Table 3
Educational Growth Accounting: 1915 to 2000

	100 × annual log change in the educational productivity index of the work force using:				Change in the educational attainment of the work force (in years)
	Chain weighted prices		Fixed weight prices		
Period	Employment	Hours	Employment	Hours	
1915-40	0.52	0.50	0.41	0.39	1.38
1940-60	0.50	0.49	0.51	0.49	1.52
1960-80	0.61	0.59	0.69	0.69	1.93
1980-2000	0.35	0.35	0.34	0.35	0.86
1915-2000	0.50	0.48	0.48	0.47	5.69

Sources: 1915 Iowa State Census sample (Goldin and Katz 2000); 1940, 1960, and 1980 U.S. population censuses (IPUMS); 1980 and 2000 CPS MORG samples.

Notes: Details on the construction of the educational productivity indexes are given in the Appendix. The indexes cover the civilian work force (ages 16 or older) in each year. Changes from 1915 to 1940 are for Iowa; changes for the other time periods cover the entire United States. The education groups used are 0-4, 5-6, 7-8, 9-11, 12, 13-15, and 16 or more years of schooling. The chain-weighted index covering years *t* to *t'* uses the average educational wage differentials for *t* and *t'*. The fixed-weight index uses the average educational wage differentials for 1915 to 2000. Employment-based indexes weight workers by their sampling weights; hours-based indexes weight workers by the product of their sampling weight and hours worked in the survey reference week.

Table 4
Augmented Labor Quality Index: 1915-2000,
Chain-Weighted Prices

Period	Employment	Hours
1915-1049	0.61	n.a.
1940-1960	0.47	0.46
1960-1980	0.12	0.14
1980-2000	0.43	0.43
1915-2000	0.42	n.a.

Sources: 1915 Iowa State Census sample (Goldin and Katz 2000); 1910, 1920, 1940, 1960, and 1980 U.S. population censuses (IPUMS); 1980 and 2000 CPS MORG samples.

Notes: Details on the construction of the labor quality index are given in the Appendix. The indexes cover the civilian work force (ages 16 or older) in each year. The chain-weighted index covering years *t* to *t'* uses predicted wage based on average wage differentials for *t* and *t'*. Employment-based indexes weight workers by their sampling weights; hours-based indexes weight workers by the product of their sampling weight and hours worked in the survey reference week.

Table 5
Oliner and Sichel's Growth-Accounting Estimates of Sources of the Late 1990s Productivity Growth Acceleration

Acceleration in Labor Productivity:	
1996-2000 vs. 1991-1995	1.00%
Contributions from:	
Capital deepening	0.57
Information technology capital	0.54
Computer hardware	0.36
Computer software	0.13
Telecommunications equipment	0.07
Other capital	0.02
Multifactor productivity	
Semiconductors	0.30
Computer hardware manufacture	0.06
All other sectors	0.26
Labor quality	-0.20

Source: Oliner and Sichel (2002).

Notes: Updated versions of the growth-accounting estimates found in Oliner and Sichel (2000)

Sources and Notes for Figures:

Figure 1:

Sources: 1940 to 1990 Integrated Public Use Microsamples (IPUMS) of the U.S. population censuses; and 1999 and 2000 Current Population Survey (CPS) Merged Outgoing Rotation Group (MORG) samples.

Notes: The figure plots mean years of completed schooling for the U.S. born by birth cohort at 35 years of age (or adjusted to age 35 for cohorts not observed at exactly 35). Years of schooling are given by highest grade completed for the 1940 to 1980 samples, top coded at 18 years. Those with 17 years in 1940 and 1950 (the highest category in those years) are assigned 17.6 years (the mean for those with 17 or 18 years of schooling in 1960). The categorical education variable for the 1990, 1999, and 2000 samples is converted to years of completed schooling. We translated the categories covering more than a single grade as follows: 2.5 years for those in the 1^{st} – 4^{th} grade category; 6.5 years for those in the 5^{th}-8^{th} grade categories; 12 years for those with 12 years of schooling, a GED, or a high school diploma; 14 years for those with some college or with an associate degree; 16 years for those with a bachelor's degree; 17.6 years for those with a master's degree; and 18 years for those with a professional or doctoral degree.

We use the proportional life-cycle change in reported years of schooling for U.S. birth cohorts from 1876 to 1975 to age-adjust reported years of schooling. Specifically, we collapse the data into birth cohort-year cells. We then run a regression of the log of mean years of schooling on a full set of birth cohort dummies and a quartic in age, pooling all the samples from 1940 to 2000 for those U.S. born aged 25 to 64 (covering birth cohorts from 1876 to 1975). The age coefficients from this regression are used to create age-adjusted schooling measures evaluated at age 35. We use actual mean years of schooling at age 35 for birth cohorts observed at 35 in one of our sample year. Mean years of schooling adjusted to age 35 for the observed year closest to age 35 (or the average of a pair of years in the case of a tie) are reported for cohorts not observed in our samples at exactly age 35. The results are quite similar we average the age-adjusted years of schooling of a birth cohort across all years observed.

Figure 2:

Sources: 1940 to 1990 Census IPUMS, 1999 and 2000 CPS MORG Samples.

Notes: The figure plots the mean years of completed schooling by birth cohort and sex adjusted to 35 years of age for the U.S. born using the approach described in the notes to Figure 1.

Figure 3:

Sources: 1940 to 1990 Census IPUMS, 1999 and 2000 CPS MORG Samples.

Notes: The figure plots the fraction of college graduates by birth cohort and sex adjusted to 35 years of age for the U.S. born. College graduates are those with 16 or more completed years of schooling for the 1940 to 1980 samples and those with a bachelor's degree or higher in the 1990 to 2000 samples. The log of the college graduation rate for a birth cohort-year cell is the dependent variable in the age-adjustment regressions. The approach is the same as that used for years of schooling and described in the notes to Figure 1.

Figure 4:

Sources: The returns to a year of high school and of college for young men are from Goldin and Katz (2001a, Table 2.4 and Figure 2.6) based on data from the 1915 Iowa state census, the 1940 to 1970 Census IPUMS, and the 1970 to 1996 March CPSs. The samples include full-year, nonfarm male workers with 0 to 19 years of potential experience.

The returns to a year of college for all workers use data from the 1915 Iowa state census, 1940 to 1980 Census IPUMS, and 1980-2000 CPS MORG samples. The returns to a year of college equals the regression-adjusted wage differential between a worker with exactly 16 years of schooling (or a bachelor's degree) and with 12 years of schooling (or a high school degree) divided by 4. These college returns for 1940 to 2000 are derived from log hourly wage regressions for samples of all workers (males and females) aged 18 to 65 years using the same specifications and data processing procedures as Autor, Katz, and Krueger (1998, Table 1). The wage regressions include educational attainment dummies; a quartic in experience; a nonwhite dummy; a marital status dummy; a female dummy and its interaction with the experience, marriage and race variables; region dummies; and a part-time dummy. The evolution of the college premium from 1940 to 1980 uses the IPUMS data and changes from 1980 to 2000 are estimated from the CPS MORG samples. The 1915 to 1940 change in the college wage premium uses samples of full year workers from Iowa and the methods of Goldin and Katz (2000).

Figure 5:

Sources: Angus Maddison's estimates from Maddison (1995). The estimates do not include the value of residential structures. Note that heroic assumptions are required to obtain consistent deflators for capital goods. Note also that the composition of physical capital changes

substantially over time: in 1890 perhaps 15 percent of the physical capital stock consisted of machinery and equipment. Today some 40 percent of the physical capital stock does.

Figure 6:

Sources: National Income and Product Accounts, as constructed by the Bureau of Economic Analysis of the Department of Commerce. NIPA revision of December 2001. Gross private domestic investment estimates.

Figure 7:

Sources: National Income and Product Accounts, as constructed by the Bureau of Economic Analysis of the Department of Commerce. NIPA revision of December 2001. To the extent that business capital consumption allowances overstate true economic depreciation, these estimates of private savings rates are too low.