below, a year of schooling in one country is not necessarily equivalent to a year of schooling in another country. The primary issue is not one of quantity, but one of quality.

![Average Years of Schooling Per Person](chart.png)

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Barro and Lee (2016)
The share of Israelis with academic degrees is one of the highest in the world

Almost one in three prime working age Israelis have an academic degree. Only three countries in the world exceed this share.

But this national achievement has not yielded average national incomes at the levels of countries ranked far below Israel in educational attainment.

Not all segments of Israel’s population reach academia at such rates – and not all degrees are created equal. Reaching a higher education institution is important, reaching the best ones even more so. More on all of this below.
Large gaps between population groups in attainment of academic degrees

The most educated group in Israel are the secular Jews. Roughly half of the prime working age men and almost 60% of the prime working age women have an academic degree.

The fact that there are thousands more Haredim registering for an academic education than in the past has led to a prevailing sentiment that this matter is well on the way to being resolved. However, in light of the rapid increase in the overall Haredi population, the issue is not whether there has been an increase in absolute numbers. More relevant is whether the population share has increased – not in terms of how many register, but in terms of how many actually graduate.

There are no shortcuts in life to academic degrees. When individuals do not study any core subjects beyond 8th grade, it should not come as a surprise that they have substantial difficulties at the academic levels. Consequently, in contrast to conventional wisdom, the share of Haredim who actually graduated with an academic degree is very low, and steady – and it has not been significantly different between Haredi women and men.

Given the small sample size, there is considerable volatility in the outcomes – though these have been relatively stable over the past decade. That said, the 2015 results for the Haredim may, or may not, signal a possible change for the future.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics
Significant increases in the academic attainment of Arabic speakers in Israel

While the share of Arabic speakers in Israel with academic degrees was below that of the Haredim in the middle of the past decade, it has been rising steadily and approaching Haredi levels.

Within Israel’s Arabic-speaking population, there are considerable differences between the various religious groups – and within them, between women and men. Muslims make up roughly 80% of the Arab speaking population. While their men have the lowest academic attainment rate among all men, this rate has nonetheless increased by four-fifths, from 10% to 14%. Muslim women exhibited the largest relative increase by far, from 4.6% to 13.5%.

The Druze, like the Muslims, differ from Israel’s other population groups in that their women have lower rates of academic attainment than do their men.

The Christian Arabs’ school system is much better, enabling them to attain considerably higher academic graduation rates than both of the other groups. The share of Christian Arab woman with academic degrees doubled over the past decade. As a result, these women have overtaken the Christian Arab men, who also experienced a marked increase in their academic attainment.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics
Not all academic institutions are created equal – students beware

In Israel, as in other countries, the prevailing wisdom is that college degrees open the door to the labor market. What too few in Israel realize is that what one studies, and where, matters. While getting any academic degree makes it possible to at least find a job, the level of studies greatly influences the graduate’s actual knowledge level – and this is what ultimately determines an individual’s success in the labor market.

It is not easy to distinguish between academic levels within fields across the many institutions of higher learning. Rare are the measurement tools that allow comparison.

One discipline in which such comparisons are possible is Law. Only 33% of those taking the national bar exam passed it in December 2017, a seemingly low percentage. But a large majority of the Hebrew University and Tel-Aviv University students passed the exam, as did most of the students in a number of other institutions.

However, the majority of Israeli students studied law in institutions that were very far under the bar – both figuratively and literally. This reflects both the low level of primary and secondary education that many of these students received, as well as the low level in which they were taught in college. It is insufficient to simply check off the higher education slot on the resume and assume that equal opportunities will ensue. They don’t.

The importance of emphasizing education quality

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University

Data: Israel Bar Association
The timing of education matters – beginning young is vital

In his seminal studies on the link between education at an early age and subsequent returns to education, James Heckman highlights how essential it is to reach children as early as possible. Pre-school education usually enters the public discourse within the context of having frameworks that enable parents to work. But the importance of education at these ages for the future of the child cannot be overstated.

The younger the age that individuals receives a better education, the larger the subsequent funnel into the higher quality education and higher earnings in later stages of life. In short, there are no shortcuts. The better a country’s primary education, the more pupils will be able to study at enhanced secondary levels. This, in turn, determines the size of the student cohorts that can then study at the highest academic levels. More important than having numerous academic degree holders, is having a larger share of individuals who actually know more, can produce more – and hence, will earn more. This is the key to increasing productivity and reducing poverty.

This message pertains to all sectors of Israeli society, though to the Haredim, in particular. While there may be a few particularly gifted Haredim (as in other population groups) able to avoid studying core material beyond 8\textsuperscript{th} grade and then complete college when in their 20s or 30s, with young children of their own, the Heckman findings show that these are the exceptions, rather than the rule. Very few Haredim will be able to attain quality academic degrees that open up the complete vista of labor market opportunities they could otherwise have. This will have huge ramifications for Haredim at the personal level – and for all of Israel, given the large size and growing share of this population group.

* Returns to a unit dollar invested at different ages from the perspective of the beginning of life, assuming one dollar initially invested at each age.

Source: James Heckman (2008)
Weak relationship between economic growth and *years of schooling*

The positive link between education and economic growth is strong, but not always understood. After controlling for a host of additional key determinants of economic growth, the number of years of schooling is found to have only a weak positive relationship with economic growth.

* Relationship between both variables after controlling for the impact of other influencing variables (such as average years of schooling and initial level of real per capita GDP in 1960) on each. This yields an association between the two variables that is not driven by the control variables. The regression residuals are added to the unconditional means of the variables on each axis.

Strong relationship between economic growth and *quality* of schooling

What matters most for economic growth is not the quantity of education but the quality of education. There is a strong relationship between economic growth and the quality of schooling in a country – much more so than with the number of years of schooling – even after controlling for other variables that affect economic growth.

![Graph showing the relationship between test scores and economic growth](image)

* Relationship between both variables after controlling for the impact of other influencing variables (such as average years of schooling and initial level of real per capita GDP in 1960) on each. This yields an association between the two variables that is not driven by the control variables. The regression residuals are added to the unconditional means of the variables on each axis.

Completing 12 years of schooling is insufficient for graduating from high school in Israel. Graduation requires successfully passing matriculation examinations (bagrut, in Hebrew) in a host of subjects.

Israel’s education system has required generations of 12th graders to take these matriculation exams – but it has never determined exam levels that are comparable over time. Thus, it is impossible to learn from the matriculation exams if the Israeli high schoolers’ level of knowledge in required subjects is improving or deteriorating over time. The only way to attain any useful benchmarks is via international exams and the domestic Meitsav exams – though both provide incomplete information.

One major reason for the incomplete information – though not the only reason – is that these exams do not cover all of Israel’s pupils and, therefore, are only partially representative. For example, Haredi boys – most of whom do not study the required material – do not take the exams.

The magnitude of the distortion in Israeli test scores can be intuited by the degree of disregard that the country has for international norms on exam coverage. In the TIMSS math and science exams, countries are allowed to exclude up to 5% of their pupils (such as special education pupils, or those living in far-flung rural areas). Nearly all participating countries abide by the rules. The huge outlier is Israel, excluding nearly a quarter of its children. Therefore, in the international comparisons that follow, there is a need to be aware of the misrepresentative Israeli samples that apparently provide better outcomes than would have been achieved otherwise, had a truly representative sample of children been tested.
Achievements in core subjects seemingly declining over the decades

In the early years, Israel’s math and science scores tended to be better than those of today. However, the earlier samplings of Israeli children were even less representative than current ones. Not only were Haredi children excluded then – as today – but Arab-Israeli children were not included in the international exams prior to the late 1990s. Consequently, the 1963 exam apparently suffered from an even stronger selection bias than all subsequent exams.

The unfortunate bottom line is that other than anecdotal evidence, there is no objective measure available for determining what actually happened to the quality of Israeli education over the long term.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: IEA, TIMSS and PISA
Relative improvement in scores compared to international means since the late 1990s ...

Since the 1999 TIMSS exams, Arab-Israeli pupils have been included in the national samples – though there still exists a major bias at the national level due to the exclusion of the large, and growing, share of Haredi pupils.

The two primary international exams administered since 1999 have been the TIMSS and PISA exams. Though Israel’s TIMSS results tend to be consistently higher than the country’s PISA results, both appear to indicate improvements over time.

While this is clearly a better outcome than the alternative, these two exams are not calibrated over time. Hence, all changes are relative to the overall means of 500 each year. There is no way of ascertaining from these results if there has been an absolute improvement in Israeli achievement over the past two decades – especially since the number of countries has grown from exam to exam, thereby affecting the value of the mean score (500) that all countries are compared to.
... and yet, still doing very poorly compared to the developed world

While Israel’s scores on the international exams have improved over the past two decades, they are still below those of 24 of 25 relevant developed countries. Since the Israeli sample does not include Haredi boys, who do not study the material, the actual national average – had it been measured – would likely be much lower.

In some respects, this comparison provides a glimpse of the future, as these children from the various countries will one day have to compete with one another in the global marketplace – and this is how their nations are preparing them for that future. Small countries like Israel, who do not have economies of scale for producing all of their domestic needs, are even more reliant than the large countries on international trade – making these outcomes especially problematic.

Even without the Haredi boys, the average score of the remaining Jewish children are below most of the developed countries. The education that Israel provides to its Arabic-speaking children is below that in many Third World countries. In fact, Arab-Israeli pupils attained a lower score than the average scores in most of the predominantly Muslim countries also participating in the exam.

* National average in math, science and reading exams. Israeli examinees did not include Haredi boys.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University

Data: PISA and Israel’s National Authority for Educational Measurement and Evaluation
Actual improvement in 8th grade scores over past decade ...

In 2008, sixty years after attaining independence, Israel finally began administering a domestic exam that is calibrated over time. The benchmark for all years that followed is the 2008 mean score of 500. The exam is given to both 5th and 8th graders in a number of core subjects – including the native language of the Arabic or Hebrew speakers.

In all areas and at both grade levels, the recent results are higher than those a decade ago. Once again, there is a need to keep in mind that a large, and growing, share of the pupils – Haredi boys – are not studying the material and are not being tested. So, this apparent improvement at the national level needs to be taken with a grain of salt.

While there has been an improvement among the remaining children, these results do not provide any indication of how well the pupils actually know the material that they are supposed to.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: National Authority for Educational Measurement and Evaluation (RAMA)
... and yet, a very large share of the children still don’t know the core material

In addition to publishing the scores indexed to the 2008 base year of 500, the Meitsav exams also publish the actual scores of the pupils in each exam.

The highest scores were in the English exams. On average, the 5th and 8th grade pupils answered correctly on roughly two-thirds of the questions. The percent of correct responses is even lower in math: 61% in 5th grade and 56% in 8th grade math. In the case of the science and technology exam – which for some reason was administered to 5th graders in the past, but dropped in recent years – the 8th grade pupils managed to answer correctly on only half the questions. In short, if these were regular exams, grades in the 60s are barely passing, while 56 and 50 are failing grades.

Aside from a nation of children with seemingly insufficient knowledge to answer questions on core subjects, it is unclear that pupils are even being questioned on what they should know at their respective grade levels.

Israel has never determined a specific core curriculum that all pupils at each grade level need to know. Therefore, these Meitsav exams do not really test how well pupils are familiar with the material required of them, since this has never been formally specified.

* Not including Haredi boys.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: National Authority for Educational Measurement and Evaluation (RAMA)
Educational inequality within Israel is the highest in the developed world

While the average national achievements of Israeli children in core subjects are low from both an absolute perspective, as well as a comparative international perspective, educational gaps among Israeli children are the highest in the developed world – and have consistently been at the developed world peak for decades.

Such inequality during the formative years cannot be conducive to reducing income inequality in subsequent adulthood.

*Educational inequality in developed world, PISA 2015

Average gaps in achievement levels in 25 OECD countries and in Israel.*

* National average standard deviation in math, science and reading exams. Israel is the base (100). Israeli examinees did not include Haredi boys.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University

Data: PISA
A comparison of the scores attained by Israel’s weakest pupils – those at the bottom 5 percent of the distribution – with the scores of the weakest pupils in the developed world does not bode well for the future.

The weakest Israeli pupils score below the weakest pupils in each of the other developed countries. The future ability of these children to attain the skills needed to successfully contend with a global, competitive economy is severely handicapped by the poor level of education that they are receiving today.

This handicap apparently extends far beyond an insufficient knowledge of basic math, science and reading, as indicated in the next figure.

* National average in math, science and reading exams. Israeli examinees did not include Haredi boys.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University

Data: PISA and Israel’s National Authority for Educational Measurement and Evaluation
More than twice as many Israeli pupils as in the G7 do not have the ability to plan ahead

Roughly two out of every five Israeli pupils are below the minimum level deemed sufficient by the OECD for planning ahead or setting subgoals. This is over twice the shares found in each of the G7 countries.

As shown on the next page, there exists a strong relationship between the share of pupils unable to plan ahead and the share of pupils lacking necessary core educational skills. This mix as adults can become combustible.

Frustration mounts for those with an increasing inability to secure jobs in rapidly changing economies. An accompanying inability to distinguish between the actual source of the problem and perceived sources can lead to democratic choices that are not conducive to dealing with the original problem – while potentially exacerbating the situation by creating new, and possibly greater problems.

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent at or beneath lowest level in PISA 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>7%</td>
</tr>
<tr>
<td>Canada</td>
<td>15%</td>
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<tr>
<td>England</td>
<td>16%</td>
</tr>
<tr>
<td>Italy</td>
<td>16%</td>
</tr>
<tr>
<td>France</td>
<td>16%</td>
</tr>
<tr>
<td>United States</td>
<td>18%</td>
</tr>
<tr>
<td>Germany</td>
<td>19%</td>
</tr>
<tr>
<td>Israel</td>
<td>39%</td>
</tr>
</tbody>
</table>

* The lowest problem solving level measured by the OECD is level 1, which defined as follows: “Level 1 students tend not to be able to plan ahead or set subgoals.”

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: PISA
Democratic threat: strong positive link between share of population not knowing material and share of population not understanding consequences of political decisions

Attainment of level 2 in the core subjects (math, science and reading) is considered by the OECD to reflect the minimum skill level needed for contending in a modern economy. Pupils below this level will face major economic hurdles as adults that they may be unable to overcome.

Similarly, level 2 in creative problem solving reflects a minimum in this realm. Specifically, the OECD defines the lowest level measured as follows: “Level 1 students tend not to be able to plan ahead or set subgoals.”

There exists a very strong positive relationship between the percentage of students not reaching the minimum knowledge level required in a modern economy and the percentage of students not possessing the minimum ability to understand the consequences of their current actions on subsequent outcomes.

Imagine the political impact that this can have in democracies in which individuals lose jobs because of inadequate skills and education to keep up with technological advancements – and yet have the ability to vote without fully comprehending the actual source of their problems, nor the viability of populistic solutions that some politicians offer.

The above is not intended in any way to minimize the importance of democratic institutions, but rather to highlight the need for democracies to provide the best education possible, to as many persons as possible, in order to improve their decision-making process as much as possible.
Israel’s top pupils are in bottom third of developed world

Israel still has fine universities and a cutting edge hi-tech sector. The country’s top pupils today are among the prime candidates to receive the leadership baton in these realms tomorrow.

However, the knowledge level in core subjects exhibited by the top five percent of Israel’s pupils is not encouraging. Their average score places Israelis in the bottom third of the developed world’s leading pupils.

**Comparison of Top Pupils in Developed World**

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Achievement Scores in Top 5 Percentiles</th>
<th>OECD Countries</th>
<th>Israel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>670</td>
<td>670</td>
<td></td>
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<tr>
<td>Japan</td>
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<tr>
<td>Canada</td>
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<td>New Zealand</td>
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<td><strong>Israel</strong></td>
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<tr>
<td>Slovak Republic</td>
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<td>620</td>
<td></td>
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</tbody>
</table>

* National average in math, science and reading exams. Israeli examinees did not include Haredi boys.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: PISA and Israel’s National Authority for Educational Measurement and Evaluation
On the mechanics of Israel’s education system

The poor level of education in Israel is often blamed on an insufficient supply of resources. However, the actual problem has less to do with the quantity of resources and more to do with their quality, and how they are utilized. A comprehensive reform of the education system is vital. Its implementation will undoubtedly require considerably more resources than currently available. However, there is a need to distinguish between the requirements of a transition from one era to the next, and the steady state requirements of a new and improved education system – which doesn’t necessarily imply a substantial increase from the total resources spent today.
Crowded classes – but more than enough teachers

The prevailing wisdom – though not always corroborated by evidence – is that crowded classrooms have very negative effects on the quality of learning. While reducing class size from 25 to 18 may not always produce significantly better outcomes, it is likely that a reduction from 40 children in a class (the maximum allowable in Israel) to 20 could substantially improve the learning environment.

While a very large number of classes in Israeli schools reach the 40 pupil limit, the variance is high and there are many other schools with small classes. The average Israeli class is nonetheless considerably more crowded than the OECD average. The question is why this is so.

The number of teachers already on Israel’s payroll is sufficient for substantially reducing class size. In fact, the number of pupils per full-time equivalent teacher in Israel’s primary schools is nearly identical to the OECD average, while the number of pupils per teacher in the country’s secondary schools is even lower than the OECD average.

In short, there is no lack of teachers in Israel. The problem of overcrowded classrooms is related to how Israel’s teachers are utilized.

* According to full-time equivalents.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Israelis children have more school days – by far – than in all other developed countries

The number of school days in Israel cannot explain the poor level of knowledge in core subjects. There are many more days of instruction in the Israeli school year than provided by any other developed country. In contrast with the common five-day school week elsewhere, the Israeli school week lasts six days, from Sunday through Friday.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Most developed countries provide fewer instruction hours in core subjects – but attain better results than Israel

Not only does Israel provide its children with more days of instruction, it also provides more instruction hours in core subjects over the course of the school year than do most other developed countries.

And yet, most of the other countries that finance less hours of instruction still manage to obtain higher scores in the core subjects.

The key issue is not how many school days or the number of schooling hours the country provides. The primary problems emanate from what actually occurs during the instruction time: what is being taught; the level of teaching; and the kind of discipline that is being enforced.

### OECD Average Relative to Israel in Core Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Less than Israel</th>
<th>More than Israel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading, writing and literature</td>
<td>-21%</td>
<td>3%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>-28%</td>
<td>4%</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>-29%</td>
<td>6%</td>
</tr>
</tbody>
</table>

* Cumulative number of compulsory instruction hours in primary and lower secondary schools, and average achievement levels in math, science and reading in PISA 2015.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University

Data: OECD
Israeli teachers work many less hours than the OECD average

Primary school teachers in Israel work almost a quarter less hours per year than the OECD average. Israeli high school teachers work roughly half the average number of hours in the OECD.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Teachers’ monthly salaries are low – but hourly salaries are higher than OECD average

A common complaint is that teachers’ salaries are so low in Israel that it is difficult to attract good teachers. Public pressure to increase teacher salaries led to new comprehensive wage bargaining agreements in recent years that caused a spike in education spending.

Even after the new wage agreements, monthly salaries of Israeli teachers are still below the average OECD salaries. However, teachers in Israel work considerably less hours. Thus, a more accurate comparison of wages than amounts paid per month are amounts paid per hour worked.

Israeli primary school teachers earn 9% more per hour than the OECD average, while high school teachers earn a third more. But this does not really capture the full extent of the discrepancy in favor of Israeli teachers.

Since the amount of GDP produced per hour of work in Israel is low, hourly wages in general are also lower in Israel. When teachers’ hourly wages are normalized across countries to account for the variance in GDP per hour, the gap between Israeli teachers’ wage and the OECD average rises considerably.

The normalized salaries of primary school teachers in Israel are 44% higher than the OECD average. In lower secondary schools, this gap rises to 62%, while in upper secondary schools, it is a full three-quarters greater in Israel.

* Annual average salaries (including bonuses and allowances) of 25-64 year old teachers in public institutions using purchasing power parities.
** Salaries per statutory hour worked.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Education students are at the lower end of acceptance scores to higher education

Over three-quarters of Israel’s future teachers study in teaching colleges. The entrance requirements at these colleges are so low that their average psychometric scores (similar to the American SATs) are below 61% of all persons taking the exam. An additional 15% of first-year education students study in general non-research colleges. Their average psychometric score is below three-quarters of all those taking the exam. All told, nearly all of Israel’s future teachers (94%) have an average psychometric score below most Israelis. If the majority of teachers are not at a level that could enable them to get accepted to the better academic institutions, how can they be expected to raise their pupils to these levels?

An alternative approach to the current one would be to require all teachers to obtain an academic degree in a specific discipline, and obtain a teaching certificate only afterwards. This will increase teachers’ job market alternatives and lead to better pay – while also making it possible for teacher work hours to be competitive with the rest of the labor market.

* The average psychometric score of all 1st year students in the general colleges was 529 (above 48% of all examinees in Israel).

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics
National education expenditure in Israel is lower today than in most previous years

After peaking in the late 1970s, Israel’s national education expenditure (as a share of GDP) fell to the 8.0%-8.5% range from the mid-1980s until the early 2000s. The decline that followed ended only after implementation of comprehensive wage bargaining agreements in recent years, which raised teachers’ wages considerably.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel's Central Bureau of Statistics
National education expenditure in Israel is among the highest in developed world...

Israel’s national education expenditure – comprised of public and private expenditures – is one of the highest in the developed world (when normalized by GDP). The country’s public expenditure on education is also one of the highest among developed countries.

These relatively high levels of expenditure are not necessarily indicative of waste. One important factor that needs to be taken into account is the number of children that the education system is intended to service.

* National expenditure in 2012.
** Public expenditure in 2012.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
... share of children in Israel’s population near the top of developed world

While Israel’s national and public education expenditures are high, the share of children in the country’s population is one of the highest in the OECD, as well.

Therefore, a more relevant measure of education expenditures is the amount spent per pupil – though, as will be explained below, this is also not free of bias.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
National expenditures in secondary, primary and pre-primary education rose steeply in recent years

In the three decades that elapsed between 1979 and 2009, national expenditures per pupil in secondary education (after netting out inflation) rose by 10%. In primary education, national expenditures per pupil rose by 47% during this period.

Comprehensive wage bargaining agreements in recent years led to considerable hikes in teachers’ salaries – and to accompanying spikes in primary and secondary education expenditures. By the 2013/14 school year, education expenditures per pupil were 57% higher in the primary schools and 62% higher in the secondary schools than in the 2009/10 school year.

Spending in Israel’s pre-primary school actually exhibited a 9% decline between 1998 and 2012. However, one of the results of the massive social protests in Israel during the summer of 2011 was a major increase in funding for pre-schools. Pre-school expenditures per pupil in the 2013/14 school year exceeded the 2012/13 expenditures by 69%.

Since no comprehensive education reform was implemented that could have accompanied the increased spending, it should come as no surprise that these additional education expenditures did not result in the provision of a better education.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics
Public expenditure on primary education places Israel in middle of OECD

While education expenditures per pupil provide a more accurate gauge for comparison across countries, there is a need to account for the fact that most education expenditures are to pay salaries. There exist major differences in living standards across countries – and these, in turn, affect salaries.

Therefore, a comparison of education expenditures per pupil across countries requires that these be normalized by GDP per capita (which is used to reflect average living standards in a country). Mathematically, this is identical to normalizing the share of education expenditures in GDP by the share of pupils in the population.

When this normalization is performed, Israel’s public expenditure per pupil on primary education is near the center of the OECD ranking. It is not excessively high, nor is it particularly low.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
While public expenditure per pupil (relative to GDP per capita) in primary schools is near the OECD median, it is relatively low in secondary schools.
Public expenditure on public secondary education at bottom of OECD

Most public expenditures in secondary schools go to public schools, while some are directed to private schools.

Israel’s public expenditure per pupil (relative to GDP per capita) on public secondary schools is the lowest in the OECD.

PUBLIC EXPENDITURE PER PUPIL IN PUBLIC SECONDARY SCHOOLS
RELATIVE TO GDP PER CAPITA, 2013

* when public funding accounts for at least 50% of a school’s income, that institution is considered a public school.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Public expenditure on *private* secondary education at top of OECD

Though Israel’s public expenditure per pupil (relative to GDP per capita) on public secondary schools is the lowest in the OECD, the public expenditure per pupil on private secondary schools in Israel is the highest in the OECD – and four times the amount per pupil in public secondary schools.

In lieu of transparency in Israel’s budgets, it is hard to discern where exactly this money is being directed, or how it is being spent. According to Israel’s Central Bureau of Statistics, a private school is considered a school receiving less than half its income from public funds. A major share of Israeli schools considered private under this definition are Haredi schools.

<table>
<thead>
<tr>
<th>Country</th>
<th>Public Expenditure per Pupil in Private Secondary Schools Relative to GDP per Capita, 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>41.5%</td>
</tr>
<tr>
<td>Denmark</td>
<td>29.2%</td>
</tr>
<tr>
<td>Norway</td>
<td>28.7%</td>
</tr>
<tr>
<td>Belgium</td>
<td>27.0%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>23.4%</td>
</tr>
<tr>
<td>Finland</td>
<td>23.0%</td>
</tr>
<tr>
<td>Sweden</td>
<td>22.6%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>22.1%</td>
</tr>
<tr>
<td>Poland</td>
<td>20.6%</td>
</tr>
<tr>
<td>Hungary</td>
<td>20.6%</td>
</tr>
<tr>
<td>Korea</td>
<td>20.2%</td>
</tr>
<tr>
<td>Austria</td>
<td>19.1%</td>
</tr>
<tr>
<td>France</td>
<td>16.6%</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>16.2%</td>
</tr>
<tr>
<td>Estonia</td>
<td>15.9%</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>15.2%</td>
</tr>
<tr>
<td>Iceland</td>
<td>14.5%</td>
</tr>
<tr>
<td>Latvia</td>
<td>14.4%</td>
</tr>
<tr>
<td>Australia</td>
<td>13.0%</td>
</tr>
<tr>
<td>Spain</td>
<td>12.7%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>12.4%</td>
</tr>
<tr>
<td>Chile</td>
<td>11.9%</td>
</tr>
<tr>
<td>Italy</td>
<td>10.0%</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>9.5%</td>
</tr>
<tr>
<td>Portugal</td>
<td>8.9%</td>
</tr>
<tr>
<td>Canada</td>
<td>3.2%</td>
</tr>
<tr>
<td>United States</td>
<td>2.5%</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

* when public funding accounts for under 50% of a school’s income, that institution is considered a private school. Haredi (ultra-Orthodox) education, which is dependent primarily on donations, accounts for a large part of the private schools.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
The higher the mothers’ education, the higher the pupils’ scores

Children’s scholastic achievements are highly correlated with their parents’ education. Particularly important in this regard is the mother’s level of education. While this link exists across the entire developed world, it is particularly strong in Israel.

More educated parents are better able to assist their children directly, and since they also tend to have higher incomes, they can live in areas with better schools and purchase tutoring assistance when needed.

Thus, education can be considered a market failure in economic terms – with major policy implications. If a country wants to create a more equal opportunity labor market, and improve the subsequent socioeconomic mobility later in life, then it needs to begin with schools that help pupils overcome what the parents of many are unable to provide.

Part of Israel’s education budget does indeed provide more resources to schools whose parents are relatively poorly educated. But the magnitude of this portion of a school’s budget is small compared to mitigating factors that operate in the other direction – from teachers with higher academic degrees receiving higher salaries while working in some of the better school districts, to parents who can chip in more private money in these areas, as well.
Share of Israeli mothers with academic degrees is high

On the face of it, the share of highly educated Israeli mothers is very high compared to other countries, so Israeli children should be doing well. But this brings back the question of quality versus quantity – and it is far from obvious that Israeli mothers are really better off in terms of the quality of education that they received.

![Diagram illustrating mother's education levels in Israel, all countries, and 10 leading countries.](image)

*Ten leading countries: Canada, Estonia, Finland, Hong Kong, Japan, Korea, Netherlands, Singapore, Switzerland, Taiwan

Source: Noam Gruber (Shoresh Institution research paper, 2017)

Data: PISA 2012
Subjective poll shows that a greater share of Israeli pupils believe they’re disciplined

A recent Shoresh study by Noam Gruber highlights the role that discipline plays in educational achievement. Using factor analysis to examine the impact of discipline on achievements in PISA, Gruber distinguishes between subjective and objective levels of discipline. He finds a huge gap between how Israelis perceive themselves and how they actually behave.

One indicator of subjective discipline measured by the OECD is the degree to which pupils believe that they and their peers pay attention to their teachers. In a comparison with all countries participating in the PISA exam, as well as a comparison with the ten countries with the highest scores, Israeli pupils respond that they have a much greater tendency to listen to their teachers than do children abroad.

In several other subjective measures of discipline, the responses of Israeli children would appear to indicate that they are among the most disciplined in the developed world.

*Ten leading countries: Canada, Estonia, Finland, Hong Kong, Japan, Korea, Netherlands, Singapore, Switzerland, Taiwan

Source: Noam Gruber (Shoresh Institution research paper, 2017)
Data: PISA 2012
Objective indications show that a greater share of Israeli pupils are undisciplined

Gruber also examines a number of additional variables that provide a more objective sense of discipline in Israeli classrooms. One such variable is the extent of unauthorized tardiness by Israeli pupils. The share of such Israeli pupils arriving late without permission at least three times during the two-week period prior to the PISA exam was double the all-country average and over two and a half times the average of the 10 leading countries.

In general, Gruber finds that in contrast to what they believe, Israeli pupils are very undisciplined. He concludes that the confluence of unruliness and crowded classrooms is a major contributor to the poor achievements of Israeli pupils in core subjects.

### DISTRIBUTION OF UNAPPROVED TARDY ARRIVALS TO CLASS IN TWO WEEKS PRIOR TO EXAM

<table>
<thead>
<tr>
<th></th>
<th>3 tardies or more</th>
<th>1-2 tardies</th>
<th>no tardies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>18.7%</td>
<td>35.7%</td>
<td>45.7%</td>
</tr>
<tr>
<td>All countries</td>
<td>9.7%</td>
<td>24.2%</td>
<td>66.0%</td>
</tr>
<tr>
<td>10 leading countries*</td>
<td>7.3%</td>
<td>20.0%</td>
<td>72.7%</td>
</tr>
</tbody>
</table>

* Ten leading countries: Canada, Estonia, Finland, Hong Kong, Japan, Korea, Netherlands, Singapore, Switzerland, Taiwan

Source: Noam Gruber (Shoresh Institution research paper, 2017)
Data: PISA 2012
Needed: comprehensive, systemic, education reform

In what follows, two examples are provided about the economic gains from a substantial improvement in the education system. The first example focuses just on the weakest pupils and shows the scale of increases in GDP emanating solely from increasing the education levels of these pupils. The second example focuses on the other end of the spectrum, the top students, and shows the impact on wages emanating from higher level of studies in high school.

What Israel urgently needs is a comprehensive education reform that focuses on the entire system, rather than just one end of the spectrum or the other. Such a reform needs to finally determine a core curriculum at much higher standards than exist today – and ensure that it is provided to every pupil in the country, including the Haredim. This reform needs to include a structural change in the way teachers are chosen, trained and compensated. Finally, a systemic reform must be exactly that, reforming the way that the entire education system operates: the way that it utilizes its resources; its measurement and analytic capabilities; its transparency; creating direct links between accountability and authority; and separating between the running of the system and the oversight on its operations.
Israel has the highest share of pupils in the developed world with scores below the OECD minimum acceptable math level

Israel has, by far, the greatest share of pupils (a full third) below what the OECD considers the minimum level of mathematics necessary for participating productively in globally competitive economies. And this share does not even include the Haredi boys who do not study much of the material and do not take the exam.

As such, it stands to reason that Israel stands to gain the most – in economic terms – if all countries focus on their weakest pupils and raise them to the OECD’s defined minimum, as illustrated on the next page.

* Israel examinees do not include Haredi boys.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: OECD
Education reform focusing on just the weakest pupils would increase Israel’s GDP over time by many multiples of the country’s entire education budget.

Eric Hanushek and Ludger Woessmann calculated the economic impact of an education reform that concentrates solely on the weakest pupils in each country.

Assume that over a 15 year span, such a reform raises all math scores in each country to at least the level defined by the OECD as the minimum required and that workers remain in the labor force for 40 years. The study estimates the present value of the addition to each country’s GDP over an 80 year period, which roughly matches the life expectancy of a person born in 2015.

The outcome of such a reform provides major economic benefits for all of the countries – and, as expected, the primary beneficiary would be Israel, as it has the highest share of pupils at the lowest levels.

To put the cumulative increase of 301% in Israel’s GDP into perspective, the country’s 2015 GDP reached 1,150 billion Israeli shekels. The present value of the expected cumulative increase over the 80 year span would be 3,462 billion shekels – which dwarfs the 51 billion shekel education budget of 2015.

<table>
<thead>
<tr>
<th>Country</th>
<th>Increase in GDP (%)</th>
<th>Present Value of Additions to Future GDP as a % of Current GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>301%</td>
<td>247%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>247%</td>
<td>205%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>193%</td>
<td>166%</td>
</tr>
<tr>
<td>Spain</td>
<td>136%</td>
<td>122%</td>
</tr>
<tr>
<td>Austria</td>
<td>117%</td>
<td>108%</td>
</tr>
<tr>
<td>Germany</td>
<td>114%</td>
<td>108%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>108%</td>
<td>94%</td>
</tr>
<tr>
<td>Ireland</td>
<td>92%</td>
<td>86%</td>
</tr>
<tr>
<td>Canada</td>
<td>78%</td>
<td>66%</td>
</tr>
<tr>
<td>Finland</td>
<td>66%</td>
<td>51%</td>
</tr>
<tr>
<td>Japan</td>
<td>66%</td>
<td>51%</td>
</tr>
<tr>
<td>Korea</td>
<td>51%</td>
<td>51%</td>
</tr>
</tbody>
</table>

* Additions to GDP if every current student attains a minimum of 420 points in PISA exam.

Reducing the education gap within Israel will reduce the income gap between Israel and the G7 countries

By concentrating solely on the weakest pupils, Israel will benefit not only from the direct gains to those individuals as adults – which, in turn will reduce poverty and income inequality within Israel as those who would have been candidates for life in poverty now receive basic tools to work in a modern economy.

The additional benefit, to Israel as a nation, will be a major shift in its long term growth path. The increment to Israel’s future annual growth rates will be almost twice the increase in the G7 countries most benefitting from such a reform, and up to four times the growth increase that Japan will experience.

**Economic Growth Impact of Educational Improvement among the Lowest Achievers in Israel and the G7 Countries**

*percentage point increase in future annual growth rates if every current student acquires a minimum of 420 PISA points in PISA exam.*

Marked decline in share of Israeli high schoolers taking high quality STEM courses

The comparative advantage of an Israel wishing to compete in global markets is not at the lower end of the production and services spectrum. It is at the top end, where the ability to capitalize on technological spillovers from other countries is vital – and the ability to innovate and forge ahead is just as important. Attaining and maintaining such a national ability requires a greater share of Israelis receiving a math and science education at the highest levels.

That is not currently the case. On the one hand, there has been a substantial narrowing of the gap between boys and girls since the mid-1990s, suggesting future reductions in gender wage gaps. On the other hand, this narrowing of the gap is the result of problematic trends. The share of girls studying math and science at the highest levels has been declining for two decades, while the share of boys studying at these levels has been dropping even faster.

The future economic ramifications of these declines are quite problematic – both at the personal level for a greater share of Israelis, and at the national level in terms of the impact that this will have on economic growth.

* SHARE OF 12TH GRADERS TAKING HIGH LEVEL MATH AND SCIENCE COURSES *

- boys
- girls

* share of matriculation (bagrut) examinees taking at least two subjects in the math and sciences fields at the level of at least 4 units.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics
Even high schoolers who received the lowest scores at the highest math levels earn more as adults

The personal economic benefit of studying mathematics at the highest levels can be seen in the findings of a study by Ayal Kimhi and Arik Horovitz.

After a dozen years had elapsed, persons who had studied math at five units (the highest level) when in 11th grade earned more than those who had studied at four units. In fact, pupils that had the lowest grades at five units subsequently earned roughly the same as those who excelled at four units. Similarly, those who had done poorly at four units received hourly wages similar to those who had excelled at three units.

* among salaried employees born in 1979 who were 29 years old in 2008
Source: Ayal Kimhi and Arik Horovitz, Shoresh Institution (based on findings from 2015 Taub Center study by the same authors)
Data: Central Bureau of Statistics
Studying higher levels of math in high school leads to higher wages in nearly all disciplines

Building on the relationship between high school math levels and future wages, Kimhi and Horovitz examined the link with academic studies. They found that wages are progressively higher in fields where there is an obvious connection to math.

In addition, computer science graduates who had studied at five levels of math earned more than computer science graduates who had studied at four units, and likewise with regard to four versus three units for such graduates. A similar boost was given to engineering students.

While such a link may be obvious with regard to disciplines in which high levels of math knowledge are required, it also exists in disciplines where the need for math knowledge is less obvious – for example, in law.

* among salaried employees born in 1979 who were 29 years old in 2008

Source: Ayal Kimhi and Arik Horovitz, Shoresh Institution (based on findings from 2015 Taub Center study by the same authors)

Data: Central Bureau of Statistics
The impact of high school math on subsequent wages is both direct and indirect

While not all high schoolers have the ability to study math at 5 units, the drop from 14% who studied at this level in 2006 to just 9% in 2012 is indicative of the room available at the top for additional pupils.

Kimhi and Horovitz estimate the percent increase in wages resulting from a number of scenarios in which students studying at the four unit level shift to studying at the five unit level.

Each one of these scenarios indicates a wage increase. This wage increase is consistently higher for girls than for boys, suggesting how important a cultural shift can be with regard to providing such encouragement for girls.

The wage increases are due to both a direct impact resulting from studying math at five units, as well as an indirect impact – the fact that studying math at high levels open academic doors that would otherwise remain closed, which in turn serve as a gateway to higher wages in the labor market.

Source: Ayal Kimhi and Arik Horovitz, Shoresh Institution (based on findings from 2015 Taub Center study by the same authors)
Data: Central Bureau of Statistics
The state of higher education

There has been an extensive retransformation of Israel’s higher education system over the past several decades. An array of non-research colleges has been created since the 1990s, providing an academic education between top-tier research universities and high schools. This led to a doubling in the share of students in the population. At the same time, the top tier was left to rest on its laurels. Though Israel’s population more than doubled since the 1970s, not one additional research university was created and the number of research university faculty members per capita fell by 60%. The share of university students studying toward graduate degrees rose by 40%, while the number of research faculty per graduate student fell by 32%. Public expenditure on higher education per student declined and is near the lower end of the OECD countries. In some of the more important fields for economic growth, the quality of Israel’s leading universities (as measured by citations per article) has been slowly narrowing the gap with leading universities in the United States.
Adding another layer of higher education between high school and research universities

Israel opened up higher education in the 1990s. Following the lead of other countries, an intermediate layer between the top tier research universities and high schools was created. This resulted in over a doubling of the number of students per capita.

The initial emphasis was on creating new institutions of higher education that provided only undergraduate degrees, with the research universities concentrating on graduate degrees that are more expensive to produce.

Over the years, non-research colleges began to include graduate degrees, as well. This created new opportunities that had not existed before for many Israelis, offering alternatives to prospective students that had been considering attending university.

Declining birth rates in Israel may be bringing the number of individuals seeking academic degrees to a saturation point, with the total number of students per capita beginning to fall in recent years.

* Total number of students in research universities and non-research colleges.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics and the Council for Higher Education
National priorities have shifted away from Israel’s research universities

Following its War of Independence in 1948, Israel was flooded with new immigrants. Within just two and a half decades, by 1973, the country’s population had increased four-fold. Despite the tremendous internal and external existential pressures, Israel built research universities. By 1973, there were seven.

Over four decades have elapsed since 1973, and the population is now 2.6 times the size it was then. The country is considerably wealthier, with GDP per capita more than doubling. And yet, not one additional research university has been created since the 1970s. The number of senior research faculty per capita has fallen steadily for over four decades, and is now just 40% of the 1973 peak. Even with the addition of non-research colleges, the number of faculty per capita is much lower, and falling.

To reach the world’s highest living standards, and to remain there, requires that a nation shift from imitation to innovation – and research universities are the key to the latter. This is something that the country’s founders understood, but it appears to be unrecognized or unimportant to many of Israel’s recent leaders.

2 The decision, a few years ago, to label the West Bank college of Ariel as a university emanated more from political considerations than any strategic decision to increase the country’s research universities.

* Senior research faculty includes full professors, associate professors, senior lecturers and lecturers. Basis of data changed in 2011.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics and the Council for Higher Education

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Shoresh Institution for Socioeconomic Research

The state of higher education
More graduate students are guided by fewer faculty members

Graduate school represents the top echelon of a country’s education system. This is where the nation’s future researchers are trained. It is the home to the basic research platforms underlying the business sector’s hi-tech and bio-tech locomotives. The higher the degree, the greater the need for more personal guidance by senior academic faculty members.

As Israel’s economy has grown and matured, the resultant increase in demand for more educated and skilled workers has also translated into a greater need for workers with more advanced degrees. As a result, there has been a 41% increase in the share of graduate degrees out of the total number of degrees granted by the research universities since 1999.

However, the shift in national priorities away from the research universities led to a decline from one senior faculty member per 7.2 graduate students in 1999 to one in 10.6 in 2014, a decrease of 32%.

This result is not conducive to the quality of graduate research. It means less time available for mentors to guide the work and advise their students. In addition, the rapid increase in the number of graduate students may indicate a fall in the average quality of these students – especially given the low quality of education at the primary and secondary levels, which are often succeeded by lower quality undergraduate educations provided by some of the colleges.

Whatever the reason, a decline in the quality of graduate student research will not bode well for Israel’s future.
Multi-decade decline in higher education spending per student – until recently

The reduction in Israel’s national expenditure per student began in the 1970s, before the introduction of the non-research colleges in the 1990s. To a certain extent, what has transpired after the advent of the colleges makes sense.

Since these colleges focus on undergraduate studies (less so in recent years), they not only provide an opportunity for many who, in the past, might not have been accepted into higher level institutions, they also represent a cheaper way to provide an academic education.

On the other hand, Israel’s population has more than doubled since the 1970s. Provision of the highest level of academic education to the same share of Israel’s top students who had received this in the past, means providing considerably more resources to the research universities today than in earlier years (the number of students in these institutions alone has more than doubled since 1980).

Public pressure in the last decade has led to a turnaround in the funding landscape, with some major increases in recent years.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Central Bureau of Statistics
Public spending on Israel’s higher education is one of the lowest in the OECD

The relatively low place that Israel ascribes to higher education in its national priorities can be seen in the ranking OECD countries according to their public expenditures per student in higher education. Israel is below the large majority of the OECD countries.

It is possible to go in the way of some other countries, privatizing and charging students much higher tuition. There is some justification in the approach that a person whose future income stream will be higher as a result of higher education should also pay for this investment, without expecting government to finance it on their behalf.

Such an approach omits two major considerations, one general and the other specific to Israel. Human capital is a fundamental ingredient in determining productivity, which in turn, determines a country’s living standards and their rate of growth. We all benefit if the human capital of others rises, even if it helps them personally. Given how much greater the social rate of return of higher education is over the private rate of return, a strong case can and should be made for subsidizing higher education.

In Israel, there is another reason for doing so. The country asks its young people to serve in the army for several years to protect it. Not only is the army pay meager, these individuals are asked to forgo up to three years of a business career to serve their country – three lost years that are worth a considerable amount of money in the years prior to retirement. A country that knows how to ask should also know how to give back to those who enable its existence.
The quality of academic research is converging in the developed world

A major gauge for the quality of academic research is the contribution that it has as a stepping stone for subsequent research by others. This contribution can be measured by the number of times a study is cited in later studies.

Since the number of researchers and journals has grown considerably over time, it is not possible to assess qualitative changes over time using the cites per article measure. However, it is possible to measure relative quality at any point in time in comparison with other countries.

Four decades ago, the average number of times that academic papers from Israeli institutions were cited was substantially higher than the average from institutions in countries now belonging to the OECD. It was also higher than the G7 average, but below the American average.

Since the 1970s there has been a general convergence trend in the developed world. The gaps between Israel and the averages for the OECD and G7 countries, as well as with the US, have been all but eliminated – which also indicates a similar reduction in the gaps between each of these groups.

Two provisos are in order here: First, recent articles have not yet had their complete moment in the sun, so cites of them may yet rise. Second, the average number of citations per article differs from discipline to discipline. The underlying assumption here – which may or may not be correct – is that the law of large numbers applies with regard to the distribution and relative weight of disciplines within countries, making possible a comparison such as the one conducted here.

* Observations at five year intervals. Citations exclude self-citations.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Web of Science
The quality of academic research in Israel’s top five universities is converging to that of the top five American universities

A country’s technological level can only be as high as its best academic institutions. Thus, a comparison of all universities and colleges produces national averages that do not provide a true indication of how good the country’s highest levels are vis-à-vis other countries.

To deal with the great amount of noise that exists in national comparisons of citations per article, the great variance between academic institutions within countries and across disciplines, it useful to narrow the focus to the top of the top in each country – and to conduct such comparisons within specific disciplines.

America’s top universities, which generally have their pick of the world’s best scholars, tend to reflect the highest international academic standards. All other academic institutions strive to get as close to these standards as possible.

Three academic fields – physics, engineering and computer science – are among the most important for raising a country’s technological level. In each of these fields, the top five Israeli universities are compared to the top five American universities. The gap between the top US and Israeli universities declined in all fields between the mid-seventies and the eighties. Since then, the computer science field in Israel has remained at a fairly constant – albeit highly fluctuating – gap from the top American universities. In physics, the gap has declined further in recent years, while in engineering, the gap has been steadily falling for decades.

CITATIONS PER PUBLICATION* IN EACH COUNTRY’S TOP 5 ACADEMIC INSTITUTIONS

PERCENT DIFFERENCES BETWEEN ISRAEL AND US IN SELECTED FIELDS, 1975-2015

* Observations at five year intervals. Citations exclude self-citations.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Web of Science
Demography, education and the future

Israel has one of the youngest populations in the developed world. The problem is that the children receiving the worst education belong to the country’s fastest growing populations – a situation that will become economically untenable in the future if not addressed in the present.

There do appear to be a number of interesting changes in the offing – though unfortunately, none of these currently includes a revamping and systemic improvement of the education system. First, birth rates appear to be changing, especially after the major cut in welfare benefits at the beginning of the 2000s. There have been substantial declines in fertility within the two fastest growing groups – who are also receiving the worst education in Israel. Second, among the Jewish population, it appears that a sizeable number of Haredim have begun to register their children in non-Haredi religious schools, while many others have begun to register their children in the secular schools.

In light of the strong link between education and income, this is welcome news from an economic perspective. The income tax burden in Israel is already skewed in that half the population do not reach the bottom rung of the income tax ladder and pay no income tax at all. In fact, 20% of the population shoulders 90% of the Israel’s income tax revenue burden. This skewness is even more pronounced than that of the United States.
Roughly half of Israel’s children are receiving a Third World education

The composition of Israeli society is changing rapidly. The fastest growing group, by far, are the Haredim. While they comprise just 7% of the country’s prime working age adults, Haredi children account for 19% of the country’s first graders. Most Haredi boys do not receive a core education beyond 8th grade – and what they do receive excludes science, English and other basic material. The girls receive a better education, yet refuse to take the standard high school matriculation exams required elsewhere in the system, preferring to take a different exam tailored specifically for them.

One quarter of the nation’s first graders are in the Arab-speaking parts of the system. These children receive an education that results in achievements in core subjects below those of many Third World countries. The remaining 57% of the first graders include many children from Israel’s social and geographic peripheries.

Israel’s education system is divided into four streams. These are distinguished not only by their areas of emphasis, but also by political intervention that prevents transparency in the funding and the operations of these streams. Basic information such as expenditure per pupil in each, or the average number of pupils per class in each, are not made public. In light of its byzantine organization and the archaic way that the system is run, it is possible that such basic information is unknown even to the Education Ministry.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Central Bureau of Statistics and Ministry of Education
The population groups receiving the worst education are the fastest growing

Fertility rates by religious group provide a hint of the demographic rates of change in Israel. The largest families tend to be those of the Haredim. The average size of Haredi families increased by two children in just two and a half decades (from 5.6 in 1980 to a peak of 7.6 children in 2004). After a slight lag following the steep cuts in welfare payments, including child benefits, the average number per Haredi woman fell to 6.5.

The decline in the number of Muslim children per family was in stages, falling from 6 in 1980 to 4.5 in 1987, and then stabilizing for about a decade and a half, before beginning to fall again in 2002.

Fertility rates among religious and secular Jews declined slightly during the 1980s (and continuing into the 1990s for the religious Jews). After a brief period of stabilization, fertility rates among secular Jews began to rise in the 1990. They have been continuing their slow climb ever since, crossing the 2 child per woman threshold in the 2000s.

* year reflects mid-point of 3-4 years averages. ¹ ultra-Orthodox Jews. ² Muslims represent over 80% of Arabic speakers in Israel. ³ ranging from traditional through Orthodox Jews. ⁴ non-religious Jews

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Ahmad Hleihel (Central Bureau of Statistics, 2011)
Changing sectoral enrollment in first grade does not entirely match the demographics

The pattern that characterized first grade enrollment for decades – a declining share of secular enrolment alongside rising shares for all other groups – ended in 2009. Since then, the share of first grade children in secular schools has begun to rebound, while the share of Arabic speaking children has been steadily declining.

It is not clear how to view the Haredi path. It is possible the 2012 is an outlier year in what is otherwise a continuous and steadily increasing path. Or, it is possible that the Haredi share stopped rising at around 2010-2011 and has been fluctuating around roughly the same share since then.

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel's Ministry of Education
Haredi children moving to religious schools, and more children – in general – to secular schools

The enrollment decline among Arabic speakers is due to a decline among the Muslims and Druze, and a substantial slowdown in the enrollment increase among Bedouins.

A decomposition of the Jewish groups and time periods provides an interesting perspective that does not coincide with much of the conventional wisdom in Israel.

In the years 2000-2009, Haredi enrollment in first grade increased by 4.2% a year. Enrollment in the religious schools increased by 1.2% a year, while it was 0.3% in the secular schools during this period. These are children born between 1994 and 2003. The annual changes in enrollment reflect the fertility differences in these groups.

Haredi birth rates began falling in 2003, though they remained far above those of the religious Jews, which remained higher than the birth rates among secular Jews. Despite the differences in birth rates, annual changes in first grade enrollment since 2009 have been nearly identical for all three groups. In light of the differences in fertility between the groups, it is likely that many Haredim now register their children in non-Haredi religious schools. The higher rates of change in secular school enrollment in recent years may be due to religious Jews and possibly Arabic-speaking children who now also register in secular schools. To the extent that these changes in enrollment reflect the kind of shifts between streams described above\(^3\), this may reflect a growing realization among Israeli parents of the importance of providing their children with a more adequate education – one that will better prepare them for work in a competitive economy.

\(^3\) Accurate data from the education ministry that could corroborate this conjecture is unavailable.

ANNUAL CHANGES IN FIRST GRADE ENROLMENT

BY SECTOR AND PERIOD, 2000-2016

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</thead>
<tbody>
<tr>
<td>Arabic speakers</td>
<td>3.0%</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Jewish Haredi</td>
<td>4.2%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Jewish religious</td>
<td>1.2%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Jewish secular</td>
<td>0.3%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: Israel’s Ministry of Education

Shoresh Institution for Socioeconomic Research

Demography, education and the future
Bottom line: who will shoulder the tax burden when today’s children become adults?

In the final analysis, it all comes down to the economic viability of Israel when today’s children grow up.

Israel currently bases a larger share of its tax revenues on indirect taxes than most developed countries. Indirect taxes are considered regressive, as they tend to place a greater burden on the poor than on those with higher incomes. This is why most developed countries have moved towards direct taxation, such as income tax.

Herein lies another problem. Already today, the income of half the Israeli population is so low that they do not reach the bottom rung of the income tax ladder, and pay no income tax at all. A full 90% of all income tax revenue today in Israel comes from just 20% of the population. This is high even in comparison with the United States, which is also relatively one-sided compared to the OECD average — and it is higher today in Israel than it was a decade ago.

In fact, the income tax paid by the top two deciles in Israel equals almost 10% of Israel’s GDP, compared to just 6% of American GDP paid by the top two deciles in the United States. If this is the current situation, what will happen when today’s first-graders reach working age? How many will have the tools to work in a modern economy and how many will require assistance to get by? Who will be able to shoulder the increasingly heavier tax burden brought about by greater needs alongside a declining share of individuals paying taxes?

* Israel in 2015, USA in 2013

Source: Dan Ben-David, Shoresh Institution and Tel-Aviv University
Data: from Israel’s Finance Ministry and Center for Federal Tax Policy
Summary

The quality of education that Israel’s children receive today will determine the country’s future. While this statement holds for all countries, there is no other nation that has attained so much in so few years – and faces an existential danger of losing it all, if it does not wake up in time to understand the perils of its current trajectory.

Though Israel may seem to be one of the world’s most educated countries, the qualitative level of its education system is one of the worst in the developed world. At the end of the day, quality matters more than quantity. Hence, a country with one of the highest number of years of schooling per person in the developed world also has one of the lowest productivity levels and highest poverty rates. There are no shortcuts.

While the challenges are substantial, Israel has the ability to make such a turnaround possible. The country’s economy is currently doing better than most, with extensive investment flows from abroad providing a signal of the confidence that others have in Israel. The level of knowledge in Israel’s best academic institutions is state-of-the-art. It just needs to reach all corners of society.

In the final analysis, Israel’s entire population is no greater than a large school district in other countries. The issue of fixing Israel’s education system is primarily one of removing blinders that confuse wishful thinking and fantasy with actual evidence – and finding the political wherewithal and leadership to implement the necessary changes.
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Shoresh Leadership

**Professor Dan Ben-David**

Professor Dan Ben-David is the founder and President of the independent, non-partisan, Shoresh Institution for Socioeconomic Research and a senior faculty member of the Department of Public Policy at Tel-Aviv University. He is the former executive director of the Taub Center for Social Policy Studies.

Professor Ben-David received his Ph.D. in Economics from the University of Chicago and specializes in macroeconomics, economic growth and international trade. He served as a Research Fellow at the Centre for Economic Policy Research (CEPR) in London and as a Faculty Research Fellow at the National Bureau for Economic Research (NBER) in Cambridge, Massachusetts. Dan Ben-David also served as an advisor to the World Bank and the World Trade Organization.

In the public sphere, Professor Ben-David was named “Person of the Year” by the Calcalist newspaper. He was included twice among the 100 most influential people in Israel by the Haaretz-TheMarker newspaper while the Ha’ir newspaper ranked him among the 50 most influential people in Israeli education. Academically, Professor Dan Ben-David was ranked among the 1,000 most cited academic economists in the world and among the ten most cited economists in Israel during the years 1990-2000. He has twice received Tel-Aviv University’s “Best Teacher Award” in Social Sciences.

**Professor Ayal Kimhi**

Professor Ayal Kimhi is the Vice President and head of research at the Shoresh Institution and the Sir Henry d’Avigdor Goldsmid Professor in Agricultural Economics at the Hebrew University. He is the former deputy director and head of research at the Taub Center for Social Policy Studies.

Professor Kimhi received his Ph.D. in Economics from the University of Chicago. His research spans the fields of labor economics, family economics, applied econometrics, agricultural economics, and development economics. He has held visiting positions at the Universities of Maryland, Yale, Pennsylvania, Nagoya, Leuven and Sydney and has published more than 40 articles in refereed academic journals.
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