A CERTAIN FUTURE

For

THE U.S.-ISRAEL TECHNOLOGY PARTNERSHIP

Economic |STRATEGY| Institute

On behalf of the three U.S.-Israel binational science and technology foundations, this study has been conducted by the Economic Strategy Institute to evaluate the contribution of the foundations to the U.S. economy and particularly to its scientific, technological, and industrial base over the past forty years.

EXECUTIVE SUMMARY

Formed with an initial total endowment of $200 million provided equally by each government in the 1970s the three U.S.-Israel binational technology foundations – the Binational Science Foundation (BSF), the Binational Industrial Research and Development Foundation (BIRD), and the Binational Agricultural Research and Development Foundation (BARD) – aimed initially to strengthen U.S.-Israel ties by fostering Israel's then nascent technology community. Over the past forty years, however, they have not only helped establish Israel's scientific and industrial technology community as one of the world's most highly regarded, but have also become significant factors in helping to stem the erosion of U.S. R&D and technological leadership.

After being supplemented in 1984, the total endowment of the foundations reached $320 million ($160 million from each government) and has remained there ever since. In addition BIRD has received $91 million in repayments from successful projects. [1]

Annual grant allocations are: BSF - $15 million; BIRD - $11 million; BARD - $7 million.

Historical Total Investment (current dollars): $1.3 billion, of which: BSF - $500 million in 4000 projects, BIRD - $400 million in 826 projects, and BARD - $400 million in 1100 projects.[2]

	BSF	BIRD	BARD
Total Number of Projects	4000	826	1100
Historic Total Investment	$500 million	$400 million	$400 million
Annual Grants	$15 million	$11 million	$7 million

[1] Nominal dollars.
[2] Current dollars. All figures in this report are in current dollars unless otherwise stated.

RESULTS

Outstanding, Award Winning Science

- 38 Nobel laureates have participated in BSF projects
- One Nobel prize shared by an American and two Israelis resulted directly from a BSF project
- Six of eight Nobel winners in 2004 were BSF grantees
- 19 Lasker Award winners and 38 Wolf Prize awardees have also been BSF grantees
- 2004 Chemistry Nobel for protein research now used to treat cancer
- Major advances in a wide range of agricultural technologies

Outstanding Technology Development and Commercialization

- BSF grantees developed critical isotopes to enable PET scanning for cancer until other isotopes became available. PET sales were $723 million in 2003 and are expected to top $4 billion by 2018. Last year alone PET use supported 2600 U.S. jobs. The payoff to the United States from this single project far surpasses the total investment in BSF; the return on investment is nearly infinite.
- An online auction site algorithm developed as an academic project under BSF later revolutionized online advertising. Yahoo alone increased revenue by $50 million in one year.
- BIRD funding made a critical contribution to creation of the digital signal processing chips that are essential to a wide variety of electronic products. To cite just one example, U.S. exports of digital cameras in 2010 alone were $1 billion.
- U.S. corporation KLA turned a $675,000 grant in 1992 into annual sales of $100 million, profits of $20 million, and over 500 jobs.
- BIRD sponsored projects have yielded total estimated direct and indirect U.S. based production and global sales of about $5 billion with profits before tax of $1 billion and tax payments of $100 million.
- Just ten major BARD projects with a total BARD investment of $2 million have resulted in total economic benefits to the United States of $1.7 billion.

Jobs

- Based on these results, a very conservative estimate of the historical number of jobs created in the United States by the investments of the binational foundations is 18,000 - 50,000. But it could well be in the 200,000 or more range. [3]

R&D Extender

- Since 1972, U.S. federal spending on R&D has fallen from 1.3 percent of GDP to 0.73 percent. The binational foundations have helped to mitigate the impact of that decline.
- Even large corporations like General Electric say they are able to do things they otherwise could not do because of the grants they have received from BIRD, for example.

Multipliers and Spillovers

- Technology developed in Israel tends to get commercialized and mass produced in the United States because the Israeli market is small and U.S. corporations often acquire small Israeli start-ups and transfer the technology and production to the United States. This is the opposite of the usual U.S. pattern and is quite advantageous to America.

[3] Estimating job creation is extremely complex because different kinds of business activity and investment generate vastly different numbers of jobs. For example, the Center for American Progress calculates that $1 billion of investment in new infrastructure generates 18,000 new jobs. In an investment by Bridgestone Tire Company in the state of Tennessee, a $1 billion investment generated 2330 jobs. A $100 million investment by KLA in connection with the BIRD program generated 560 jobs, suggesting that $1 billion of investment might create 5600 jobs. Part of the differential here has to do with whether the job numbers are only direct jobs or direct plus indirect jobs, but even accounting for that (the indirect job multiplier varies from less than 1 to more than 4 depending on the industry), it is clear that the numbers vary tremendously.

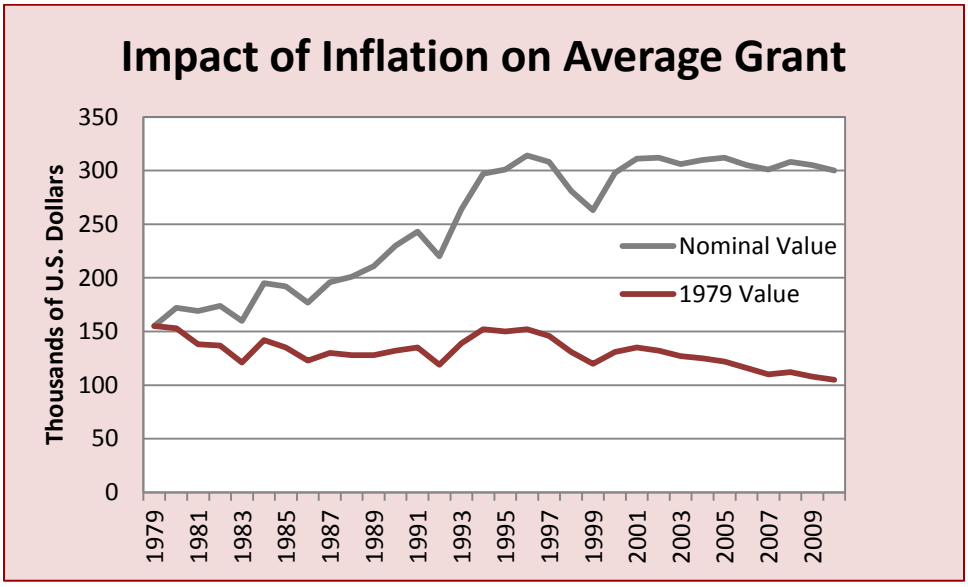
If we look at jobs created per dollar of sales, the story is similar. Thus a study by Civic Economics for the state of Michigan estimates that one job is created for every $150,000 of new sales. A study by the Peterson Institute for International Economics suggests that every $200,000 of export sales generates 1400 jobs. Another study by Civic Economics shows 3 jobs for every $200,000 of sales. Retail sales, for example, generate a lot fewer jobs than say auto sales.

For purposes of this study, we have tried to be extremely conservative but have also used range estimates to suggest the extent of the potentiality. We have used 1 job per $200,000 of economic benefit as our basic yardstick. We have also limited our sales/economic benefit numbers to what has been reported or estimated in previous detailed studies of particular projects. We know, however, that the bulk of the economic benefits occur beyond the period of active grant follow up and are thus not reported or even estimated. We have therefore used ranges based on our own conservative estimates to suggest what we believe to be a realistic possible actuality.

- Israeli companies involved in BIRD projects often establish a U.S. presence and thereby add further value and jobs to the U.S. economy.
- Because of the strong reputation of BIRD and its extensive network of contacts, a BIRD grant can open doors to large venture funding or public grants for new companies or even to a public offering of shares. A recent BIRD grant for a wood sugar project led to a state investment in the project of $100 million.
- Synergy between the Israeli and U.S. parties means that they often create more together than either could singly.

THE CHALLENGE

- The funding available to support the grant giving capacity of the foundations is increasingly insufficient.
- Inflation since the last funding enhancement in 1984 has decreased the buying power and thus the grant capacity of the foundations.



[4]

- In recent years the foundations have been forced to give either fewer or smaller grants.

[4] BARD Statistical Data, 2011.

- At the same time, the EU's European Research Council is making large grants available to Israeli technologists and academics and is thereby redirecting the flow of Israeli technology away from the United States and toward Europe.
- In addition, several new binational research and development groups with countries like Singapore and Korea are also providing large grants and attracting the technology flow to Asia.

THE NEED

- While the Israeli government has agreed to increase the funding capability of the foundations and has allocated annual funding for 2012-2016, the U.S. government has not yet determined if and by what amount it might match the Israeli contributions.
- Such a renewal of U.S. funding should not be looked upon as a gift or grant, but rather as an investment with enormous payback potential.
- We strongly recommend that the U.S. government move ahead with all deliberate speed to appropriate the necessary funding.

A CERTAIN FUTURE

For

THE U.S.-ISRAEL TECHNOLOGY PARTNERSHIP

BACKGROUND

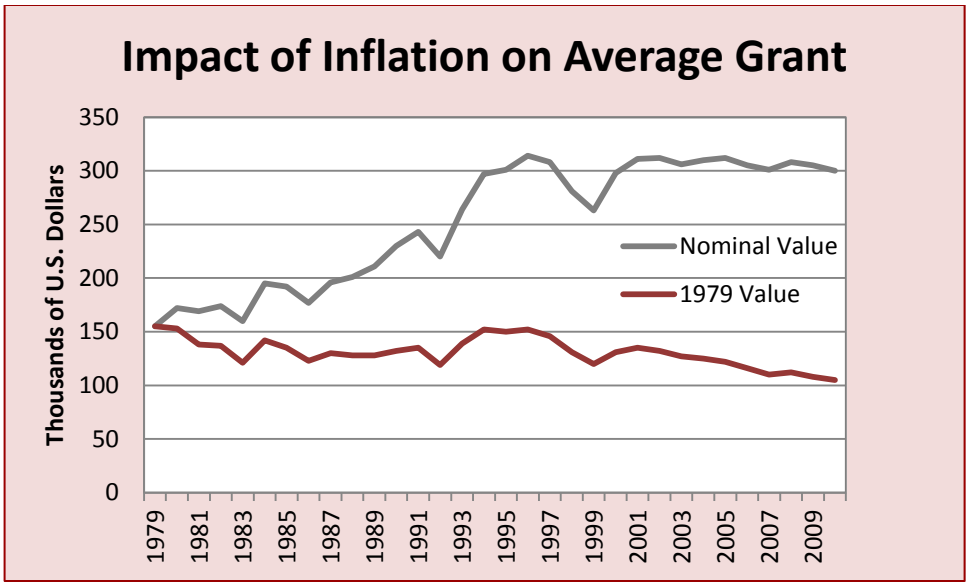
In the decade of the 1970s, three U.S.-Israel binational foundations were established to foster closer ties between the two countries, to encourage development of Israel's then nascent scientific community, and to promote mutually beneficial research and development along with mutually profitable business exploitation of new technology. The first of these was the Binational Science Foundation (BSF), founded in 1972 for the purpose of funding and permitting collaboration on a nonprofit basis by U.S. and Israeli scientists for advancement of important scientific research that is the basis for the technological development that eventually finds its way into the commercial world. This was followed by the founding of the Binational Industrial Research and Development Foundation (BIRD) in 1976 for the purpose of promoting joint non-defense industrial research and development by Israel and the United States for their mutual benefit with an eye toward commercialization. It was to be managed as a kind of investment fund promoting joint ventures between U.S. and Israeli companies to commercialize important technologies for the mutual benefit of both countries. In addition to its endowment, BIRD was also designed to be funded by repayments of grants from joint ventures with successful projects. Then, in 1977, the Binational Agriculture Research and Development Foundation (BARD) was founded as a somewhat more mission oriented BSF to fund and promote collaboration by U.S. and Israeli scientists on important agricultural research and development projects of mutual interest and benefit. In these projects full collaboration between the U.S. and Israeli scientists was required and the budget was equally distributed between the U.S. and Israeli investigators.

Initial endowments provided equally by both governments were $60 million for BSF, $60 million for BIRD, and $80 million for BARD. These were increased in 1984 to $100 million for BSF, $110 million for BIRD, and $110 million for BARD. In the cases of BSF and BARD, projects are funded entirely from the interest earned on the endowments. As noted above, BIRD projects are funded both from endowment interest and from repayments from successfully commercialized projects. Annual grants now amount to $15 million for BSF, $11 million for BIRD, and $7 million for BARD. Since the establishment of the foundations, BSF has invested $500 million in 4000 projects, while BIRD has invested $400 million in 800 projects, and BARD has invested $400 million in 1100 projects. This amounts to a total of $1.3 billion invested in projects that have produced major scientific and commercial breakthroughs in a wide variety of cutting edge technology areas from semiconductors to animal husbandry, pharmaceuticals, telecommunications, brain training, fish farming, medical equipment, and many more.

Of particular significance is the fact that while the foundations were initially very important for Israel, they have, in keeping with their original objective of providing mutual benefit to both countries, increasingly become a valuable element in assuring U.S. leadership in science and technology with an increasing amount of their grant money being allocated to the United States.

THE CHALLENGE

The endowments of the foundations have not been replenished in nearly thirty years. Inflation, the need for more sophisticated and expensive equipment and dollar devaluation have all combined over the years to erode their financial and grant giving capacity. Although the grants have been increased by the foundations through the years, their actual value and buying power has declined by nearly one-third since 1979. This has created two large risks. One is that the inflation and growing research costs in the context of fixed endowments are forcing fewer and smaller grants that increasingly cannot cover the absolutely necessary costs. The second is that increasingly plentiful research funding from Europe (and now also Asia) is drawing the attention of companies and researchers who cannot get the funding they need from the U.S.-Israeli foundations.



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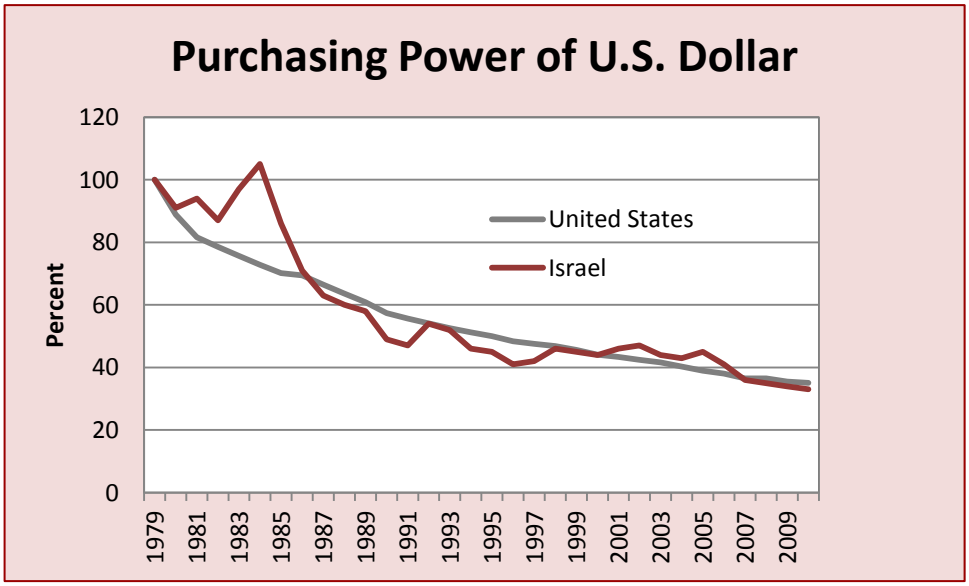


[6]

GRANT SIZE

The current funding capacity of the foundations allows BSF to make average grants of about $140,000, while BARD makes an average grant of $300,000. These are much lower sums than grants from institutes like the National Science Foundation, National Institutes of Health, or the European Research Council. An average NSF grant, for example, is approximately $500,000,

[5] This chart reflects BARD grants, but the effect on BIRD and BSF grants is the same. For BIRD, the actual average grant amount is $800,000, growing from an initial $400,000, but it is impacted in the same way as BSF and BARD by the erosive effect of inflation. The real value has actually declined.

[6] BARD Statistical Data, February 2011.

more than double the average BSF grant and two thirds larger than the average BARD grant. BIRD functions differently as more of an investor and is able to make grants of as much as 50 percent of the project cost up to a maximum of $1 million (average grant is $800,000) but it is still limited in the same way as BARD and BSF by the effects of inflation and dollar devaluation. In recent years, the foundations have decreased the number of grants awarded yearly so that they can maintain the size of grants that can be given. In fact, the BSF must alternate by year the scientific disciplines in which it can give grants, halving the years in which researchers in certain fields are eligible to apply for funding. It has also turned to doing its own active fundraising (a diversion of attention from the foundation's main purposes) in an effort to increase the size of the grants it can provide.

COMPETITION

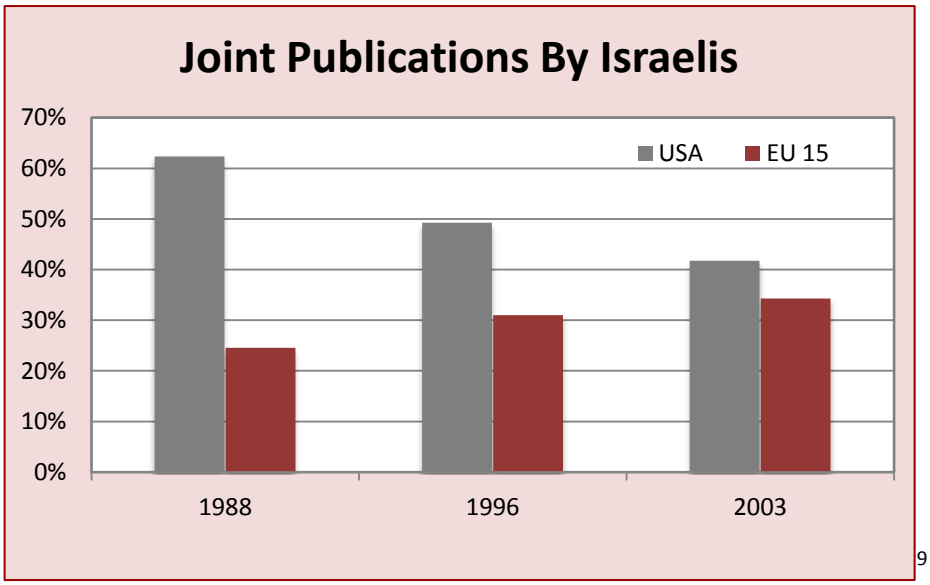
BSF and BARD are both very prestigious programs in Israel, but they are not the only programs available to Israeli scientists. Even though it is not a member of the EU, Israel has been made a member of the European Research Council (ERC) because the EU thought an Israeli contribution would stimulate European scientific and technological development. Founded in part to make Europe competitive with the United States in the realm of scientific research, the ERC "looks to substantially strengthen and shape the European research system. This is done through high quality peer review, the establishment of international benchmarks of success, and the provision of up-to-date information on who is succeeding and why."[7] As a contributing member, Israeli universities can receive grants from the ERC, which are considerably larger than those give by the U.S.-Israeli foundations (up to €3.5 million). In fact, in recent years Hebrew University has been awarded as many grants as Oxford University in the United Kingdom (11).[8] It rates fourth in the EU, behind only Oxford, Cambridge, and Lausanne.

Additionally, Israel is a full member of EUREKA, a Europe-wide network promoting collaborative market-driven research and development projects in most fields of advanced civilian technology.

Israeli researchers sometimes mention their access to ERC grants as something that competes with BSF and BARD funding. Indeed, there are cases of Israeli researchers withdrawing from BSF projects because the European rules do not allow use of both sources of funding and their European grants were larger.

[7] European Research Commission, http://erc.europa.eu/about-erc/mission.
[8] "Hebrew U. ties with Oxford University in number of new European Research Council grants in past two years," The Hebrew university of Jerusalem, http://support.huji.ac.il/HeaderMenu/campaign-priorities-2/young-faculty-recruitment/oxford-ties/.

However, there are drawbacks. Work done through the ERC must be done as part of a consortium of European countries, whereas the binational foundations sponsor collaborative efforts between only the United States and Israel. Although the size of the grants is greater, scientists are constrained by the need to work in a consortium, and thus have less control over their projects. Nevertheless, there has been a marked shift in Israeli research towards Europe in recent years. For example, as the following chart demonstrates, the number of joint publications with U.S. researchers has decreased significantly, while joint publications with European researchers are growing steadily:



[9]

Researchers also speak highly of other binational foundations that Israel has established such as the German Israeli Foundation for Scientific Research and Development (GIF). Created in 1986 as "an additional instrument complementing the continuous fruitful ties in scientific and technological cooperation between the two countries," GIF has a €211 million endowment.[10]

BIRD too faces significantly increased competition. In pursuing international collaborative R&D opportunities for Israeli industry, two main program models are followed for bilateral activities. The first, independent bilateral funds where each nation makes an equal contribution, have been established between Israel and South Korea (2001), Canada (1994) and Singapore (1997). The missions of the funds are similar to that of BIRD. For example, the Singapore-Israel Industrial Research and Development Foundation (SIIRD) is a cooperation between the Singapore Economic Development Board (EDB – Singapore's chief industrial policy and economic strategy institution) and the Office of the Chief Scientist (OCS) in Israel "to promote,

[9] BSF Washington Seminar Presentation, http://www.birdf.com/_Uploads/216DrYairRotstein_June1708Seminar.pdf.
[10] German-Israeli Foundation, http://www.gif.org.il/index_files/page0001.htm.

facilitate and support joint industrial R&D projects, between companies from Israel and Singapore, which would lead to successful commercialization."[11]

The second model consists of bilateral cooperation agreements whereby each nation is committed to funding R&D performed by the joint venture partner company from its own country in accordance with their respective laws and regulations. Along with EUREKA, Israel has such arrangements with Australia, China, India, Brazil, Argentina, and Uruguay. This increased interest in Israeli technology and innovative Israeli companies, especially in China and elsewhere in Asia, will only serve to increase competition for BIRD.

IMPLICATIONS

To move ahead on priority areas like nanotech, communications and broadband access, life sciences, renewable energy and alternative fuels, homeland security, and sustainable food production, and to remain competitive with the European and Asian foundations, BSF, BIRD, and BARD need badly to replenish and enlarge their funding capability to create more awareness of their activities and successes. Larger grants would help to limit the drift toward other countries in Europe and Asia, and maintain the technological and innovative edge the United States receives from these partnerships. It will further allow the programs to keep up with the rising costs of innovative research.

THE NEED

While the Israeli government has agreed to increase the funding capability of the foundations and has allocated funds to do so for 2012-2016, the U.S. government has not yet made a determination on matching the Israeli contribution.

It is in order to develop a better understanding of whether or not such funding is important to the United States, that the Economic Strategy Institute has undertaken to do this evaluation of the benefits (or lack thereof) to the United States to date of the work of the foundations. This report builds on several previous evaluations and adds the results of more than 100 interviews with senior executives and officials as well as additional quantitative calculations to that work.

Although we are considering an increase in the funding capability of all the foundations, we analyzed the impact of each separately.

[11] Singapore-Israel Industrial R&D Foundation, www.siird.com.

BINATIONAL SCIENCE FOUNDATION

Binational Science Foundation - BSF

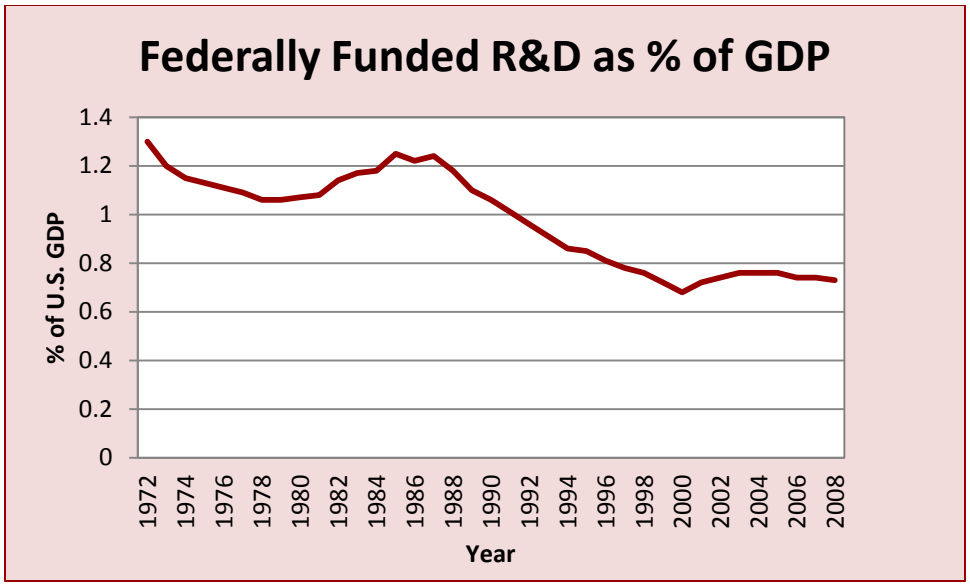
The Binational Science Foundation supports collaborative U.S.-Israeli scientific research in non-profit organizations such as universities, hospitals, and government institutions in fields such as physics, chemistry, medicine, and computer science. This fundamental research provides the underpinnings for future economic projects, and is what allows groundbreaking leaps in technology to be made.

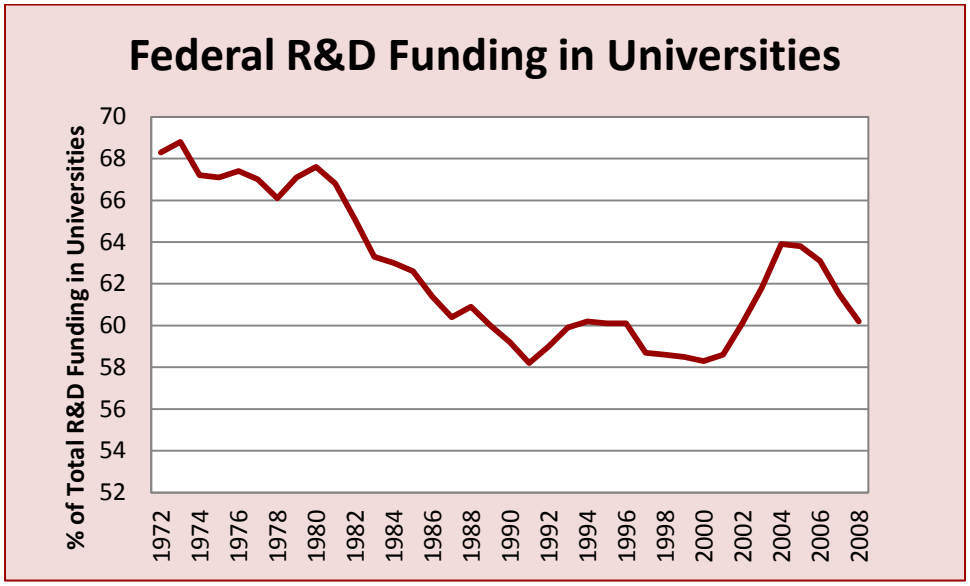
The BSF is jointly governed by a board consisting of five American and five Israeli members nominated by the respective governments. Its $100 million endowment is held by the Israeli government and yields $15 million annually for grant purposes. This high rate of interest paid by the Israeli government is based on a formula agreed between the two governments when the endowment was placed in Israel. Grants are made on a competitive, peer reviewed basis, juried by leading scientists from the United States, Israel and around the world. Eligible projects must demonstrate outstanding scientific merit and clear collaboration between Israeli and American researchers from institutions throughout the two countries.

By its fundamentally exploratory nature, the work supported by BSF does not lead to a direct calculation of the economic benefit that accrues to the United States in terms of generated sales or job creation. Basic research does eventually lead to that, but usually only in the long term. Yet, BSF has been of enormous economic value to the United States in several ways.

Federally funded fundamental research in the United States has declined dramatically over the last two decades as has corporate support of fundamental research. Since BSF's founding in 1972, U.S. federal R&D funding has shrunk from 1.3% of GDP to 0.73% in 2008.[12] Federal funding of R&D in colleges and universities has fallen from 69% of total R&D expenditures to 59% in 2008. On top of that, the great private sector labs like Bell Labs, Watson Labs, and Xerox Palo Alto Research Corporation are mostly a thing of the past.

[12] National Science Foundation, Division of Science Resources Statistics, National Patterns of R&D Resources (annual series). *Science and Engineering Indicators 2010.*





[13]

BSF has helped to mitigate this declining trend of fundamental research in the United States and helps to maintain the quality of science performed in United States by providing a consistent source of funding for fundamental research that everyone knows is of enormous long term importance but that fewer and fewer are willing to pay for in the short term. This has been especially the case because whereas BSF was initially set up to support scientific growth in Israel and to spend most of its money there, today the funds are split between U.S. and Israeli

[13] National Science Foundation, National Patterns of R&D Resources: 2008 Data Update, Table 1. U.S. research and development expenditures, by performing sector and source of funds: 1953–2008, http://www.nsf.gov/statistics/nsf10314/pdf/tab1.pdf.

researchers. This shift was not something intended upon establishment of the program, and thus has created an added and unexpected benefit to the United States. In addition, the United States benefits from the fact that in many projects it is possible to take advantage of the Israeli government's subsidy of university overheads to get more actual R&D work done for a given grant amount.

A further benefit to the United States is the award-winning science that has emerged from BSF projects and scholars. 38 Nobel laureates have participated in BSF-supported research. In 2004 alone, six out of the eight science laureates were previous BSF grantees. Other BSF grantees have included winners of the world's most prestigious scientific awards, including 19 winners of the Albert Lasker Medical Research Award, and 38 recipients of the Wolf Prize.

Nobel Laureates in BSF Programs

	MEDICINE
1959	Arthur Kornberg
1975	Howard M. Temin
1978	Daniel Nathans
1990	E. Donnall Thomas
1990	Alfred G. Gilman
1994	Martin Rodbell
1995	Eric F. Wieschaus
1997	Stanley B. Prusiner
2000	Eric R. Kandel
2004	Richard Axel

	PHYSICS
1961	Robert Hofstadter
1964	Charles H. Townes
1979	Steven Weinberg
1980	James Cronin
1981	Nicolaas Bloembergen
1996	Robert C. Richardson
1998	Daniel C. Tsui
1998	Horst Stormer
2004	David J. Gross
2004	H. David Politzer

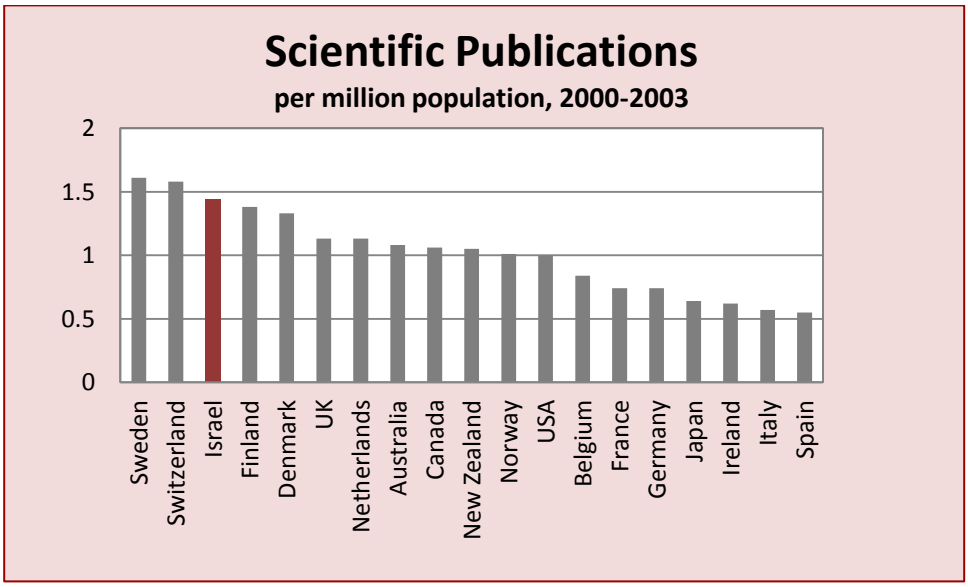
	CHEMISTRY
1972	Christian Anfinsen
1980	Paul Berg
1986	Dudley R. Herschbach
1986	Yuan T. Lee
1989	Sidney Altman
1996	Richard E. Smalley
1998	Walter Kohn
2000	Alan J. Heeger
2001	Barry K. Sharpless
2004	Aaron J. Ciechanover*
2004	Avram Hershko*
2004	Irwin A. Rose*
2006	Roger D. Kornberg
2009	Ada E. Yonath
2011	Dan Shechtman

	ECONOMICS
2000	Daniel L. McFadden
2002	Daniel Kahneman
2005	Robert J. Aumann

*Won for a BSF-sponsored project

In fact, the 2004 Nobel Prize for Chemistry was awarded to Avram Hershko and Aaron Ciechanover of Technion and Irwin Rose of UC Irvine, for their joint discovery of the ubiquitin system for protein degradation, which regulates the breakdown of proteins governing almost all major functions of the cell. This opened up new research opportunities which have led towards developing treatments for cancer, neurodegenerative disorders and more. The cooperation between the Israeli and American research groups was made possible by continuous support by the BSF for some 15 years.

U.S. researchers have told us that they are anxious to work with their Israeli counterparts because of their excellence, and the way that stimulates the best work.



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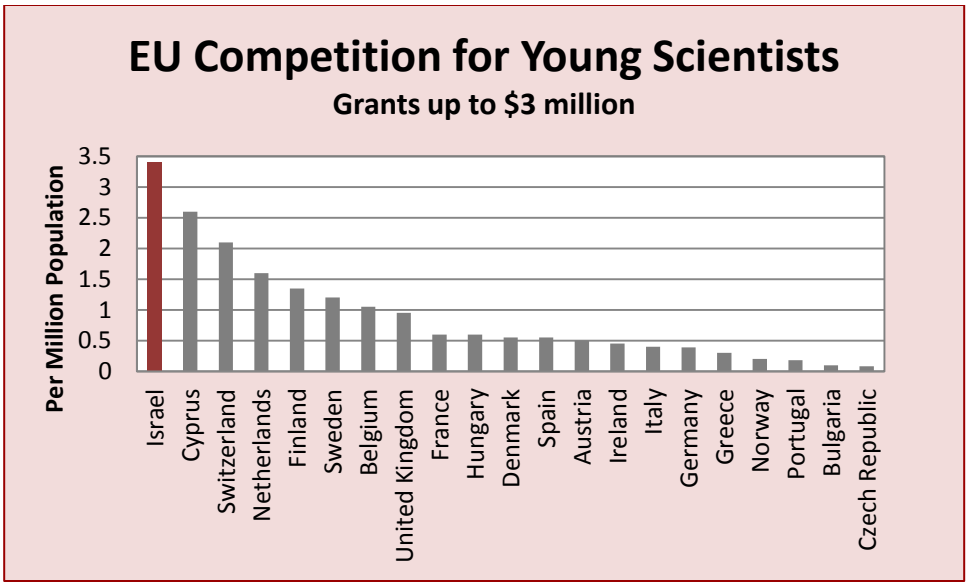
[14] National Science Foundation, Science and Engineering Indicators 2006.



[15]

As it happens, BSF has also had at least two commercial successes that have allowed it to pay for itself many times over even though that was not the idea behind its original creation.

The first of these is the worldwide use of PET (Positron Emitting Tomography) to identify cancer. The development of this basic oncological diagnostic tool and multibillion dollar business was almost abandoned due to the lack of abundant short-lived isotopes required for the imaging. Supported by the BSF, scientists from Tel-Aviv University worked with the group who developed the PET at Washington University to synthesize acetyl hypoflurite, which was immediately adopted by the NIH and by industry. It became the single most important isotope for PET use for 15 years and secured the development of the method until other sources were discovered.

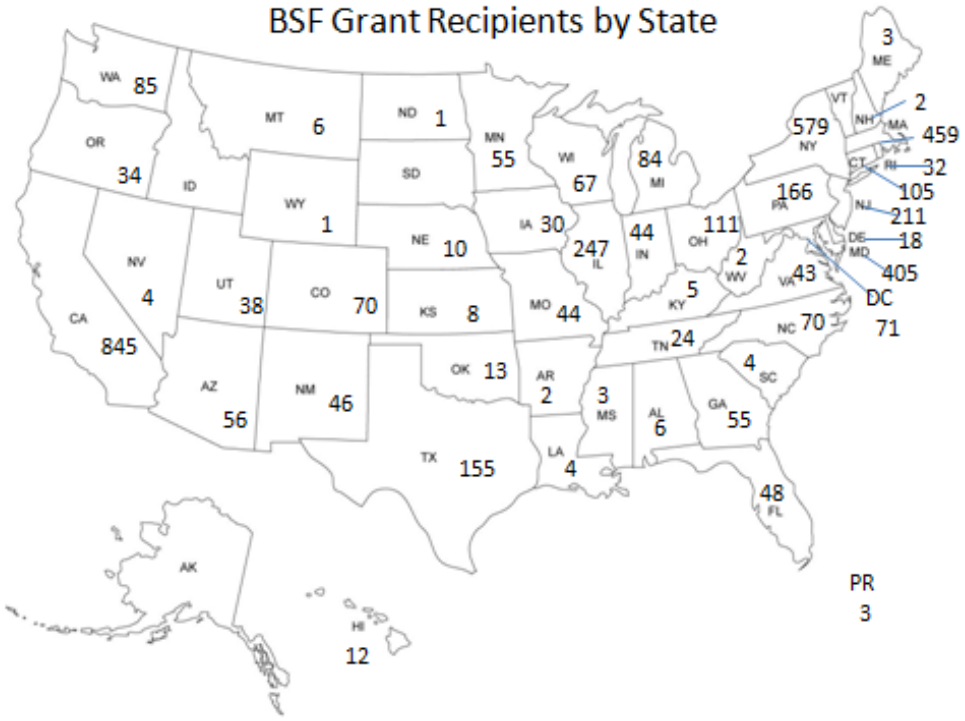
In 2003, U.S. sales of PET scanners were $477.5 million, and worldwide sales were $723.5 million. PET sales in the United States are expected to increase to $4.31 billion annually by 2018.[16] This project alone has surpassed the original investment in BSF, and has been a tremendous boon to the U.S. economy. In 2010, PET use supported up to 2600 American jobs.

Another example is an algorithm that runs online auctions for websites. This BSF sponsored project helped to revolutionize how Internet companies market to advertisers, and allows them

[15] European Research Council Starting Grant Competition 2007 - Results, http://erc.europa.eu/sites/default/files/document/file/erc_2007_stg_results_all%20domains.pdf.
[16] Bio-Tech Systems, Inc. "PET and SPECT Markets Should Reach $6 Billion by 2018," http://www.biotechsystems.com/breakingmarketnews/pet-and-spect-markets-should-reach-6-billion-by-2018.asp.

to increase their advertising revenue. When Yahoo adopted the technology its revenue increased by a reported 5%, an estimated $50 million in 2000.

The extent of BSF activity in the United States is demonstrated by the following map showing the locations and numbers of U.S. BSF grants by state:



Binational Industrial Research and Development Foundation

Binational Industrial Research and Development Foundation - BIRD

Unlike BSF, BIRD was founded specifically to generate industrial and commercial activity by bringing U.S. and Israeli companies together for innovative industrial projects. With an endowment of $110 million, BIRD gives out approximately $11 million in conditional grants annually. Unlike BSF and BARD, grants provided by BIRD can vary from $200,000 to $1 million. Since its inception, BIRD has approved grants of $290 million ($400 million in current dollars) for 826 projects.

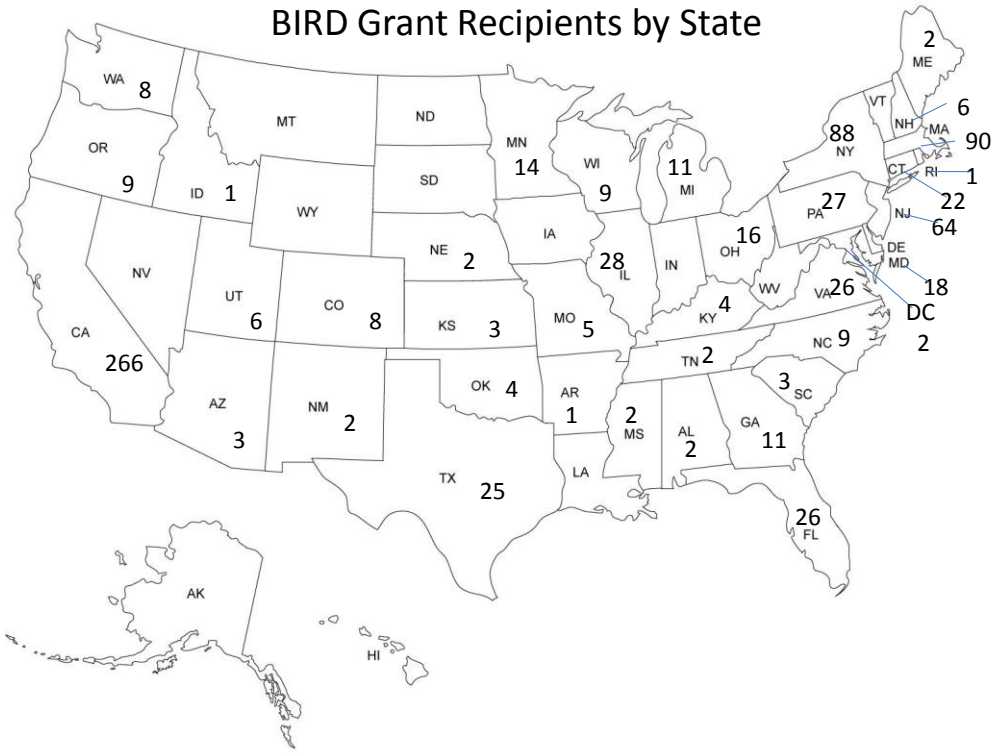
BIRD grants differ from those of BSF and BARD in that if the BIRD project is successful and generates revenue, the grant must be repaid based on the revenue it generates. If the grant can be repaid in one year, the companies must pay back 100% of the grant. If it takes 5 or more years, they must pay back 150% of the amount of the conditional grant. Of course, not all projects will successfully reach the commercialization stage, and therefore the conditional grants do not need to be repaid; however, of the 826 projects that BIRD has supported over its duration, 384 have repaid their grants to the tune of $91 million or about a third of the $290 million invested.[17] These repayments are then reinvested into the program.

BIRD has offices in Palo Alto and New Jersey, and works with U.S.-Israel Chambers of Commerce and the Israeli Economic Missions across the United States in order to facilitate introductions between Israeli and U.S. corporations. As a result, BIRD is an excellent way for businesses to become acquainted with potential partners. Many companies approach BIRD in both countries, requesting a partner in their particular area in the United States or Israel, and BIRD facilitates this process by bringing companies together to find an ideal partnership for a particular project. BIRD funding also allows small firms to reach the significant milestones necessary to make them attractive to venture capitalists, and take their ideas to the next level.

By its nature, BIRD's results and contributions to the U.S. economy are relatively easy to calculate. Since its founding, BIRD's commercial results have been:

[17] These figures are in nominal dollars.

Amount Invested in Project Grants	$290 million[18]
Projects Approved	826
Amount Repaid As Success Fees	$91 million
Net Invested	$199 million
Direct and Indirect Sales Generated	$8 billion
Estimated Profits Before Tax	$1.6 billion
Estimated Tax Payments	$320 million
Estimated Sales in U.S.	$5 billion
Estimated Profits in U.S.	$1.2 billion
Estimated Taxes Paid in U.S.	$240 million
Estimated Jobs Created in U.S.	12,000 - 30,000
Success Rate	33% (Success repayments divided by total investment)
Return on Investment	600% (After tax profits divided by net investment)



[18] The figures in this chart are in nominal dollars.

SUCCESS EXAMPLES

The BIRD program has had a large number of extraordinary success stories. Following are just a few particularly good examples of the hundreds of very positive results:

One major success has been the digital signal processing chip that is essential to virtually all modern electronics, from processors for digital televisions, to printers, cameras, cable boxes, Blu-ray, and other systems. This is an area that has had a tremendous impact on the U.S. economy. To take just one product for example, U.S. exports of digital cameras in 2010 were estimated at around $1 billion.

Another example was a KLA project for semiconductor equipment. An original grant of $675,000 in 1992 generated sales of $72 million between 1993 and 1995. Total sales were more than $100 million with a pre-tax profit stream of about $20 million. This one investment paid back many times over and generated an estimated 500 jobs along with millions of dollars of new investment.

A company that received a similar grant around the same time was American Pager. Its sales between 1993 and 1995 went from zero to $12 million. The company also did an IPO that raised its value from $10 million to $28 million.

Applied Cognitive Engineering (ACE) and USA Hockey have teamed up to develop the first hockey-sense training program for hockey players. The Hockey IntelliGym™ is a software-based program that allows players to develop perception, short-term memory focus and decision-making skills, and enables coaches to fine-tune programs and follow up on each player's progress. By exposing a player to simulated situations and forcing him to make a decision as to what his next move should be, the program trains the player to make the most effective decision in any given situation. In the past 12 world championships since utilizing the program, the U.S. team has won nine gold medals.

At the urging of General Motors Corp and with funding from the BIRD Foundation, Tesco (now HIROTEC AMERICA) joined forces with CogniTens Inc. to develop a measurement system specifically tuned to the needs of automotive BIW assemblies. The result is the I3 Measurement Cell, which reduces auto makers' cost for developing, proving out and monitoring expensive product-specific tooling. GM uses the I3 approach extensively to evaluate, fit and finish the interior and exterior of the Chevrolet Tahoe SUV.

Funding from BIRD also brought about the development of the Aircraft Enhanced Vision System (EVS). This combined project between Kollsman and Opgal produced the EVS camera which is designed to provide day/night improved orientation during taxiing or flying. It allows visual landing in reduced visibility conditions, such as fog, haze, dust, and other inclement conditions.

BIRD has also sponsored many projects in the life sciences that have led to the discovery of groundbreaking pharmaceuticals. The joint development of 'loteprednol etabonate' (LE) by Pharmos and Bausch & Lomb, funded by the BIRD Foundation, has been the fundamental formulation for the development of Lotemax, the most dispensed ophthalmic steroid brand in the United States, and Alrex, the treatment of choice among many eye-care professionals in the United States for severe seasonal allergic conjunctivitis. Bausch & Lomb manufactures and markets these drugs in the United States.

A second pharmaceutical that has been developed through BIRD funding is KRYSTEXXA™ (pegloticase), a PEGylated uric acid specific enzyme indicated for the treatment of chronic gout in adult patients that are refractory to conventional therapy. The drug was developed by Mountain View Pharmaceuticals, and Bio-technology General (acquired by Savient Pharmaceuticals).

BIRD-sponsored medical breakthroughs extend to other therapeutics, including the treatment of Alpha1 Antitrypsin Deficiency. This procedure extracts the Alpha-1 Anti-Trypsin (AAT) Protein needed for patients whose livers are unable to synthesize it naturally, and administers it to them by infusion. The joint project between Kamada and the American Red Cross to develop Alpha1-Proteinase Inhibitor from human source for Alpha-1-Antitrypsin Deficiency patients was completed with the preparation of clinical grade of the Active Pharmaceutical Ingredient and IND submission to the FDA. This submission led to successful clinical trials completed with FDA approval in July 2010. Kamada has reached a major licensing agreement with Baxter International to distribute intravenous Alpha 1 Antitrypsin Product under the trade name Glassia™ for the treatment of hereditary Alpha-1 antitrypsin Deficiency.

REPAYMENT EXAMPLES

Israeli Company	U.S. Company	Project Title	Total Repaid	Sales
Atrica Israel	Infinera	Optical Ethernet System	$1,351,205	$27,024,100
Cadent	3M	3D Imaging	$1,660,969	$33,219,380
CareerHarmony	Manpower	NetSelect	$910,297	$18,205,940
CByond	ACMI	Fox Project	$1,033,310	$20,666,200
Cognitens	Tesco	Flexible 3D Measurement	$527,311	$10,546,220
KLA[19]	KLA	Wafer Inspection	$2,578,192	$103,127,680
KLA	KLA	Submicron CPM System	$1,083,338	$21,666,760
Opgal	Kollsman	Aircraft Vision System	$1,148,429	$22,968,580
Pharmos	Bausch & Lomb	Loteprednol etabonat	$411,372	$16,324,778
Sandisk	Sandisk	MediClip Card	$579,187	$17,721,660
Sterling Software	Sterling Software	Galil LAN Storage	$934,573	$18,691,460
Zoran	Zoran	Dolby AC-3 Decoder	$867,399	$17,370,066

ENERGY

Because of BIRD's success it was chosen to establish BIRD Energy based on the clause calling for U.S.-Israel cooperation in the 2007 Energy Independence and Security Act. Six projects were approved in 2009-2010 with total grants of close to $5 million (average grant was $800,000) and this leveraged public funding of $9.5 million.

HCL Clean Tech, which offers a process to turn wood chips into biofuel, has been able to leverage its BIRD Energy grant into a $100 million bond package from the state of Mississippi to build plants in Grenada, Booneville, Hattiesburg and Natchez for products in the cosmetics, pet food, and lubricants industries. The plants will take wood chips from the region, where there is a surplus of pine trees, and begin processing them in 2012 in Grenada. Three bigger plants will be opened in 2015, 2017 and 2019. The new project is expected to create about 800 new jobs, with an average salary of $67,500 plus benefits.

BIRD also awarded Israeli start-up TransBiodiesel and U.S. partner Purolite $700,000 to commercialize its process for using immobilized lipases for the production of biodiesel from

[19] Until 1996, BIRD allowed projects between related companies.

different oils, including plant oils, animal fats and recycled greases. Purolite is a U.S. company engaged in the development, manufacture, service and support of resins for ion-exchange. TransBiodiesel develops biocatalyst substitutes to chemical catalysts, presently used for production of biodiesel fuels. Biodiesel fuels are of growing importance as partial substitutes for petroleum based fuels. Unlike chemical catalysts, biocatalysts are environmentally benign and lower the total production costs of biodiesel fuels. Their first biodiesel plant will begin operating near Newark, New Jersey, with plans for another plant in Utah.

VENTURE CAPITAL

BIRD also plays an important venture capital role for U.S. companies. The venture capital community has been hit hard by the recent economic collapse, and it is considerably more difficult for firms with cutting-edge, innovative ideas to secure funding. BIRD provides a much needed service to small companies who under normal circumstance would be seeking venture capital funds. Furthermore, because of the reputation that BIRD has established over the last decades, a BIRD grant can open doors to potential joint ventures. BIRD acts like a stamp of approval, lending credence to an idea that might be too avant-garde to get typical venture capital funding, but clearly has commercial potential. BIRD taking on some of this risk through the grants they provide sends a signal to others that these are companies worth investing in.

However, small start ups are not the only companies that benefit from the BIRD model. For example, large pharmaceutical companies know that they are not the sole engine for innovation. Many of their products come from licensing concepts and patents developed by others. Startups tend to be very innovative, and can provide a more flexible path for creating a drug or product than might be possible in a larger organization. As such, large industries in the United States benefit from these projects by taking advantage of the complementary skill sets. Instead of needing to bring in new staff to advance innovation, U.S. companies can partner with smaller ones in Israel, who can in turn utilize the marketing and product development capabilities of their larger partner.

Of key importance is the fact that BIRD steers Israeli companies toward the United States for the development of these new technologies. These projects often involve technology transfer to the United States and help to maintain the United States' global position as a leader in innovation.

The services that BIRD provides are of particular usefulness to start up companies. It requires the company to come up with a business plan first, illustrate why it is good to develop their proposed product, describe the unique technology they are going to offer, and explain why the

two groups are a good fit for working together. Many people told us they used the BIRD guidelines for creating their general business plans. And though the end result might be the same with an alternative source of funding, BIRD funding is like a very risk-free loan; if the project is not successful, the loan is not paid back. This allows a company to attempt revolutionary things without bearing all of the risk itself, fostering innovation in the private sector. Companies typically return money within two years; one recipient considered it to be a 'success fee,' because you pay only if you're successful. Some projects would not be launched without support from entities like BIRD.

But BIRD is not only useful for small startup companies. General Electric, a very large company with a diverse product line and a large R&D division, has been the recipient of several BIRD grants. GE has done joint battery research with companies in Israel, looking at organic light emitting diodes and paper batteries, and trying to find commercial applications for them. GE works with these smaller companies to take innovative technology that is not yet proven and looks for specialty applications, taking these unique items and making them useful. If a useful application is discovered, the Israeli company often opens branches in the United States as suppliers, while GE (and similar large firms) can manufacture and distribute the product to the American or global market. Projects like this are often difficult to start within GE, because you need a team of people dedicated to a specific project that, in the end, may not yield any results. Working with BIRD to find innovative Israeli companies allows GE to focus on speed to innovation, and do so at relatively low cost.

The relationship between the United States and Israel is a symbiotic one. Israel has a very small market, and needs access to the global market to make its products viable. The United States can provide that, and also benefits from the creativity of people who need to go global. As many people told us, it is to the United States' advantage that Israel partner with us rather than transfer its technology to Europe or Asia. The technology transfer between the United States and Israel is good for the United States and good for U.S. competitiveness in the long term. Such benefits would not accrue to the United States if Israel were to seek partnerships with other countries, particularly China. In this respect, BIRD acts as an innovation engine, supporting projects that can have tremendous positive impact on the U.S. economy. This is a case where the United States rather than being the transferor of technology, as it is with China and much of the rest of Asia, is the receiver and commercializer. If the U.S. technology relationship with Asia were the same as that with Israel, there would be no economic friction between China and America.

Conversations with the BIRD representatives in Virginia reinforced these facts. That BIRD generates benefits for the United States is without question – the technology that comes out of BIRD is labeled as American technology. Furthermore, Israeli companies who have had projects

with companies in Virginia have regularly opened offices or branches in Virginia. They also create jobs in Virginia: either the Israeli company will enter the U.S. market with the product and add offices here, or a new technology will be created and a local company will create job by selling that product here. With fears that America is losing its technological edge, BIRD is a way to encourage new technologies and foster innovation in the United States.

Binational Agricultural Research and Development Foundation

Binational Agricultural Research and Development Foundation - BARD

The Binational Agricultural Research and Development Foundation was established in 1977. Like BSF, this program is jointly executed by U.S. and Israeli scientists, and provides funding for mission-oriented agricultural research projects. With funding of $110 million, BARD provides approximately $7 million in grants annually.[20] Since the program began, BARD has sponsored approximately 1100 projects, investing nearly $400 million.

BARD is a competitive funding program for mutually beneficial, mission-oriented, strategic and applied research of agricultural problems, jointly conducted by American and Israeli scientists. Most BARD projects focus on increasing agricultural productivity, particularly in hot and dry climates, and emphasize plant and animal health, food quality and safety, and environmental issues. BARD also supports international workshops. BARD further offers fellowships for postdoctoral research, senior research scientists and graduate students.

Although commercialization is not the goal of BARD, its mission-oriented approach leads to products and methods that have a tremendous impact on the agriculture sector. A study in 2000 calculated that ten select BARD projects garnered an estimated $736 million in economic benefits to the United States. With additional projects increasing this estimate to over $1 billion, our analysis suggests that the BARD program has created between 2200 and 6000 jobs in the United States.

The BARD program has always distributed its grant funds evenly between the U.S. and Israeli recipients. Although the typical size of the grants is small, they have fostered close ties between Israeli and U.S. researchers and sparked many scientific breakthroughs in a wide variety of areas:

[20] Although BARD's endowment is similar to that of BSF, the interest is calculated differently than in the case of BSF and the result is a smaller income with which to support grants.

- FOOD SAFETY
    - A BARD project has led to the development of a machine that can screen for more pesticides and chemicals, and do so more quickly than conventional methods allow. This allows government agencies as well as industry to maintain the security of the food supply.
- AQUACULTURE
    - Researchers have developed and implemented a fully closed, zero discharge intensive aquaculture system that is suitable for both fresh and sea water fish. The system prevents environmental pollution, and can operate in any climate regardless of the availability of water resource or proximity to the sea. Two such systems have been built in New York and Washington.
- CUT FLOWERS
    - Scientists have devised methods of preservation for cut flowers so they can be transported over long distances without light, food or water. This allows for cheaper but slower shipping options, such as boat, to be utilized by the flower industry.
- CHILI PEPPERS
    - In New Mexico alone, chili peppers are a $500 million industry, but cannot compete with labor costs overseas. Researchers are working to develop peppers for machine harvesting so the United States can remain competitive with places like China, India, and Brazil.
- GENOMIC DATABASES
    - BARD-sponsored research has led to the creation of databases in several fields. Interbull compares bulls across countries, allowing farmers to optimize cattle breeding. Genetic mapping of fruit allows scientists all over the world to study aroma, taste and fruit quality.

SUCCESS STORIES

Poultry feed restriction technology developed with BARD support has been widely adopted in the United States. Restricting the amount of feed birds receive early in life causes the birds to grow to a larger size than those with unrestricted feed, growing larger birds at a lower cost. Because poultry is a multi-billion dollar industry, this increase in efficiency has had a substantial impact on revenue, with benefits to the U.S. broiler industry by the end of 2010 estimated at

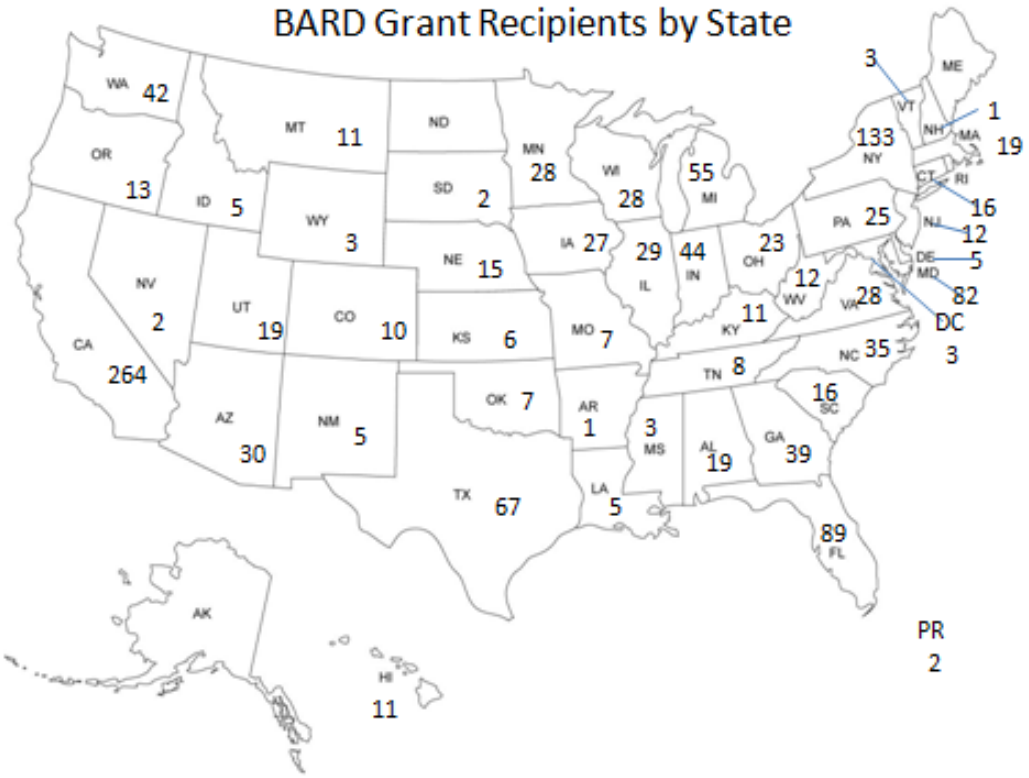
over $2 billion. This is of particular value to an industry that has been facing higher corn prices over the last five years.

A project that researched selective breeding in tilapia was instrumental in launching the industry in the United States. Male tilapia have a higher growth rate than females, and an all male environment prevents reproduction which can lead to overcrowding, which in turn can lead to lower growth and survival rates. Controlling for this allows farmers to breed larger, healthier stock. The advances made in sex-reversal are a primary reason the U.S. tilapia industry has become commercially competitive. Benefits to the U.S. tilapia industry were estimated at $96 million by the end of 1999.

Trichoderma is a fungus that can be used to control soil borne diseases. By making better strains of fungi and developing methods of delivery, these fungi can be used by farmers to protect their crops. Not only is this more cost-effective than chemical pesticides, but commercialized strains have been produced by a company in New York, with revenue of over $5 million and royalties of $800,000. Additional strains of fungi have evolved from the work done under the BARD grant, and they expect to eventually exceed $100 million in revenue. Without BARD grants, Trichoderma would not have been commercialized. The net value to farmers in the United States in the next few years from creating heartier crops is pushing $1 billion dollars. About 60 people are employed in the United States as a result of this project, and there will be more in the future as the company grows.

The introduction of transferable water rights in California's Central Valley stems from early BARD support in the 1980s. The research derived from this project showed that water trading could lead to the adoption of modern technologies, a switch to higher-value crops, and greater value obtained from smaller volumes of water. The heightened awareness of the value of water trading led to the creation of the water bank at the height of the California drought in the late 1980s, and is estimated to have generated $60 million in benefits. BARD was an important source of funding, as it allowed the research team to apply lessons from one country to another.

In addition to the technologies that emerge from the projects that it supports, BARD also sponsors graduate student and postdoctoral fellowships for U.S. students. Additionally, BARD funds on average 2-3 workshops a year to enable scientists from the United States and Israel to meet with many international scientists and discuss relevant issues, policy matters, and future directions on specific topics.


BARD Grant Recipients by State
WA 42
OR 13
CA 264
ID 5
NV 2
MT 11
WY 3
UT 19
AZ 30
CO 10
NM 5
ND
SD 2
NE 15
KS 6
OK 7
TX 67
MN 28
IA 27
MO 7
AR 1
LA 5
WI 28
IL 29
MS 3
MI 55
IN 44
KY 11
TN 8
AL 19
OH 23
WV 12
GA 39
FL 89
SC 16
NC 35
VA 28
PA 25
NY 133
ME 3
VT 1
NH 19
MA
CT
RI
NJ 16
DE 12
MD 5
DC 82
3
AK
HI 11
PR 2

ADDITIONAL BENEFITS OF THE BINATIONAL FOUNDATIONS

Besides the contributions that these programs have made to the U.S. economy in terms of GDP growth and job creation, there are other benefits that the United States receives as a partner in these foundations.

BENEFITS OF COLLABORATION

The people we interviewed spoke highly of the collaborative aspects of these programs. Not only do the projects form strong partnerships between scientists, but they also foster additional collaborations both within and outside the binational programs. For example, one American grant recipient explained that a researcher at Technion had molecules that were not available in the U.S. research community. As a result of this grant program, American scientists have been able to study these molecules and employ them in their work in the United States. U.S. researchers were also able to avail themselves of a microscopy lab developed at the Weizmann Institute, which helped them to address key issues in their research when they did not have the necessary equipment. This mutual help allows scientists from the two countries to increase the scope of their research, both together and individually.

But the true benefit of collaboration, as explained by many of the people we spoke with, is that these foundations put two primary investigators with two different backgrounds and two different approaches on a team that then develops a novel approach for solving a particular problem. Many of the scientists who received grants from BARD are not agronomists, but may be virologists or physicists – not fields typically associated with agriculture. Two scientists from different fields who otherwise may not work together can get their projects supported through these foundations and create innovative products.

The United States and Israel also benefit from their frequently complementary nature. For instance, there are unique environments in Israel such as the Dead Sea that are ideal for certain marine ecosystems and their related research. Working with Israel allows U.S. scientists to take advantage of resources that might not exist within the United States. In many of the projects we studied, one side will have one component of the study, such as a genetic map or an ecosystem, while the other will have its complementary component, such as access to certain cultivars or equipment. The collaborative process in these cases is necessary to take the research to the next level.

These projects have also led to collaborations between U.S. and Israeli scientists outside the aegis of the foundations. A melon project that was funded with a BARD grant then led to the

two groups engaging additional teams of researchers and securing funding from an industry consortium. This then funded a core project designed to create the molecular resources necessary for scientists doing work with melons. Seed companies saw this as a resource development for the entire community, and now the consortium is recognized as the world's focal point for melon genomics. The external support that has been received, based on the work completed through the BARD grant, has attracted international attention and has made a significant global impact.

BENEFITS OF WORKING WITH ISRAEL

The American researchers with whom we spoke uniformly praised the Israeli scientific community. Many emphasized its ability to do more with less; lacking the substantial funding of U.S. universities, Israeli researchers have learned to stretch their money as far as it can go. This is facilitated by the fact that the government subsidizes graduate and post-doctoral students and much of the other university overhead thereby enabling researchers to spend more on equipment and supplies than is the case in the United States.

Another comment offered by many U.S. scientists is that the Israeli scientists are very well trained, especially the graduate students who visit the United States to work on foundation sponsored projects. It was noted that researchers from other countries – particularly China and India – come to the United States as a method of receiving training. They face a steep learning curve, and cannot fully contribute to the projects on which they are working until they are brought up to speed. In contrast, Israeli graduate students and post-doctoral students received high marks from U.S. grant recipients as being exceptionally well-trained and able to contribute to the research as soon as they arrive.

More broadly, these foundations allow the United States to maintain strong ties with a longtime ally, and support regional cooperation in the Middle East. BIRD manages TRIDE, a trilateral industrial development fund established by the United States, Israel and Jordan. BARD provides Facilitating Grants that allow investigators from Jordan, the Palestinian Authority, Israel and the United States to prepare joint research proposals to be submitted and funded by international funding agencies. Others mentioned to us the positive aspects of the United States having ties with Israel that go beyond just strategic security issues. Particularly advantageous is the fact that joint projects with Israel will not worsen the U.S. trade balance or affect strategic relationships as often tends to be the case with other countries. On the contrary the U.S.-Israel strategic partnership is reinforced through these binational foundations.

TECHNOLOGY TRANSFER COMPANIES

Although research funded by the BSF (and often BARD) is basic scientific research, and the end goal is not a commercial product, the way that many of the Israeli universities are set up helps to foster the development of commercial properties from this basic research. Many Israeli universities have technology transfer companies that take the research done by their faculty members and make it available to companies for commercial applications. While technology transfer offices are not uncommon at universities in the United States, the separate companies created by the Israeli universities work to capitalize on the innovations of their faculty, streamlining commercialization to make it easier and more efficient. By fostering relationships with private companies, these technology transfer companies help to bridge the gap between academia and the production of innovative new products.

Yissum is the technology transfer company for the Hebrew University of Jerusalem (HU). Over the past 47 years, Yissum has granted more than 530 technology licenses and is responsible for commercializing an array of successful products that generate over $2 billion in worldwide sales every year. More than 72 spin-off companies, including Mobileye, Keryx, Nasvax, and Novagali have had their start at Yissum. HU is twelfth in the world in technology transfer revenue, and receives more patents a year than any industry in Israel.

Yeda is the technology transfer company for the Weizmann Institute (WIS). Over 2500 introductions & presentations of WIS Technologies have been made to private companies. Yeda has also given over 130 presentations of confidential information to interested companies under signed secrecy agreements, and has had over 65 new license and option agreements signed. Over 70 research projects at WIS were funded through Yeda by private companies, by the chief scientist of the ministry of industry and trade, and by Yeda itself. More than 160 patent disclosures have been submitted by WIS scientists.

Ramot is the technology transfer company of Tel Aviv University, and manages all activities relating to the protection and commercialization of inventions and discoveries made by faculty, students and other researchers of TAU.

These technology transfer companies operate in a similar way. Forty percent of the revenue goes to the inventor, 20% goes to his or her laboratory, and the remaining 40% goes to the university. It should also be noted that neither these companies nor the universities push their faculty to do applied research; this is simply an avenue that exists for realizing the commercial potential of the research that occurs, and is not designed to force researchers to conduct research with obvious commercial potential. These transfer companies not only license technology, but also create spin-off companies, acting as an incubator for startups. Furthermore, many U.S. companies visit these technology transfer companies to develop a

working relationship with them, signing framework agreements that give them access to the technologies that are developed in these institutes. This close relationship, reinforced by the binational foundations, is yet another method through which the United States can stay at the vanguard of scientific innovation.

IMPORTANCE FOR U.S. RESEARCHERS

Not only do these foundations support projects that advance scientific study in both the United States and Israel, but they provide a mutually advantageous resource to scientists in both countries. The United States benefits in several ways:

By partnering with Israeli universities, U.S. researchers gain access to a highly innovative and cost-effective research community. Moreover, as noted above, because Israeli universities are subsidized by the state, the overhead in Israeli universities is considerably lower than in U.S. schools (sometimes by as much as 30%) allowing more of the funding to be spent on personnel and research. U.S. scientists have told us that Israeli universities are enormously innovative in the way they leverage the funds they do have, using them creatively to seed projects and encourage innovative research. BSF and BARD are similar in that respect – by funding the basic science that some larger grant sources might not be interested in or willing to take a chance on, a project could lead to a breakthrough or interesting discovery that will then receive funding from additional sources.

These foundations also provide funding in areas where larger scale funding sources will not. For example, the U.S. Department of Agriculture (USDA) is very restrictive as to what research areas they will fund, and limited their funding to topics that they consider to be critical. The lack of government and private sector interest makes funding from other sources critical. We were told that USDA used to be more open with respect to what topics it would support, but recently has been focused on specific diseases or species, which prevents researchers in certain fields from applying for USDA grants. With BARD, as long as the project is agriculturally important and has potential benefits for both countries, it can be funded.

TRAINING THE NEXT GENERATION

The scientists we interviewed highlighted the training their students receive as one of the great benefits of the binational foundations. Some mentioned students they had trained in their labs on BSF or BARD projects who had gone on to become professors at prestigious universities. Another told us of a former post-graduate student who founded a "start-up" company in the

United States that was subsequently acquired by a large corporation. Thus it is clear that talented people on both sides nurtured by these programs have gone on to do excellent work of their own.

This training is also related to job creation. One researcher mentioned that he has trained 40 graduate students who have then gone on to train their own graduate students and so forth in a cycle that builds a cadre of people who have expertise in key areas. Just as with the benefits that researchers enjoy, students who assist with these projects obtain access to materials and ideas that they would not otherwise have. Additionally, these grants generate jobs and bring in money to the local community for scientific training.

CONCERNS

Although scientists we spoke with applauded the ability of these programs to support excellent projects through comparatively small grants, many strongly suggested that the amount of the grants needs to be increased. In the United States, a typical BSF or BARD grant will barely cover the cost of a graduate student researcher. Some grantees we interviewed mentioned that they had had to supplement their grant funding with alternative sources. Other scientists suggested that increasing the amount of the grants awarded would make the application process more competitive, and bring in a wider array of scientists and projects, resulting in stronger projects.

Other people with whom we spoke mentioned that many Americans will not apply for the grants because they are too small and not worth the substantial time and effort necessary to make an application. Even recipients of the more generous BIRD grants felt that the amount of the grant was comparatively low, and recommended a follow on program that would facilitate the next stage of commercialization. In fact, some researchers suggested that some sort of progression from BSF or BARD grants to a BIRD-type grant would be useful, and help with issues of commercialization.

CONCLUSIONS AND RECOMMENDATIONS

The earlier reviews of BARD (1990 and 2000), BSF (2006), and BIRD (1996) made strong cases that the foundations are of significant benefit to the United States. Our analysis confirms this and suggests that these programs have paid for themselves several times over not only in technological terms but also in terms of economic growth, job creation, education and fostering of talent, and broader diplomacy. In our interviews with the directors and staff of each of the foundations, the grant recipients in both the United States and Israel, corporate executives involved in the BIRD programs, and involved government officials on both sides, we found exceptionally well-run programs with a strong scientific pedigree and entrepreneurial/innovative excellence, grant recipients who overwhelmingly supported them, and corporate executives and government officials who almost unanimously describe the programs as highly cost effective and called for more. From Nobel Prize-winning projects to technologies and companies that have become familiar to Americans in their everyday life, the impact of these foundations on scientific research and technology development and commercialization in the United States has been extraordinary in light of the relatively small amounts invested.

Since their inception, we estimate that the three binational foundations have produced economic benefits of at least $11 billion, with at least $7 billion of that accruing to the United States. We estimate very conservatively that the number of American jobs created from this activity ranges from 18,000 to 50,000 and probably to a lot more. Even at the lower end, this is a significant return on what has been for the United States only a $160 million investment.

Total Economic Benefits	$11 billion
Benefits to the United States	$7 billion
U.S. Jobs Created	18,000 to 50,000
U.S. Investment	$160 million
Estimated U.S. Tax Revenue	$700 million
Estimated U.S. After Tax Profits	$1.1 billion

Beyond the strictly economic benefits, there have also been large benefits in terms of education, training of new generations of skilled researchers, the fostering and cementing of entrepreneurial ties, the development of systems and techniques for identifying and developing key technologies, the fostering of broader diplomatic and strategic activities.

In view of this, we strongly recommend that the U.S. government undertake expeditiously to match the commitment to increased funding already made by the government of Israel.