

11-2-2009

Investing in people for the 21st century

Wallace E. Huffman

Iowa State University, whuffman@iastate.edu

Follow this and additional works at: http://lib.dr.iastate.edu/econ_las_workingpapers



Part of the [Economics Commons](#)

Recommended Citation

Huffman, Wallace E., "Investing in people for the 21st century" (2009). *Economics Working Papers (2002–2016)*. 150.
http://lib.dr.iastate.edu/econ_las_workingpapers/150

This Working Paper is brought to you for free and open access by the Economics at Iowa State University Digital Repository. It has been accepted for inclusion in Economics Working Papers (2002–2016) by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

Investing in people for the 21st century

Abstract

The paper draws upon the work of T.W. Schultz to show that human capital theory and labor market adjustments have important implications for investing in people for the 21st Century.

Keywords

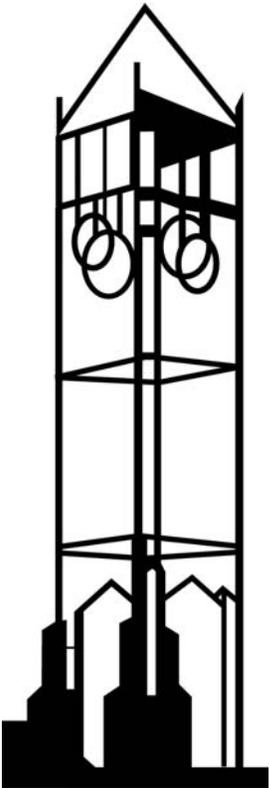
human capital, education, twenty-first century, global labor markets

Disciplines

Economics

Investing in People for the 21st Century

Wallace E. Huffman



Working Paper No. 09025
November 2009

IOWA STATE UNIVERSITY
Department of Economics
Ames, Iowa, 50011-1070

Iowa State University does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, gender identity, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Director of Equal Opportunity and Diversity, 3680 Beardshear Hall, (515) 294-7612.

Investing in People for the 21st Century

By

Wallace E. Huffman*

Abstract: The paper draws upon the work of T.W. Schultz to show that human capital theory and labor market adjustments have important implications for investing in people for the 21st Century.

Key words: Human Capital, education, twenty-first century, global labor markets

* C.F. Curtiss Distinguished Professor of Agriculture and Life Science, Iowa State University. This paper was delivered as the T.W. Schultz Lecture, South Dakota State University, October 6, 2009. Financial support was obtained by the Iowa Agricultural Experiment Station.

I. Introduction

T.S. Schultz became famous for developing a new concept, called human capital, i.e., the idea that investing in people improves their health, skills and competencies, knowledge or information base, and geographical location relative to consumption and work opportunities. Because investing in people is costly, he argued that the investment decisions are deliberate in that the benefits are weighed against the costs. Moreover, it is not a story about how innate ability, e.g., IQ, predetermines your economic lot in life.

Furthermore, he argued that we can apply the principles of investment theory developed for decision making on physical capital to human capital investments. That is, when an individual decides to obtain an additional year of schooling, he or she bears the costs of foregone earnings and direct outlays for tuition, books, supplies, and after completing the schooling, he or she expects to obtain high earnings for as long as he or she remains in the labor force. With a little work, the rate of return on this investment can be computed and compared to rates of returns on other available investments. Good investment decision making requires that the rate of return on education is greater than or equal to that on the best alternative uses of the funds (Schultz 1961a). This ambitious application of economic thinking to investments made in people shocked some economists, social scientists, and others when he presented it in his Presidential Address to the American Economics Association in St. Louis, Mo, December, 1960. For example, some people had difficulty in separating the direct consumption value and investment value of education (Schultz 1961b).

However, Schultz had for almost two decade been wrestling with the new idea of human capital. As a result of post-WW II travels to Germany and Japan, he was able to see first-hand a miraculous speed of recovery from widespread immediate devastation at the end of the war. In contrast, the United Kingdom took a long time to recover. He concluded that the rapid recovery

was due to a healthy and highly educated population in Germany and Japan relative to the UK. Education makes people productive and good healthcare keeps the educated individual able to engage in productive work more intensely and longer. These insights were also useful new ideas about the primary source of economic growth of countries and regions.

Human Capital is now a well established part of economics. The widely used *Journal of Economic Literature* classification of topics in economics places human capital under the broad field of labor and demographic economics. However, its fruits also spillover to the fields of health, education and welfare; economic development, technical change and growth; agricultural, natural resource and environmental economics; and urban, rural and regional economics.

When Schultz was born (1902), the distribution of the U.S. labor force across employment sectors was 36% in agriculture, 28% in industry and 36% in services. In 1960 (the year that Schultz gave his investing in human capital address to the AEA) the shares had shifted dramatically—only 9% in agriculture, 34% industry and 57% in services. Hence, over this slightly more than half a century, the U.S. became a service economy by having a majority of employment in the services sector. Currently, the shares are 2% in agriculture, 17% in industry, and 81% in services. Rapidly growing service sectors have been in health and education and professional and business sectors. These structural changes suggest that the demand for the ability to do physical work has largely disappeared and the opportunity to perform services, some of which are quite high skilled, have been growing rapidly. Over the past decade, there has been a discussion of outsourcing manufacturing and more recently business service jobs. However, a large share of our young people do not have the education needed to compete well in this labor market of the 21st Century; less than one-third of them have bachelors' degrees. U.S. public universities, which produce the bulk of these degrees, are facing a financial crisis of their own, struggling to establish a new identity in higher education.

The purpose of my paper is to show that human capital theory and labor market adjustments have important implications for investing in people for the 21st Century. Section two identifies major types of human capital, section three presents a model of the human capital investment decision, section four reviews globalization and changing world labor market, and section five takes up the issue how much and who pays for a college education. The final section presents some conclusions.

II. Types of Human Capital

The field of human capital has taken on a strong acquisition of skills and information flavor. Although much of the early focus was on formal educations (K-12, higher education and advanced education), the list of topics have been expanded to include, pre-school activities, informal education or information acquisition as in short courses and seminars and informal study of written materials and shopping, and learning while working on the job (on-the-job training). For example, recent research by Heckman (2006) and Heckman and Masterov (2007) report that pre-school activities of disadvantaged children help children develop social or non-cognitive skills that have long term payoff in later school, social and labor market performance, especially in disadvantaged children.

Early discussions of investing in health focused upon public health investments (mandatory vaccinations for contagious diseases and treatment of water and waste materials) and the inputs of the medical services and pharmaceuticals. However, economists were among the first to hypothesize that good health is produced by the way that we choose to live our daily lives, i.e., through long-term choices made on diet, exercise, moderate alcohol consumption, and weight and stress management, some times refereed as healthy lifestyle choices.

It is costly for individuals and families to move from one place to another, or to migrate. It takes time to plan a move, to physically pack up and move ones own and family possessions, and

in a new location, employment, housing, grocery stores, schools, banks, and churches must be located. Also, new friendships must be established. However, it is widely recognized that human migration changes and frequently provides benefits through improved education, employment or/and consumption opportunities. Moreover, it is widely accepted that education aids migration. For example, with the major shifts in the industrial (and occupational) distribution of the U.S. labor force, rapid exit from farm to nonfarm jobs occurred in the 1950-1970s. More recently, the shift has been from manufacturing to service sector jobs where added education facilitates the move.

Immigration or international migration to the U.S. has been a part of our history since at 16th Century. In particular, the U.S. had relatively unrestricted immigration to 1920, when the national origins immigration act was passed. It limited new immigrant numbers to the countries that had the largest share of the immigrants as determined in the most recent U.S. census of population. Hence, Western and Northern Europeans were favored. However, in 1965, this legislation was replaced by a family unification and refugee immigration policy. Potential immigrants who had family members who were U.S. citizens were given priority. This has had the effect of attracting a relatively large number of low skilled individuals and parents of citizens. Since 1970, U.S. immigrants have been heavily from Mexico and Central America and from Asia.

III. The Human Capital Investment Decision

Most human capital investment decisions take a similar structure. However, to be precise, let's consider the decision of whether to invest in a 4-year college degree rather than stopping with a high school diploma or completing secondary school. Let Y_t^I = earnings of a high school graduate in year t (in constant dollars), Y_t^{II} = earnings while individual is enrolled in college, net of costs of completing a four-year or BA/BS college degree, and earnings after graduating from college (in constant dollars). See Figure 1. However, students while enrolled in a four-year

college degree program are assumed (for ease of exposition) to have zero earnings. Thus, while a student is enrolled in college, he or she foregoes the earnings of a high school graduate. This is one important part of the cost of obtaining a four-year degree, see Figure 1, area C₁. Also, college students incur the direct costs of attending college: expenditures for tuition, books, fees, and any net increase in housing, food, and clothing as a result of being a college student relative to being an earner with a high school diploma, see Figure 1, area C₂. These two types of costs are combined together to obtain the total cost of obtaining a four-year college degree. In Figure 1, the earnings of a new college graduate is higher than for a high school graduate, and this difference is the net annual benefit of obtaining a college degree, see Figure 1, area B. Since a dollar next year (5 or 40 years from now) are worth less to most individuals than a dollar today, we must convert the education capital investment project into equivalent units by discounting. Let r_t be the discount rate (in constant dollars) appropriate for this education capital investment decision, e.g., the real rate of interest that the individual or household would encounter if they were to obtain a college education loan, the real rate of return foregone on a passbook savings account or stocks or bonds if returns from these assets are used to self finance the investment. Consider the net present value of investing at age 18 (NPV¹⁸), the age at high school graduation, and assume retirement occurs at age 65:

$$\begin{aligned}
 (1) \quad \text{NPV}^{18} &= \sum_{t=18}^{65} (Y_t^H - Y_t^L) / (1 + r_t)^t \\
 &= \sum_{t=18}^{22} (Y_t^H - Y_t^L) / (1 + r_t)^t + \sum_{t=22}^{65} (Y_t^H - Y_t^L) / (1 + r_t)^t = -C + B
 \end{aligned}$$

where the first term on the right of the above expression equals “-C” and the second term equals “B.” This investment in a four-year college degree is a worthy investment if NPV¹⁸ is greater than or equal zero. Alternatively, we can proceed as if we do not know r_t and set NPV¹⁸ = 0, and solve for r_t^* , the discount rate that makes NVP at age 18 equal to zero. This discount rate is the

(marginal) internal rate of return on the investment in college education. A larger r_t^* implies a more attractive education investment project.

We can draw some additional implications from this exercise. First, suppose that earnings of college graduates were to increase relative to high school graduates, then NPV^{18} and r_t^* would increase, implying that investing a four-year college degree is an even better investment proposition than before. Second, suppose that individuals who complete a four-year college degree actually work more years, say to age 68, but high school graduates retire earlier at age 65 (earnings at zero). How will this affect the decision to invest in a four-year college degree? Both NPV^{18} and r_t^* will increase. Third, suppose that the direct cost of attending college, say tuition increases dramatically (i.e., C_2 increases), how will this affect the college investment decision? Since $-C$ is a larger negative value and other things are unchanged, both NPV^{18} and r_t^* will decrease, i.e., investing in a four-year college degree will become less attractive.

Moreover, equation (1) and its internal rate of return alternative are powerful tools to be used in addressing any human capital investment decision. In almost all cases, the costs are upfront or at the beginning of the project and the benefits are in the future, generally ending at retirement (or at the end of life). For example, consider women and their treatment during pregnancy: access to pre-natal medical care, an improved diet rich in vitamins, folic acid, and calcium, and behavioral modification (no smoking, drinking alcohol or doing drugs). This set of events which has costs also has been shown to improve the health of new borne babies, including increasing birth weight (Rosenzweig and Schultz 1983). In addition, it is widely accepted that poorly developed organ systems that arise from a poor fetal environment are one of the main causes of early on-set of chronic diseases of old age (Fogel 1994). Moreover, recent research by Behrman and Rosenzweig (2004) have shown that increasing birthweight increases adult schooling attainment and adult height for babies at most levels of birthweight, but does not affect

adult body mass index. However, mature height and school attainment impact adult earnings positively (Keng and Huffman 2007). Hence, a long term payoff results from an investment in human capital as reflected in babies birthweight.

You might like some information about the relative attractiveness of various types of human capital investments. I have reviewed a wide variety of literature, and pulled together my assessment of the likely rate of return to human capital investments of various types (Heckman 2006, Welch 1999, Card 1999, Heckman et al. 1999, Dougherty 2005, Heckman et al. 2006, Heckman and Lafontaine 2006, Huffman and Evenson 2006). In Table 1, I have grouped them into the following categories: (i) extremely high, (ii) high, (iii) medium to low, and (iv) other: highly variable. In the extremely high category, I include improved gestation environment of babies, pre-school programs of disadvantaged children and an elementary school diploma. In the high category, I include a high school diploma, four-year college degree, advanced degrees I (Masters level) and advanced degrees II (Ph.D., MD, JD, DD). Investing in migration and information seem likely to have highly variable returns.

IV. Globalization and the Changing World Labor Market

Globalization of the markets for many goods and financial assets has implications for the U.S. labor market of the future, which in turn has implications for future human capital investments. Manufactured goods are highly tradable, and hence, jobs in manufacturing are especially vulnerable to international competition. But new evidence suggests that both manufacturing jobs and service jobs may be at risk to international competition. Imports from low-income countries were the fastest growing components of U.S. trade from 1972 to 1997, increasing more rapidly than aggregate imports. As U.S. trade barriers have fallen in recent years, Bernard et al. (2006) show that low-wage countries like China and India have begun exporting to the U.S. many of the more labor-intensive products formerly produced domestically. This so-

called product cycling—where the U.S. moves out of labor-intensive products like t-shirts and sneakers as lower-cost developing countries move in—is a key feature of endowment-driven trade theory. Given the higher relative wages in the U.S., it is virtually impossible for U.S. firms to earn profits producing labor-intensive goods. As a result, industries like apparel and footwear are all but disappearing, while more skill- and capital-intensive sectors such as instruments and software creation thrive here.

However, there are multiple margins of adjustment to low-wage country imports, e.g., exit and product upgrading. Labor-intense plants are relatively more susceptible to low-wage country imports than are capital- and skill-intensive plants in the same industry. As a result, within-industry activity should shift toward relatively capital- and skill-intensive plants. It is important to focus on low-wage country import penetrations, e.g., import penetration from countries that have per capita GDP that is less than 5 percent of the U.S. level. This attention to where imports originate is motivated by the factor proportions framework (capital-labor, capital-skilled labor, and/or capital-unskilled labor ratios) and allows for a cleaner test of the influence of comparative advantage than aggregate import penetration, which treats imports from high- and low-wage countries symmetrically.

Figure 2 (fig 4 of Jensen) displays the association between the U.S. low-wage-country import shares and the U.S. industry average annual wage for disaggregated U.S. industries. Low-wage U.S. manufacturing jobs can be classified as those that pay an annual wage of less than \$40,000 (or roughly a wage of \$20 per hour) and high-wage jobs pay \$40,000 or more. Figure 2 shows low-skill, low-wage, labor-intensive activities in the manufacturing sector face high levels of low-wage-country import competition as recently as 2006, e.g., apparel, leather and allied products, textile products, furniture and related products, and miscellaneous products (which include toys). In contrast, high-wage, high-skill industries face low competition from low-wage-

countries as reflected in the low-wage-country import share, e.g., transportation equipment, chemicals, and petroleum and coal products. An outlier to this trend is the computer and electronic equipment industry, which has a high average wage and a relatively high low-wage-country import competition. This exception is most likely due to the increased fragmentation of consumer electronics production where the underlying components, like semi-conductors, that are high-wage, high-skill activities produced in the U.S. and shipped to China for low-wage, labor-intensive assembly (Jensen and Kletzer 2008).

U.S. manufacturing plants seem to adjust to international competition from low-skilled, low-wage countries in three dimensions. At the industry level, exposure to low-wage country imports is negatively associated with plant survival and employment growth (Bernard et al. 2006). Within industries, the higher is the exposure of the industry to low-wage country imports, the larger is the relative performance difference between capital- and labor-intensive plants. Moreover, a positive association exists between exposure to low-wage country imports and industry switching. Plants that switch industries shift into industries that have less exposure to low-wage country imports and greater capital- and skill-intensity than the industries they left behind. In manufacturing, it is the low-wage, labor-intensive industries like Apparel that are most vulnerable to low-wage import competition. The U.S. continues to have strong export performance in high-wage, skill-intensive manufacturing industries. These results support the view that U.S. manufacturing is moving away from comparative-disadvantage activities and toward comparative advantage industries via exit, growth and industry switching.

Some U.S. industries remain quite competitive, having large exports per worker. Figure 3 (fig 7 jensen) shows the association between U.S. exports per worker in manufacturing and U.S. industry average annual wage. It confirms the story from the import competition graph—low-wage, low-skilled U.S. industries export little per worker, e.g., apparel, textile products, leather

and allied products, furniture and related products. However, it also shows that in high-wage, high-skilled U.S. industries, exports per worker are high, e.g., transportation equipment, computer and electronics and petroleum and coal products. Summing up, lower-paying, labor-intensive U.S. industries face intense international competition from low-wage, labor-abundant countries, but that the U.S. continues to have a comparative advantage in high-wage, capital- and technology-intensive manufacturing.

A new direction in potential international competition in services—both imports to the U.S. and U.S. exports. Some services require face-to-face interactions, e.g., hair cuts, legal counseling and medication treatments, but others do not, e.g., accounting, architectural services, software publishing, securities and commodity trading, and R&D. Occupational groups with low employment shares in tradable activities require a physical presence to deliver them, e.g., education, healthcare practitioners, healthcare support workers, food preparers, janitorial workers.

Jensen and Kletzer (2008) present new evidence on the potential tradability of services. They argue that good information on whether a service has the potential to be international tradable can be gleaned from evidence on intra-country tradability of services. For example, many service activities—movie and music recording production, securities and commodities trading, software and engineering services, and air-travel plan reservations—appear to be tradable within the U.S., and thus, are potentially tradable internationally. Those activities that require face-to-face interactions are far less likely to be tradable services. Figure 4 (Jensen figure 2) shows that the share of U.S. employment that is in tradable professional services is 13.7 percent, which is larger than the share of employment in tradable manufacturing industries of 12.4 percent. Some big service sectors—education, healthcare, personal services and public administration—do have low shares of employment in tradable industries. Also, a relatively small share of employment is in tradable retail and wholesale trades. When workers in tradable occupations (e.g., computer

programmers, the retail banking industry or medical transcriptionist in the health care industry) in nontradable industries are included, the share of the U.S. workforce in tradable service activities is even higher (Jensen and Kletzer 2008).

While many services appear tradable, Jensen and Kletzer (2008) suggest that only about one-third of the jobs in these activities will face meaningful competition from low-wage countries or risk being off-shored in the next decade. Tradable service jobs, such as those in engineering or research and development firms, are good jobs. Workers in tradable service activities have higher than average earnings. Part of this premium is due to these workers having higher educational attainment than other workers, but even controlling for differences in education and other personal characteristics, workers in tradable service activities have 10 percent higher earnings. Within the set of professional service industries, a worker in a tradable industry and a tradable occupation has earnings almost 20 percent higher than similar professional service workers in a nontradable industry and occupation.

High earnings in tradable service activities do not mean that these jobs will be “lost” to low-wage countries. High-wage, high-skill activities are consistent with U.S. comparative advantage. The U.S. continues to export high-wage, high-skill business services like compute software publishing, satellite telecommunications services and integrated record production and distribution (Figure 5, Jensen figure 8). Most issues about off-shoring focus on the jobs that might be lost but neglect to emphasize that the U.S. has comparative advantage in many service activities. Jensen and Kletzer (2008) suggest that increased exports of services are likely to benefit many U.S. firms and workers in the future. They suggest that at least two-thirds of tradable business service jobs are skilled enough to be consistent with U.S. comparative advantage. U.S. service workers and firms are likely to be beneficiaries of increased trade in services through increased export opportunities.

However, it is important to remember that many impediments exist to trade in services, ranging from language and cultural differences to regulatory and technical barriers. These impediments are likely to protect U.S. firms and service workers from import competition but are also likely to impede U.S. firms and service workers from rapidly growing exports. These impediments reduce the gains to the United States from trade in services and increased living standards that could result. If harmonization of regulations and expanding mutual recognition of professional standards and accreditation could occur, the future potential of increased benefits of trade in services could develop over the next decade.

It is useful to take a look at the record on industry employment change over 1998-2004, broken out by sector and tradable/nontradable classification. All industries experienced a major downturn in employment over this period—by 13 percent in nontradable agriculture, mining and manufacturing and 23 percent in tradable agriculture, mining and manufacturing. In contrast, service sector, employment increased—by 10 percent in nontradable and 13 percent in tradable services. Thus, tradable manufacturing industries experienced large losses relative to nontradable manufacturing, but tradable service industries had employment growth similar to nontradable service industries (Jensen and Kletzer 2008).

In summary, the evidence suggests that lower-paying, labor-intensive U.S. industries face competition from low-wage, labor-abundant countries, but that the U.S. continues to have a comparative advantage in high-wage, capital- and technology-intensive manufacturing. Also, there are more jobs in tradable services than in tradable manufacturing, and workers in tradable service activities have higher skill levels and are paid higher wages than manufacturing workers or workers in nontradable services activities. However, some workers are displaced in both sectors and displaced tradable service workers have higher skills and higher pre-displacement earnings than displaced manufacturing workers (Jensen and Kletzer 2005). Understanding where the future

comparative advantage of the U.S. industries, occupations and workers lies is important in planning for future educational investments. For example, U.S. high school dropouts that anticipate working in low-skilled, low-wage U.S. manufacturing can expect a large amount of competition from large countries with many low-wage, unskilled workers. Given the shift in the structure of the U.S. labor force toward services and foreign competition, young people should pursue higher education and employment in nontradable services so as lessen the feeling of competition from abroad.

V. How Much and Who Pays for a College Education?

Since we are on a university campus, where education or teaching and learning are major activities, it is useful to look more carefully at some issues underlying the supply and demand for college education. A little history may be useful here. The average earnings of full-time workers with four or more years of college education relative that of a high school graduate was roughly 1.37 in 1969 but steady declined and bottomed out in 1979 at 1.30 or about a 7.5% decline. Starting in 1980, this wage ratio rose relatively rapidly to 1.65 in 1990 or about 24% (Welch 1999). This high ratio continued through the 1990s and into the 21st Century.

A broader wage comparison is instructive here. Over the period 1979 to 2007, the constant dollar median usual weekly earning of full-time wage and salary for those with less than a high school diploma decreased by 28% for men and by 8.7% for women. See Figure 6. Men who were a high school graduate (but without any college) experienced a 16% decline, but for women, the weekly earnings rose a little—4%. Men who had some college or an associate degree also experienced a small decline—by 7%, but women’s weekly earning rose 8.6%. Men who had a Bachelors degree or higher education experienced an 18% rise in earnings over this period, and women experienced a much larger rise by 33%. These results are consistent with the story of the preceding section, low-education U.S. workers, especially men in manufacturing, have

experienced a dramatic decline in their earnings over the past 30 years. The decline for low-education women has been less because a larger share of them are employed in services, which face less foreign competition. High-education men and women have experienced a substantial rise in real earnings over the past 30 years. Many of them are employed in high-skilled, high-technology jobs that face relatively low import competition, and for some of them, they are employed in areas that are effective exporters of services.

Given that the returns to college in the U.S. seem to be high and have been high for roughly a decade, and the market for high-skilled labor is increasing, what does the distribution of educational attainment of young adults look like? Figure 7 provides information for adults 30-34 years of age in 2007. By age 30, almost all adults have completed their formal education, including advanced and professional degrees. However, only 31.2 percent of these individuals have completed at least a Bachelor's degree (only 10.6% of them with an advanced degree). This is rather shocking. The economic evidence is that individuals who have completed some college perform in the labor market at roughly the level of high school graduates, which is substantially below that of college graduates. Hence, roughly 55.4 percent of our young adults are equipped with only a high school degree or slightly more. Moreover, even with the dramatic fall in real wages for high school drop outs, 13.6 percent of the young adults are high school drop outs. This latter group is especially vulnerable to poor future labor market outcomes, and it remains a puzzle as to why the share has not declined.^{1, 2}

Who is paying for college education in the U.S.? Recent Sallie Mae, the national's leading provider of saving- and paid-for-college programs, and Gallop, conducted one of the first surveys of college students and parents of students 18-24 years of age (SallieMae 2008). The reference year was the 2007-2008 academic school year, and they asked about the total cost of college

¹ The share of adults 25-29 years of age who are high school drop outs is a little higher—almost 14%.

² Countries that rank higher include Canada, Japan, Korea, Sweden. See Appendix A.

tuition and related expenses (tuition, books, fees, room and board) and the method by which parents and students pay for college. The estimated average cost of a year at college was \$14,628--\$13,706 for four-year state universities and \$27,679 for four-year private colleges and universities. The study shows that both parents and students shared the costs of a year of college. Overall, parents on average contributed the largest share of paying for college (48%)—32 percent from current income and savings and 16 percent from borrowing (Table 2). The students on average covered 33 percent of the cost—23 percent through borrowing and 10 percent from own income and savings. Grants and scholarships made up 15 percent of the amount paid, and a small amount of support came from friends and relatives (3%).

At four-year public universities where the average cost was \$13,706, parents on average contributed 49 percent of the cost—35.2 percent from current income and savings and 13.9 percent from borrowing (Figure 8). The college students on average covered 32.1 percent of the cost—with 22.7 percent from student borrowing and 9.4 percent from student saving and income. Grants and scholarships made up 14.4 percent of the amount paid, and a small amount of support came from friends and relatives (4.4%). Hence, we see that sharing of the cost of college between parents, students and grant/scholarships are very similar for four-year state universities and all public and private institutions offering college degree. However, for parents with students in four-year public universities a little larger share of the cost—roughly 3 percentage points—is from current income and savings and less from parent borrowing.

Public universities receive a subsidy from state government appropriations to support undergraduate education and other teaching, research and outreach activities. Using a Delta Project Report (Wellman et al. 2009), I estimate that the state government subsidies to public four-year universities for undergraduate education was \$3,900 per full time equivalent student in the 2007-2008 academic year, or the average total cost of a year of college education at a four-year

public institution was \$13,706 + \$3,900 or roughly \$17,606. This is an average state government subsidy rate from state government appropriations of roughly 22 percent.³ The size of this subsidy, which is largely paid by local State income and sales tax collections, has been declining over the past decade (in constant dollars). Public universities costs in constant prices have been relatively constant and tuition has been growing at about 5.5 percent (Wellman et al. 2009). Since 2000, state governments have revealed a growing unwillingness to appropriate funds to support undergraduate education and other activities of their state universities.

One can reasonably ask why this is occurring. Recall that Land-grant universities were established by the Morrill Act of 1862 for teaching of agricultural and mechanical arts to common people. The needs of farmers (and families) across the U.S. for new scientific knowledge to help them compete and prosper led to the Hatch Act of 1887, which provided federal funding for state agricultural experiment stations to undertake agriculture and home economics research. Although early financial support was mainly federal, state governments later assumed the majority funding role, which was natural given their emphasis on applied and basic research to assist local agriculture (and families). The establishment of a federal-state extension service was aided by the Smith-Lever Act of 1914. Hence, the primary structure of land-grant universities was established by the early 20th century (Goldin and Katz 1999, Huffman and Evenson 2006b).

In the first half of the 20th Century, a growing supply of high school graduates from families with modest means were produced by the high school movement and some of them chose to attend college (Goldin and Katz 1997). During the post-World War II period, a major transformation of the land-grant system resulted in an expansion in scale (size) and scope (number of specialized departments and professional schools). Land-grant universities became major centers of complementary research and teaching activities, where faculty trained for research and

³ I use what is reported as “full educational costs,” which include direct instructional costs, plus spending for student services and the instructional share of central academic and administrative support. It does not for example include the implicit rental on capital in classrooms or laboratories and equipment used for teaching.

advancing the state of knowledge also engaged in undergraduate and graduate education. Also, over 1948-1970, the mass exodus of people out of agriculture, most with high school diplomas, provided a growing demand for college education. Public universities responded by offering an increasingly diverse range of undergraduate majors and degrees. Through this era, undergraduate students were primarily in-state students, and they were seeking a college education so that many of them could continue to live and work in the state where their parents worked and paid taxes. Abundant evidence exists that state governments were willingly to provide large subsidies to public institutions of higher education in these early years because it directly benefitted local agriculture, business, and natural resource development and the citizens of the state.⁴

Much has changed (Just and Huffman 2009). College students are now more mobile—looking across state borders for the best education deal. Even if they attend the local land-grant university, a large share of them expect to take jobs and live in other states. The USDA has dramatically reduced its block grant funding of agricultural research and extension, and scientists have been increasingly encouraged to seek competitive grant funding at the federal level (NIH, NSF, USDA, etc). This means that States can expect to capture a smaller share of the future benefits from the education of their graduates and discoveries of their scientists. Hence, state governments are reducing their appropriations for land-grant universities, and land-grant and other public universities are raising tuition rates at a relatively rapid rate in an attempt to cover a larger share of the cost of educating students.

Where are we headed? One possibility is that the consequent budget realities may lead to a new institutional structure whereby public research universities are transformed into mixed public-private universities. The components of the university that provide relatively largely within-State

⁴ Goldin and Katz (1999) emphasize that a large share of the early engineering graduates were employed by the government sector, and graduates of two- and four-year education colleges were employed primarily by local school districts. Also, early graduates of colleges of agriculture, veterinary medicine, and the sciences were largely employed in local agriculture.

benefits, such as colleges of agriculture with their experiment stations and extension services and/or colleges of education may justify large state subsidies, including low tuition rates. Other units that provide training for degrees that are similar to that offered by non-land-grant public and private universities would charge higher tuition rates—rates comparable to private universities with similar quality degree offerings. Research faculty would be asked to seek grant funds from outside of state sources. Second, given that the benefits of college education and research discoveries undertaken in any given State extend increasingly beyond its boundaries, regional groups of states or perhaps the Federal government, might take new responsibilities for raising resources and allocating them to instruction and research in public universities. This could be structured so that the cost burden of instruction and research are more closely tied to the area(s) receiving the benefits, including positive externalities. This is the principle of “fiscal equivalence” from public economics, which has been proposed by Mancur Olson, another famous economist from the Dakotas (Olson 1969, 1986).⁵ Third, land-grant and other public universities could continue on their path of slowly being converted into private universities, and eventually receiving insignificant state financial support. I have provided a short menu of options for land-grant universities in the future—some which seem better than others for the long term. However, the route that we travel will significantly impact investments in people in the 21st Century.

VI. Conclusions

Ted Schultz was an incredibly insightful man—judging ideas and people with unusual expertise. His actions were very important to improvements at Iowa State University and at the University of Chicago, where he spent a combined total of 24 years as a department head. His idea of human capital, investing in people has steadily expanded to an increasing array of activities—

⁵ Olson was from Grand Forks, North Dakota.

ranging from modern economic growth and development to the economics of the households and other non-market activities.

Land-grant universities have a very special place in the training of undergraduate and graduate students and in undertaking the work of advancing the frontiers of knowledge in many areas. These are high-skill intensive activities and cannot be successfully undertaken by part-time faculty or faculty that spends all of their time teaching. At the start of the 20th Century, major universities for the first time started to make discovery an important part of a university job. This feature distinguishes U.S. universities from those in many other parts of the world. It is a rich heritage and one not to be taken lightly.

Investing in people for the 21st Century is a very important activity, with important decisions to be made at many levels.

References

- Behrman, J.R. and M.R. Rosenzweig. "Returns to Birthweight." *The Review of Economics and Statistics* 86(2004):586-601.
- Bernard, A.B., J.B. Jensen, and P.K. Schott. "Survival of the Best Fit: Exposure to Low-Wage Countries and the (Uneven) Growth of U.S. Manufacturing Plants." *Journal of International Economics* 68(2006):219-237.
- Card, D. "The Casual Effect of Education on Earnings," in O.C. Ashenfelter and D. Card, Eds., *Handbook of Labor Econ.*, Vol. 3A. New York, NY. Elsevier, 1999, pp. 1802-1864.
- Wellman, J.V., D.M. Desrochers, and C.M. Lenihan. "The Growing Imbalance: Recent Trends in U.S. Postsecondary Education Finance." Delta Cost Project, Washington, DC, Jan. 2009.
- Dougherty, C. "Why Are the Returns to Schooling Higher for Women than for Men?" *J. Human Resources* 40(2005):969-988.
- Fogel, R.W. "Economic Growth, Population Theory, and Physiology: The Bearing of Long-Term Processes on the Making of Economic Policy." *American Economic Review* 84(1994):369-395.
- Goldin C. and L.F. Katz. "Why the United States Led in Education: Lessons from Secondary School Expansion, 1910 to 1940." National Bureau of Economic Research, Working Paper, No. 6144, August, 1997.
- Goldin, C. and L.F. Katz. "The Shaping of Higher Education: The Formative Years in the United States 1890 to 1940." *Journal of Economic Perspectives* 13(1999):37-62.
- Heckman, J.J. "Skill Formation and the Economics of Investing in Disadvantaged Children." *Science* 312(June 30, 2006):1900-1902.
- Heckman, J.J. and P. LaFontaine. "Bias-Corrected Estimates of GED Returns." *Journal of Labor Economics* 24(2006):661-700.
- Heckman, J.J., R.J. LaLonde and J.A. Smith. "The Economics of Econometric of Active Labor Market Programs." In *Handbook of Labor Economics*, Volume 3a, Chapter 31, O. Ashenfelter and D. Card, Eds., New York, NY: North-Holland Publ, 1999, pp. 1865-2097.
- Heckman, J., J. Lochner and P. Todd. "Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond. In *Handbook of the Economics of Education*, E.A. Hanushek and F. Welch, Eds., Amsterdam, The Netherlands: North-Holland, 2006, pp. 307-458.
- Heckman, J.J. and D.V. Masterov. "The Productivity Argument for Investing in Young Children," *Review of Agricultural Economics* 29(Fall 2007):446-493.

- Huffman, W.E. and R.E. Evenson. "Do Formula or Competitive Grant Funds have Greater Impacts on State Agricultural Productivity?" *American Journal of Agricultural Economics* 88(2006a):783-798.
- Huffman, W.E. and R.E. Evenson. *Science for Agriculture: A Long-Term Perspective*. 2nd Edition. Ames, IA: Blackwell Publishing 2006b.
- Jensen, J.B. and L.G. Kletzer. "Tradable Services: Understanding the Scope and Impact of Service Outsourcing." Peterson Institute for International Economics, Working Paper WP05-9, Sept 2005.
- Jensen, J.B. and L.G. Kletzer. "Fear' and Offshoring: The Scope and Potential Impact of Imports and Exports of Services." Peterson Institute for International Economics, Policy Brief PB08-1, January, 2008.
- Just, R.E. and W.E. Huffman. "The Economics of Universities in a New Age of Funding Options." *Research Policy* 38 (2009) 1102-1116.
- Keng, S.H. and W.E. Huffman. "Binge Drinking and Labor Market Success: A Longitudinal Study on Young People." *Journal of Population Economics* 20(2007):35-54.
- OECD. *Education at a Glance: 2009*. Paris, France, Sept. 2009.
- Olson, M. "The Principle of Fiscal Equivalence: The Division of Responsibilities among Different Levels of Government." *American Economic Review* 59(1969):479-487.
- Olson, M. "Toward a More General Theory of Government Structure." *American Economic Review* 76(1986):120-125.
- Rosenzweig, M.R. and T.P. Schultz. "Estimating a Household Production Function: Heterogeneity, the Demand for Health Inputs, and Their Effects on Birth Weight." *Journal of Political Economy* 91(1983):723-746.
- SallieMae. *How America Pays for College*. Reston, VA, August 2008.
- Schultz, T.W. "Investing in Human Capital." *American Economic Review* 51(March 1961):1-17.
- Schultz, T.W. "Investing in Human Capital: Reply." *American Economic Review* 51(Dec.1961):1035-1039.
- U.S. Census Bureau. "*Educational Attainment in the United States: 2007*." U.S. Department of Commerce, P20-560, January, 2009.
- Welch, F. "In Defense of Inequality." *American Economic Review* 89(May 1999):1-17.

Figure 1. The economics of investing in a 4-year college degree, given a high school diploma

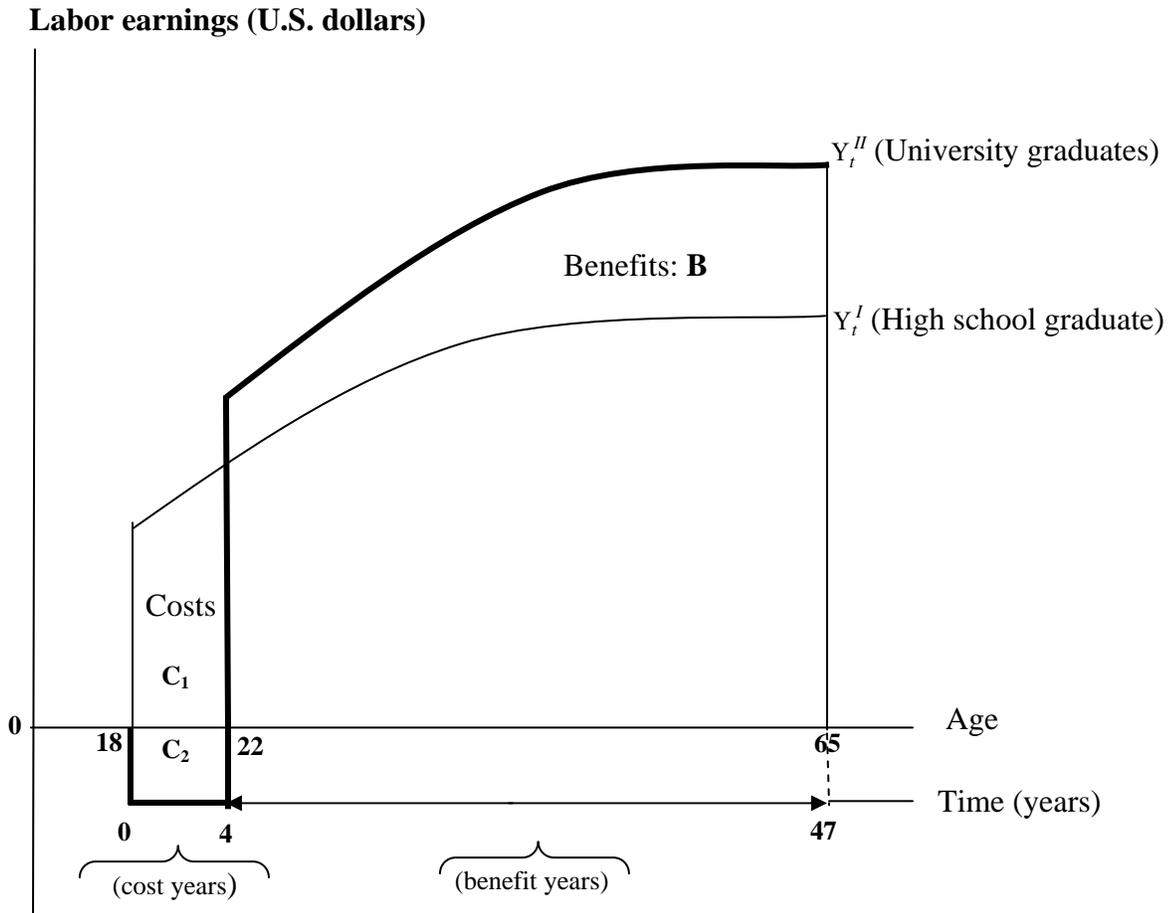
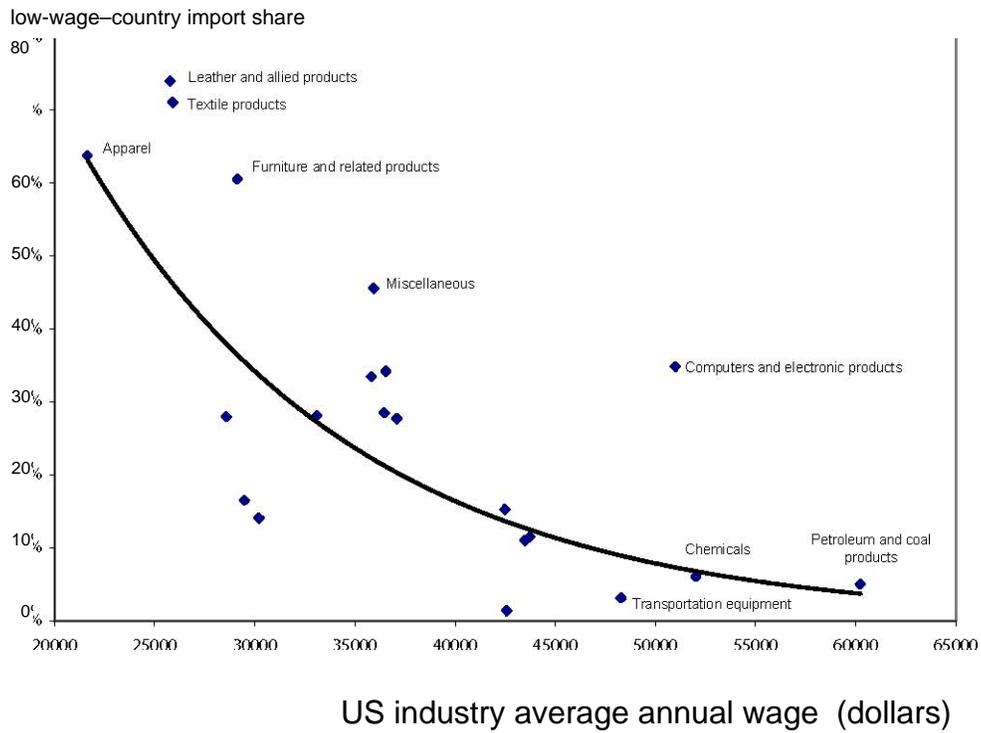


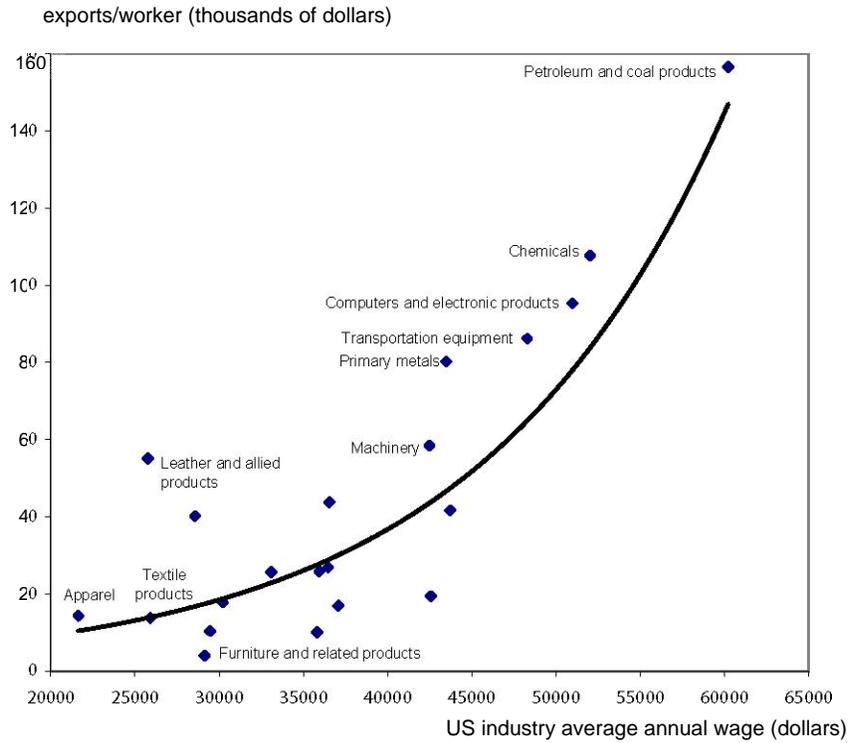
Figure 2 Low-wage US industries face low-wage-country import competition, manufacturing (NAICS 31, 32, 33)



NAICS = North American Industry Classification System.

Sources: Jensen and Kletezer 2008.

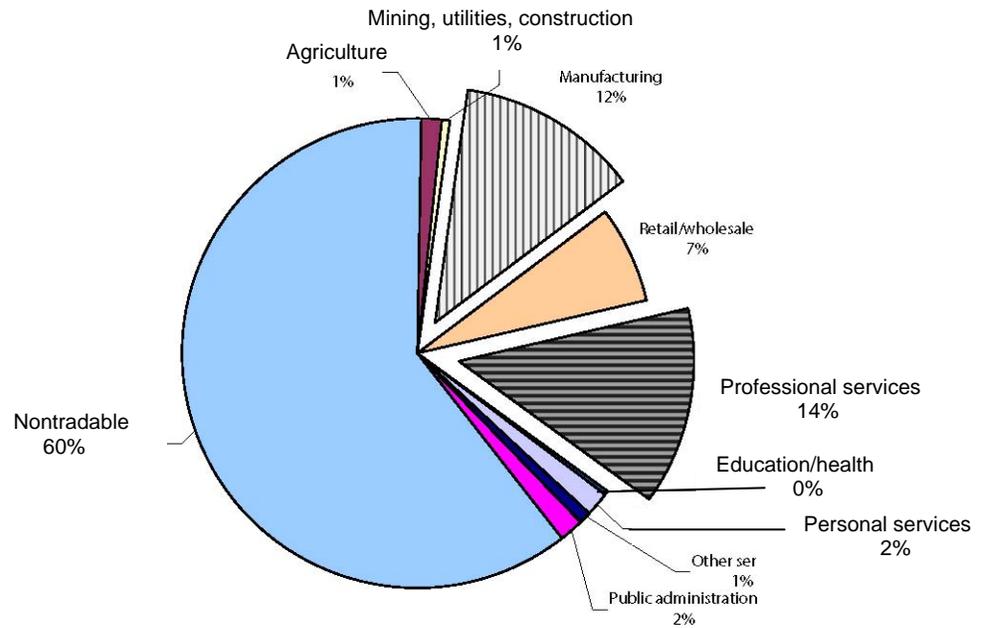
Figure 3 Exports per worker in manufacturing rise with industry wages, manufacturing (NAICS 31, 32, 33)



NAICS = North American Industry Classification System

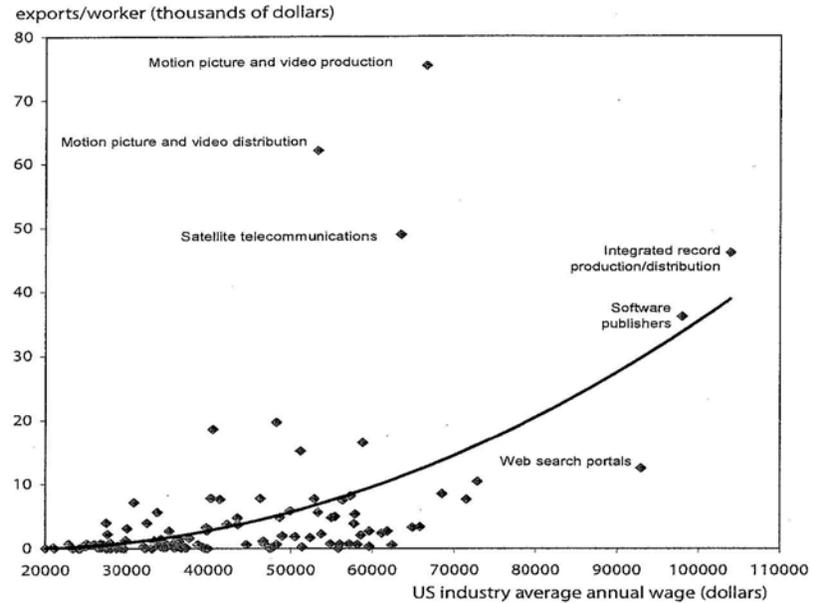
Sources: Jensen and Kletezer 2008.

Figure 4 Tradable and nontradable industries' share of total employment (percent)



Source: Jensen and Kletzer 2008.

Figure 5 Exports per worker in business services rise with industry wages, business services (NAICS 51, 54, 56)



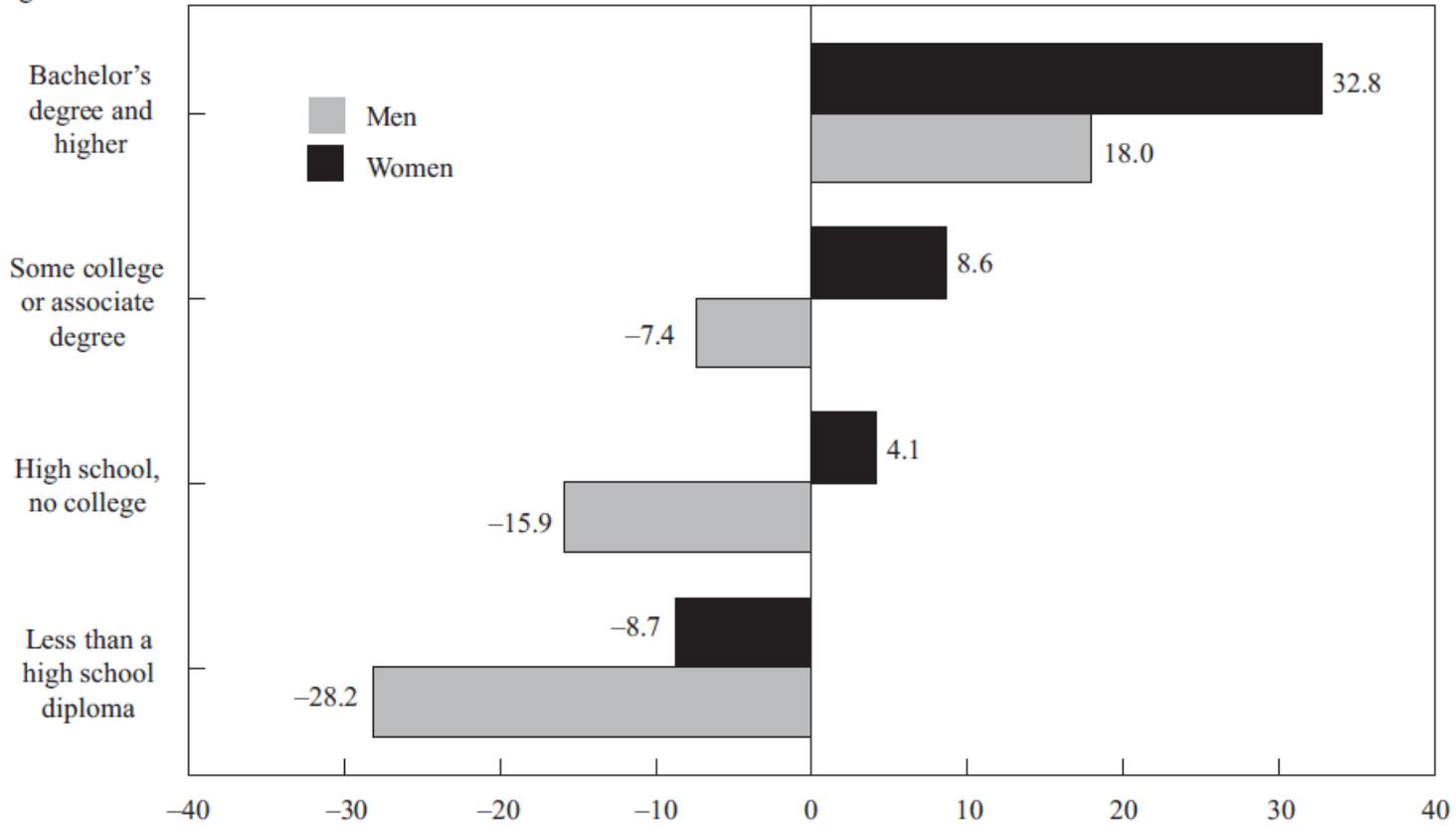
NAICS = North American Industry Classification System

Note: The trend line is a polynomial regression ($y = 5E-09x^2 - 0.0002x + 1.3732$, $R^2 = 0.2946$) of the plotted data.

Sources: Authors' calculations; 2002 Economic Census.

Figure 6 Change in constant-dollar median usual weekly earnings, by educational attainment and sex, from 1979 to 2007

Highest educational level

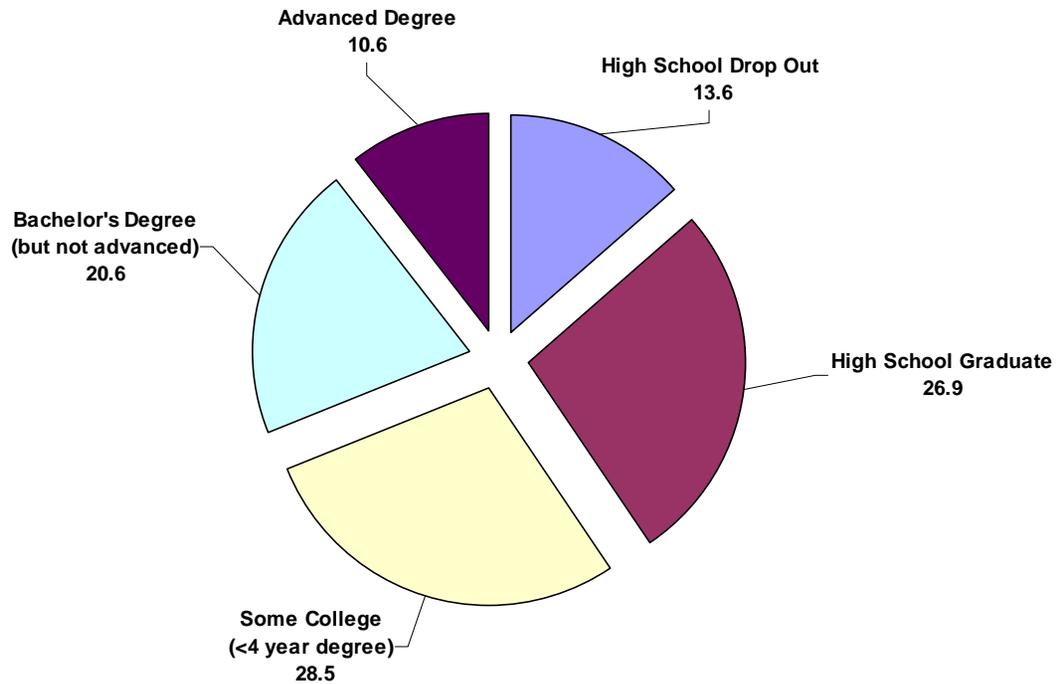


NOTE: Data relate to earnings of full-time wage and salary workers 25 years and older.

Source: Bureau of Labor Statistics

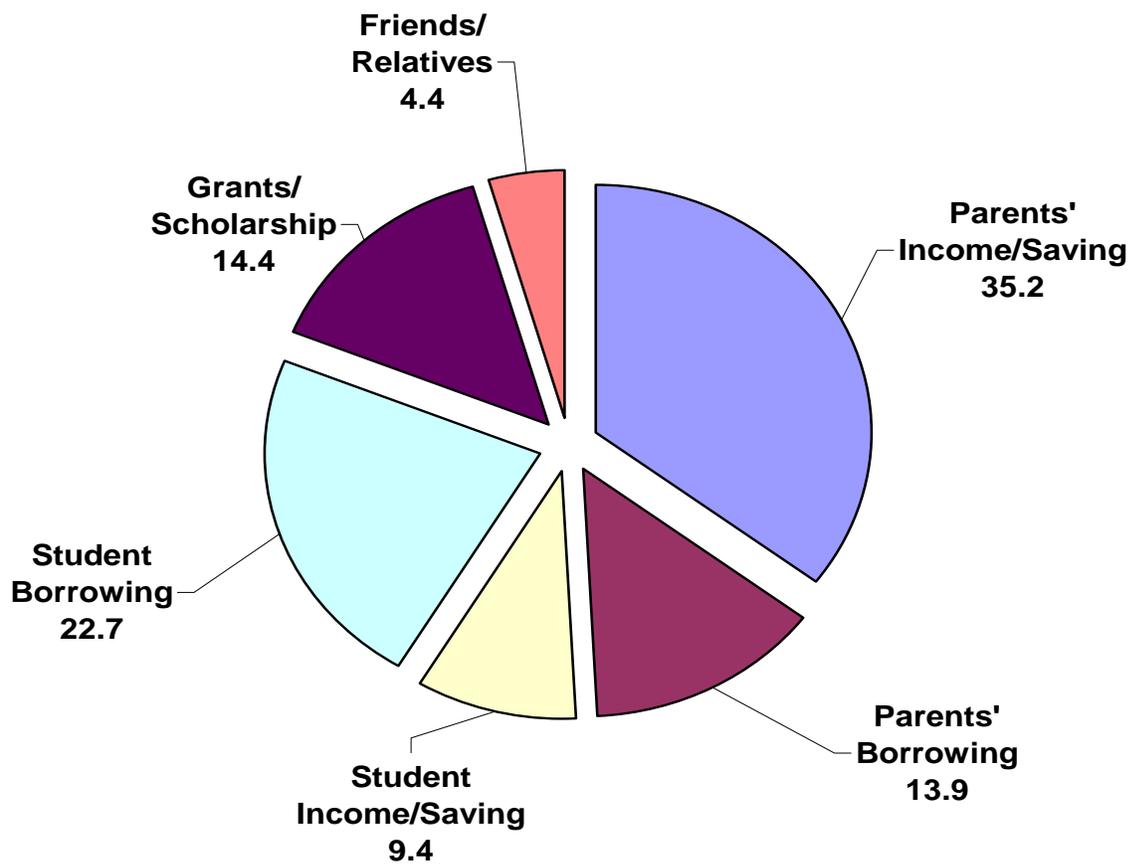
Figure 7

Educational Attainment of Adults 30-34 Years of Age, 2007(%)



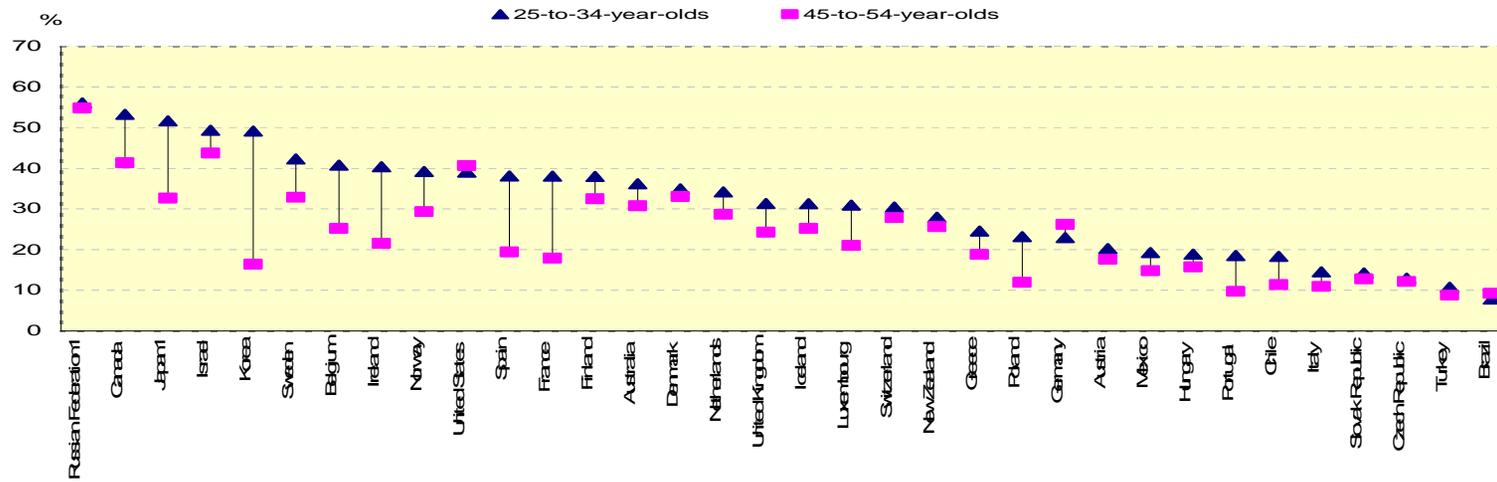
Source: U.S. Bureau of Census, Current Population Survey

Figure 8. How the Average Family Pays for College at a Four-year Public University (percent of \$13,706), 2007-2008



Source: SallieMae 2008

APPENDIX A. OECD: Population that has Attained Tertiary Education, Percentage by Age Group (2004) *



* Tertiary education is education beyond high school leading to a degree, which might be a 2-year vocational degree. OECD 2009.

Table 1. Likely Inflation Adjusted Returns to Human Capital Investments

1) Extremely high (>25%)

Improved pre-natal environment for babies

Pre-school programs for disadvantaged children (esp. development of social skills)

Elementary school diploma

2) High (10-25%)

Four-year college degree (BA/BS)

Advanced degree II (Ph.D., MD, JD, DD)

Advanced degrees I (Masters level)

High school diploma

3) Medium to Low (0-9%)

Some high school

Some college or 2-year college degree (AA)

General Equivalency Diploma (GED certificate)

Job training (O-J-T)

Job training (Job Training Partnership Act)

4) Other: Highly variable

Migration

Information, including Agricultural Extension which is actually quite high

Table 2. How the Average Family Pays for College at Public and Private Colleges and Universities (percent of \$ 14,628 in 2007-2008)

Parents income & saving	32
Parents borrowing	16
Student income & saving	10
Student borrowing	23
Grants & Scholarships	15
Friends & Relatives	<u>3</u>
Total	100

Source: SallieMae (2008)