Analyzing Environmental Policies with IGEM, an Intertemporal General Equilibrium Model of U.S. Growth and the Environment

Part 2

Appendix D. Measuring industry capital input

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D.1 Introduction

In this Appendix we describe the construction of industry capital input indexes that enter the state-space models of producer behavior presented in Chapter 3. The methodology and data sources are described in detail in Chapter 5 of Jorgenson, Ho and Stiroh (2005, henceforward JHS). We give a short summary of the methodology in section D2, outline how the data are extended 2000 to 2005 in section D3, and provide the results in section D4.

Our calculation of capital input starts with the explicit recognition of the enormous heterogeneity of capital assets. A computer, for instance, has a short service life and a high marginal product per dollar invested, while a commercial building has a long service life and a low marginal product. Recognizing these differences is critical for the measurement of capital input and modeling the future trajectory of the U.S. economy, since investment patterns have changed radically with the rapid substitution toward information technology equipment and software. Information processing equipment and software accounted for just 11.4% of total private fixed investment in 1977, but 25.1% in 2002. Changes at the industry level show even larger swings.

We emphasize the distinction between the installed stock of capital at a point in time and the annual service flow from that stock. The stock of each asset type is associated with an acquisition price, while each service flow is associated with a rental price, the cost of using the asset for a year. When the different asset types are aggregated to obtain total capital services, the weights are the rental prices which are measures of marginal productivity. This methodology is widely used, including by the Bureau of Labor Statistics (BLS) multi-factor productivity program and in the new aggregate production account for the U.S. economy constructed by the Bureau of Economic Analysis (BEA) and the BLS.[1]

As a result of the distinction between capital stock and capital services the growth of capital input can be decomposed into two sources – changes in the quantity of capital of each type and substitution among assets. This second effect, which we have denoted as the growth of capital quality, is critical for capturing the dramatic substitution toward information technology (IT) assets like computer hardware, software, and telecomm equipment with relatively short service lives and high marginal products. For the economy as a whole, the annual contribution

[1] See BLS (1983) and Harper, Moulton, Rosenthal, and Wasshausen (2009).

of capital quality growth to aggregate U.S. output growth increased from 0.90 percentage points for 1973-89 to 2.27 percentage points for 1995-2002 (JHS 2005, Chapter 2).

D.2 Methodology

This section presents the methodology used to estimate the flow of capital services in each industry, as expressed in the production function (1.2). We begin with investment by industry and asset class, use the perpetual inventory method to generate capital stocks, and then combine these with national income data on capital income to estimate the rental price of each type of capital. The BEA provides data for 61 types of nonresidential assets in its *Fixed Assets and Consumer Durables* report, and we consolidate these to the 52 assets listed in Table D1. The investment and income data are given for 62 industries, which we reorganize into the IGEM 35 industries. We further add estimates for residential assets, inventories and land.

D.2.1 Notation

We begin by defining measures of investment, capital stocks, and capital input for individual assets. In all cases, we have a price, a quantity, and a value that is the product of the two. The subscript k refers to the specific asset type, j refers to the industry, and t refers to the year. Where possible, we suppress the time subscripts.

For individual assets we define:

$I_{k,j}$ = quantity of investment

$P_{I,k,,j}$ = price of investment

δ_k = geometric depreciation rate

$A_{k,j}$ = quantity of capital stock at end of period t

$Z_{k,j}$ = quantity of two-period average capital stock

$P_{I,k,j}$ = price of capital stock

$K_{k,j}$ = quantity of capital services

$P_{K,k,j}$ = price of capital services

$Q_{K,k,j}$ = quality index of capital

For industry aggregates:

I_j = quantity index of industry investment

$P_{I,j}$ = price index of industry investment

Z_j = quantity index of industry capital stock

$P_{Z,j}$ = price index of industry capital stock

K_j = quantity index of industry capital services

$P_{K,j}$ = price of industry capital services

$Q_{K,j}$ = quality index of industry capital

D.2.2 Investment and Capital Stock

The BEA data set provides the nominal investment value and price index for each of the 62 assets. We define the quantity of investment $I_{kj,}$ as the nominal value divided by the price, $P_{I,k,j}$. The adjustment of asset prices to keep quality constant is integral to the construction of tractable measures of capital input, since this great facilitates aggregation over different vintages. The best-known example is the price deflators for computers in the U.S. national accounts, which are constructed using hedonic methods. These constant-quality price indexes reflect changes in the productive characteristics and quality of the computers over time.

The BEA data on investment provides industry-specific prices for each asset, for example, each industry pays a different price for automobiles, depending on the commodity bundle of automobiles it purchases. Some of the price estimates are volatile and show wide variations cross industries. To avoid this sampling variability we use the economy-wide price of each asset for all industries. This implies that we are assuming that there are no differences in composition within these 62 asset types across industries. This parallels the use of equal intermediate input prices for each industry in Appendix B.

Capital stocks are estimated by means of the perpetual inventory method. We assume that the investment of different ages is measured in constant efficiency units and the age-efficiency profile is defined by a constant geometric rate.[2] This allows the capital stock to be expressed as:

$$\text{(D.1)} \quad A_{k,j,t} = A_{k,j,t-1}(1-\delta_k) + I_{k,j,t} = \sum_{\tau=0}^{\infty}(1-\delta_k)^{\tau} I_{k,j,t-\tau}$$

where $A_{k,j,t}$ is the stock at the end of period *t*, and the efficiency of an asset declines geometrically with age at the rate δ_k .

[2] These assumptions are discussed in JHS (2005) Section 5.2.3 which also notes that other age-efficiency profiles could also be incorporated into our framework.

D.2.3 Capital Services

We let $A_{k,j}$ represent the installed stock of capital, but require the flow of capital services or capital input from that stock over a given period $K_{k,j}$. The distinction between the stock of capital and the flow of capital services is essential when we aggregate heterogeneous assets with widely different marginal products. We assume that it takes some time for new investment to provide productive services, so that the *capital service flow* is proportional to the average of the current and lagged capital stock:

$$\text{(D.2)} \quad \begin{aligned} K_{k,j,t} &= Q_{K,k,j}\,\frac{1}{2}\left(A_{k,j,t} + A_{k,j,t-1}\right) \\ K_{k,j,t} &= Q_{K,k,j} \cdot Z_{k,j,t} \end{aligned}$$

where $Z_{k,j,t}$ is the two-period average of the installed capital stock, and $Q_{K,k,j}$ is a constant factor of proportionality. This constant is the quality of capital of type *k*, so that capital must be measured in units of constant quality. It should be emphasized, however, that IGEM expresses capital input for each industry as a proportion of capital stock that varies over time, reflecting changes in the composition of the stock.

The rental price of capital services or the user cost of capital may be interpreted as an arbitrage equation between two alternatives: earning a nominal rate of return on a bond, or buying a unit of capital, collecting a rental, and then selling the depreciated asset. This implies the following equation:

$$\text{(D.3)} \quad (1+i_{t+1})P_{I,t} = c_{k,t} + (1-\delta_k)P_{I,t+1}$$

where i_t is the nominal interest, $P_{I,t}$ is acquisition price of capital, $c_{i,t}$ is the rental fee, and δ_k is the rate of economic depreciation. This expression can be rearranged to yield the common *user cost of capital* expression, which we now write using the notation defined above:

$$\text{(D.4)} \quad \begin{aligned} P_{K,k,j,t} &= (i_{j,t} - \pi_{k,j,t})P_{I,k,j,t-1} + \delta_k P_{I,k,j,t} \\ P_{K,k,j,t} &= r_{k,j,t}P_{I,k,j,t-1} + \delta_k P_{I,k,j,t} \end{aligned}$$

where $i_{j,t}$ is the nominal rate of return in industry *j*, the asset-specific capital gains term is $\pi_{k.j,t} = (P_{I,k,j,t} - P_{I,k,j,t-1}) / P_{I,k,j,t-1}$, and $r_{kj,t}$ is the real rate of return for asset *k* in *j*.

Tax considerations play an important role in the capital service price framework, as discussed by Jorgenson and Yun (2001). We use the same information here and account for tax

credits, depreciation allowances, corporate taxes, property taxes, debt/equity financing, and personal taxes. This yields the following tax-adjusted cost of capital equation:

$$(D.5) \quad P_{K,k,j,t} = \frac{1 - ITC_{k,t} - \tau_t Z_{k,t}}{1 - \tau_t}\left[r_{k,j,t} P_{I,k,j,t-1} + \delta_k P_{I,k,j,t}\right] + \tau_p P_{I,k,j,t-1}$$

where $ITC_{k,t}$ is the investment tax credit, τ_t is the statutory tax rate, $z_{k,t}$ is the present value of capital consumption allowances for tax purposes, τ_p is a property tax rate, all for asset k at time t.

The real rate of return $r_{k,j,t}$ for asset k in industry j is constructed by assuming that the total value of capital services for each industry equals property compensation, which consists of net interest, capital consumption allowances, inventory valuation adjustments, business transfer payments, corporate profits, and certain indirect business taxes. This property compensation is allocated across all asset classes and our procedure yields an internal rate of return that exhausts capital income. This ensures that all receipts of the producers are paid out to the factors of production and is consistent with constant returns to scale.

The tax treatment of income differs among the corporate, non-corporate, and household sectors. We first assume that the after-tax nominal rate of return $\rho_{j,}$, is the same for all assets in the corporate sector of each industry and estimate this as the rate of return that exhausts corporate property compensation. We then calculate the cost of capital in the non-corporate and household sectors for each industry by assuming that these ownership types enjoy the same tax-adjusted nominal rate of return to equity. This procedure is described in JHS (2005, section 5.2.4) and yields service prices that vary across assets, ownership classes, industry, and time.

Our procedure is conceptually appealing; however, the incorporation of asset-specific revaluation terms often introduces substantial volatility in the service price. It may also have implausibly strong implications for how investment is allocated across asset types. We discuss the volatility of service prices, negative service prices and our methods of dealing with them in greater detail below.

D.2.4 Industry Aggregation

Equations (D.1) through (D.5) summarize our estimation procedure for the capital service flow and capital service price, $K_{k,j,t}$ and $P_{K,k,j,t}$, respectively, for each asset, industry, and time period. To generate estimates for total capital service flows within an industry we aggregate over assets. The weights reflect marginal products and rental prices provide the appropriate

weights. In aggregating capital stocks and investment, on the other hand, we use acquisition prices as weights.

We use a Tornqvist quantity formula to aggregate the service flows from different capital assets:

$$\text{(D.6)} \quad \Delta \ln K_j = \sum_k \overline{v}_{k,j} \Delta \ln K_{k,j}$$

where $\Delta x = x_t - x_{t-1}$ denotes the change between period *t-1* and *t*, and the value share of each type of capital services is:

$$\text{(D.7)} \quad v_{k,j} = \frac{P_{K,k,j} K_{k,j}}{\sum_k P_{K,k,j} K_{k,j}}.$$

We have used the same subscript *k* in both the numerator and denominator to avoid excessive proliferation of notation, but the different uses should be clear. The two-period average value share weight is:

$$\text{(D.8)} \quad \overline{v}_{k,j,t} = \tfrac{1}{2}\left(v_{k,j,t} + v_{k,j,t-1}\right).$$

Substituting (D.2) into (D.6) we obtain the growth of capital input:

$$\text{(D.9)} \quad \Delta \ln K_{jt} = \sum_k \overline{v}_{k,j,t} \Delta \ln Z_{k,j,t}$$

The proportionality constant reflecting the quality of capital input is independent of time and drops out, so that capital input for each industry is derived from stocks and capital service weights for each asset type. The *price index of industry capital services, $P_{K,j}$,* is defined implicitly to make the value identity hold:

$$\text{(D.10)} \quad P_{K,j} K_j = \sum_k P_{K,k,j} K_{k,j}$$

The *quantity of capital stock* in industry *j* is defined as a similar aggregate over stocks of each asset type:

$$\text{(D.11)} \quad \Delta \ln Z_j = \sum_k \overline{w}_{k,j} \Delta \ln Z_{k,j}$$

where the value share weights are the two-period average of:

$$\text{(D.12)} \quad w_{k,j} = \frac{P_{I,k,j} Z_{k,j}}{\sum_k P_{I,k,j} Z_{k,j}}$$

The corresponding *price index for capital stock*, $P_{Z,j,t}$, is defined implicitly from the value identity:

(D.13) $P_{Z,j,t}Z_{j,t} = \sum_k P_{I,k,j,t}Z_{k,j,t}$.

The *quantity of investment* is an aggregate over the investment in each asset class:

(D.14) $\Delta \ln I_j = \sum_k \overline{u}_{k,j}\Delta \ln I_{k,j}$

where the value share weights are the two-period average of:

(D.15) $u_{k,j} = \dfrac{P_{I,k,j}I_{k,j}}{\sum_k P_{I,k,j}I_{k,j}}$.

The corresponding *price index for investment*, $P_{I,j,t}$, is defined implicitly from the value identity:

(D.16) $P_{I,j,t}I_{j,t} = \sum_k P_{I,k,j,t}I_{k,j,t}$

Finally, we define *capital quality* $Q_{K,j,}$ for industry *j* as the ratio of capital input to capital stock:

(D.17) $Q_{K,j} = \dfrac{K_j}{Z_j}$

Large depreciation rates and rapid downward revaluations for computers implies that these assets have high marginal products, so their weight in the index of capital services greatly exceeds their weight in the index of capital stock. Substitution toward computers as their prices fall implies that capital input grows faster than capital stock, resulting in a higher index of capital quality. It must be emphasized that our definition of capital quality does not refer to improvements across vintages. Asset-specific quality changes are incorporated into the quantity component of each type of capital through the use of constant-quality price deflators. Our measure of capital quality reflects changes in the composition of the industry capital aggregate.

JHS (2005) have documented the role of information technology in the remarkable economic resurgence after 1995. Accordingly, it is critically important to capture changes in the composition of capital resulting from the substitution of IT capital for non-IT capital. To make this distinction empirically, we define IT capital to include computer hardware, software, and telecommunications equipment, and non-IT includes all other assets. The index of industry IT capital services and non-IT capital services are defined, respectively, as:

$$\text{(D.18)}\quad \begin{aligned} \Delta \ln K_{IT,j} &= \sum_{k \in IT} \bar{v}_{IT,k,j} \Delta \ln K_{IT,j} \\ \Delta \ln K_{NON,j} &= \sum_{k \notin IT} \bar{v}_{NON,k,j} \Delta \ln K_{NON,j} \end{aligned}$$

where the shares for each type of IT capital or non-IT capital, $v_{IT,k,j}$ and $v_{NON,k,j}$, respectively, are out of total IT capital or non-IT capital for each industry, respectively.

A useful result that follows from Tornqvist aggregation is that the growth in the industry capital service flow defined in Equation (D.6) above can also be expressed as a Tornqvist index of these two sub-aggregates:

$$\text{(D.19)}\quad \Delta \ln K_j = \bar{v}_{IT,j} \Delta \ln K_{IT,j} + \left(1 - \bar{v}_{IT,j}\right) \Delta \ln K_{NON,j}$$

where $v_{IT,j}$ is the share of IT capital services in total capital services of the industry. Sub-indices of IT and non-IT capital stock and investment are defined in an analogous manner, where the aggregate of each is again a weighted average of the IT and non-IT components.

D.3 Data

D.3.1 Data Sources

The data sources used to estimate capital input by industry are presented by JHS (2005, Section 5.3). The starting point for industry capital is the estimation of capital input by the 60 private economy industries shown in Table D2. This is based on the BEA report *Fixed Assets and Consumer Durables.*[3] The period covered by this SIC-based data set is 1901-2000. For the 60 industries, we estimate capital input for 57 fixed reproducible assets listed in Table D1, inventories, and land. For the General Government sector, we estimate capital input for 22 assets, divided among Federal (Non-Military), Federal (Military), and State and Local. Our second data source is the *Fixed Asset Tables* on the NAICS basis also provided by the BEA National[4]. This covers 63 industries, consumer durables and government fixed assets, and includes investment estimates back to 1947.

We first scale the investment industry data so that it matches nominal investment for the total economy given in the NIPAs. The investment for each industry is allocated to corporate and non-corporate sectors using historical shares. The price deflator for each asset is taken from the

[3] See Herman (2000).

[4] The Fixed Asset Tables are given at the BEA website http://www.bea.gov/national/FA2004/Index.asp. Table 3.7E gives the equipment investment by industry, Table 3.7S provides investment in structures.

national average in the NIPAs. The depreciation rates are based on Fraumeni (1997) except for special adjustments for computers and automobiles, as described in JHS (2005, Section 5.3.1). There are two other assets to include, inventories and land. Total inventory change from the NIPA is allocated to the industries using information from the benchmark input-output tables. Land by industry is based on the historical data described in Jorgenson (1990).

The value of capital input is taken from industry-level value added in the Gross Product Originating database maintained by the BEA and described in Lum and Moyer (2000, 2001)[5]. This is supplemented by the 192-industry data from the BLS as described in Appendix B. In the earlier SIC-based version, the BEA data include the value of output, value added, and intermediate inputs for the 60 industries in Table D2. The current version based on NAICS covers the same 64 industries mentioned above for the investment data.

We have aggregated the 60 SIC industries to match the IGEM 35 industries. Industries such as the Utilities, have to be disaggregated for IGEM. For the estimation of capital service prices, we begin with value added in the corporate sector and subtract corporate labor income to estimate the amount of income available to corporate capital. Similarly, we subtract non-corporate labor income from value added, as described in the following section, to obtain the value of non-corporate capital income.

D.3.2 Implementation Issues

The methodology described above conforms to the international standards recommended by OECD (2001, 2009). The practical implementation of this methodology is discussed in JHS (2005, Section 5.3.2). An important issue is negative capital service prices in the years when capital income is low. The rate of return is low or even negative at the bottom of the business cycle or during periods of high asset inflation. We eliminate these negative prices by smoothing the inflation rates and capital income.

To link the two industry classifications, SIC and the NAICS, we have computed capital input for the 64 NAICS industries for the 2000-2005 period, using the entire time series of NAICS-based investment data and GDP-by-Industry data. We employ a simple bridge between the SIC and NAICS as described in Appendix B (section B.2.2) for output. Each of the NAICS

[5] The GDP by Industry data is given at the BEA website http://www.bea.gov/industry/gdpbyind_data.htm. The updates through 2005 is described in the *Survey of Current Business*, Dec 2006.

industries is assigned to one IGEM sector and the growth rates for 2000-05 are applied to the original series for 1960-2000.

The final issue is the allocation of non-corporate income between capital and the labor of the self-employed. We have assumed that the wage of the self-employed for each demographic group is equal to that of the employees, and the residual is then allocated to capital. While this leads to fluctuations in the rate of return for some sectors, the relatively small size of the non-corporate sector in most industries mitigates this effect. This is a difficult problem in sectors with high self-employment – agriculture, retail trade, office of health practitioners and some services. The estimation of the price of self-employed labor is described in Appendix C (Section C.2.c).

D.4 Results

D.4.1 Investment, Capital stock and services; a snapshot

Table D1 gives the investment by asset type in year 2005, a few years into the low investment period following the 2001 dot-com crash. Of the $3,468 billion investment in fixed reproducible assets, the private sector including Households bought $3,064 billion and the government $404 billion. Within private sector investment $1,783 billion is in residential structures and consumer durables, while $1,281 billions is in business equipment and structures. Of the $3,064 of private investment, $425 billion is in information and communications technology – computers and peripheral equipment, communications equipment, software.

Energy sector investments in structures include electric light and power structures, gas structures, petroleum pipelines, petroleum and natural gas structures and nuclear fuel rods; these came to $99 billion in 2005 or 30% of private non-residential structure investment. This investment pattern is quite different from that in 2000 at the height of the Information Technology boom. In 2000 investment in information technology assets was $457 billion out of a total of $2522 private sector investment, i.e. even higher in nominal terms than the 2005 level. Investment in energy-related structures came to only 18% of private structure investment.

JHS (2005) and others have referred to the 1995-2000 period as the Information Age. This is highlighted by the dramatic declines in prices of IT and the sharp rise in IT investments; in Figure D1 we plot the changes in investment goods prices over the period 1960-05 for the 57 assets. We can see that most goods prices rose at about 3-5% per year with general inflation, but prices of computers fell by 18% per year and communications equipment rose by only 1.0%. The

price of electric light and power structures rose at 4.4% per year while petroleum and gas structures rose at 5.6%.

Table D2 gives investment by industry in year 2000 at the most detailed level in the BEA investment data set[6]. Of the nonresidential business investment of $1,263 billion, the energy group share is $106 billion, compared to $101 billion in Wholesale and $91 in Business Services. This is 8.4% of business investment, quite a bit more than the 4.4% energy group share of total value-added. The largest investors are Electric Utilities ($41 billion) and Petroleum and Gas Mining ($41 billion).

Investment is cumulated into capital stocks according to (D1), using the depreciation rates given in Table D1 for the 60 industries given in Table D2. These are then aggregated to the 35 IGEM industries. Government electric utilities are broken out of government investment. The stocks at the end of 2000 are given in Table D3. Of the total stock of $37.2 trillion, the General Government owns $5.2 trillion. The rest is owned by the private sector, including households, or government enterprises. The largest private stocks are in the industries with large land values – FIRE ($5.8 trillion) and Agriculture ($2.9 trillion). The manufacturing group stock of capital in 2000 was $2.9 trillion. The Petroleum Refining industry is only $132 billion. Of the five energy industries, Electric Utilities has the largest stock at $1,057 billion, followed by Petroleum and Gas Mining with $462 billion.

The capital stocks generate a flow of annual services given in the next column in Table D3. Given the wide differences in the composition of industry stocks with a larger share of long-lived structures in Real Estate, relative to manufacturing, the service flow is not a fixed proportion of the stocks. Real Estate and Agriculture have a low ratio of service flow to capital stock, while Services and Construction have high ratios. In the last column we show the share of capital input due to IT capital. The Communications, Instruments and Printing & Publishing industries have the highest shares of IT, exceeding 29%, while Agriculture and Petroleum Refining have the lowest. Four of the five industries in the energy group have low IT shares, less than 6%, the exception being Gas Utilities with a 22% IT share.

[6] Data for investment by each industry is given only for the NAICS classification in 2005. These estimates for 2000 are for the SIC classification in IGEM.

D.4.2. Capital input changes over time

We next consider the change in investment patterns over time. Figure D2 shows the share of GDP going to private investment, including consumers' durables, over this period. This has been fluctuating between 20% and 25% with a large increase during the economic boom of the late 1990s and a sharp fall after the recession of 2001. Figure D2 also shows the rapid rise of the IT share of total investment, from 4% in 1960 to a peak of 19% in 2000, before falling back to 16% in the mid-2000s.

The fluctuations in investment give rise to corresponding fluctuations in the growth of capital stock. Table D4 gives the time series of investment and capital stock. It also gives the flow of capital services and the quality index. Recall that (D17) defines the quality of capital as the ratio of capital services to capital stock. Between 1960 and 2005, the capital stock almost tripled but the flow of annual services quintupled with the quality index rising from 0.64 to 1.19; the capital quality index rose at 1.5% per year during this period.

The growth of private capital stock hides a great deal of variation among the industries. In Table D5 we give the growth rates of capital stock and capital input over the period 1960-2000. The capital stocks for Electrical Equipment, Industrial Machinery, Instruments, Trade and Services grow more than 4% per year. At the opposite extreme, capital stocks for Agriculture, Leather, Primary Metals, and Transportation barely increased.

The capital stock of energy group grew at a below average rate in the 1960-2000 period with Coal Mining the most rapid at 3.1% per year and Petroleum Refining the slowest at 1.3%. As we have emphasized, the stock consists of many different asset types and these generate very different flows of capital services. The growth rates of capital services are thus quite different from the growth rates of the stock. In this period they are more rapid, reflecting a shift from long-lived assets to short-lived ones.

The last column of Table D5 gives the growth of capital quality over 1960-2000. With one exception of Coal Mining, the growth in industry capital quality is positive, reflecting a shift towards short-lived assets with higher flows of services per dollar of stock. The biggest increases in capital quality are in Other Transportation Equipment and Wholesale Trade with growth rates exceeding 2% per year. Capital quality in Petroleum Refining rose at a 0.47% rate, while capital quality in Electric Utilities rose at 0.78%.

Another way of viewing the change in the composition of investment is to examine the growth rates of IT capital and non-IT capital given in Table D6. While there are many slowly growing industries with slow growth of output and capital input, all industries had rapid growth of IT capital services. The median growth rate of IT input over 1960-2005 was 20% per year!. For Gas Utilities the growth of IT capital input was 24% per year, for Petroleum & Gas Mining, 23%, and for Electric Utilities, 15%. It is thus clear that the energy group has made much greater use of the new technologies of the Information Age.

The U.S., like much of the world, saw a sharp deceleration of growth in the 1970s, a period that included the oil shocks. The U.S. however, led the world in the acceleration in economic growth after 1995; the 1995-2000 period was the peak of the Information Age as described in Jorgenson, Ho and Stiroh (2005). In Table D7 we show the rate of growth of capital during the sub-periods 1960-73, 1973-95 and 1995-2000.

Most industries had much higher growth during the boom period except for most of the mining industries – Metal Mining, Coal, and Petroleum and Gas – and the low-skill labor intensive industries – Textile, Apparel, Leather, and Tobacco. Petroleum Refining, Electric Utilities, Other Transportation Equipment, and Government Enterprises which saw their low rates get even lower. The slow growth of capital input in the energy group relative to the rest of the economy follows the slow growth of output.

The growth of IT investment was even faster than the rapid rate for total investment during the boom of the 1990s. This resulted in a continual rise of the share of total capital input due to IT. As noted above, Figure D2 shows how this share rose from 5% in 1965 to 16% in 1995, and peaked at 19% in 2000 before falling back to 16% in 2005. In Table D8 we show how the IT shares for each industry have been rising during this period. In Gas Utilities the IT share rose from 0.5% in 1973 to 19% in 1995 and 24% in 2005, however, in Electric Utilities the share fell from 7.0% in 1990 to 5.7% in 1995 and to 4.9% in 2005. In Coal Mining, Oil Mining and Refining the IT shares were much lower, peaking at less than 4%.

In conclusion, the U.S. economy as a whole saw a growth of capital input that exceeded GDP growth, but the energy group grew much more slowly than the average industry. All industries responded to the precipitous decline in IT capital prices with a massive investment in IT capital. While IT capital is relatively less important for the energy group, these industries also saw a rapid growth of IT capital.

Table D.1: Depreciation, Inflation and Investment by Asset Type and Class

	Asset	Geometric Depreciation Rate	Price change % per year 1960-2005	Current Investment 2005 ($bn)
	Total Domestic Tangible Assets	na	2.67	3,504.8
	Fixed Reproducible Assets	na	-	3,467.9
	Private:		2.51	3,064.2
	Equipment and Software		1.36	946.5
1	Household furniture	0.1375	3.33	1.9
2	Other furniture	0.1179	3.56	36.5
3	Other fabricated metal products	0.0917	3.73	14.2
4	Steam engines	0.0516	3.73	4.3
5	Internal combustion engines	0.2063	4.05	1.2
6	Farm tractors	0.1452	4.22	10.8
7	Construction tractors	0.1633	4.56	3.9
8	Agricultural machinery, except tractors	0.1179	4.12	10.5
9	Construction machinery, except tractors	0.1550	4.29	25.3
10	Mining and oilfield machinery	0.1500	4.50	7.5
11	Metalworking machinery	0.1225	4.00	26.0
12	Special industry machinery, n.e.c.	0.1031	4.27	30.6
13	General industrial, inc materials handling, eq	0.1072	3.90	58.7
14	Computers and peripheral equipment	0.3150	-18.37	89.0
15	Service industry machinery	0.1650	3.09	19.0
16	Communication equipment	0.1100	0.98	86.2
17	Electrical transm, distrib. & indus apparatus	0.0500	2.68	21.4
18	Household appliances	0.1650	1.97	0.2
19	Other electrical equipment, n.e.c.	0.1834	2.79	6.8
20	Trucks, buses, and truck trailers	0.1917	2.63	96.7
21	Autos	0.2719	2.09	31.9
22	Aircraft	0.0825	4.41	15.0
23	Ships and boats	0.0611	4.17	4.8
24	Railroad equipment	0.0589	3.89	4.6
25	Instruments (Scientific & engineering)	0.1350	2.89	79.9
26	Photocopy and related equipment	0.1800	0.23	3.6
27	Other nonresidential equipment	0.1473	2.45	56.0
28	Other office equipment	0.3119	0.83	6.2
29	Software	0.3150	-0.88	193.8
	Non-Residential Structures		4.74	334.6
30	Industrial buildings	0.0314	4.65	23.0
31	Mobile structures (offices)	0.0556	2.51	0.9
32	Office buildings	0.0247	4.98	46.3

Table D.1 continued

	Asset	Geometric Depreciation Rate	Price change % per year 1960-2005	Current $ Investment 2005 ($bn)
33	Commercial warehouses	0.0222	0.00	0.0
34	Other commercial buildings, n.e.c.	0.0262	4.81	59.3
35	Religious buildings	0.0188	4.72	7.5
36	Educational buildings	0.0188	4.69	14.1
37	Hospital and institutional buildings	0.0188	4.72	24.9
38	Hotels and motels	0.0281	4.71	16.3
39	Amusement and recreational buildings	0.0300	4.71	6.7
40	Other nonfarm buildings, n.e.c.	0.0249	4.70	2.2
41	Railroad structures	0.0166	4.07	5.7
42	Telecommunications	0.0237	3.28	15.6
43	Electric light and power (structures)	0.0211	4.40	21.7
44	Gas (structures)	0.0237	4.46	6.4
45	Local transit buildings	0.0237	0.00	0.0
46	Petroleum pipelines	0.0237	4.49	0.7
47	Farm related buildings and structures	0.0239	4.73	5.9
48	Petroleum and natural gas	0.0751	5.62	70.2
49	Other mining exploration	0.0450	4.75	3.1
50	Other nonfarm structures	0.0450	4.53	4.2
51	Railroad track replacement	0.0275	0.00	0.0
52	Nuclear fuel rods	0.0225	0.00	0.0
	Residential Structures		4.59	759.2
53	1-to-4-unit homes	0.0114	4.67	543.6
54	5-or-more-unit homes	0.0140	4.58	44.3
55	Mobile homes	0.0455	2.49	9.1
56	Improvements	0.0255	4.62	160.7
57	Other residential	0.0227	4.75	1.5
	Consumers Durables		1.65	1023.9
61	Autos	0.2550	2.93	227.1
62	Trucks	0.2316	2.51	190.8
63	Other (RVs)	0.2316	2.29	27.0
64	Furniture	0.1179	2.25	79.9
65	Kitchen Appliance	0.1500	0.81	36.8
66	China, Glassware	0.1650	2.66	36.6
67	Other Durable	0.1650	-1.96	85.8
68	Computers and Software	0.3150	-14.23	56.5
69	Video, Audio	0.1833	1.59	82.7
70	Jewelry	0.1500	3.69	24.3
71	Ophthalmic	0.2750	1.78	76.2
72	Books and Maps	0.1650	1.75	58.4
73	Wheel Goods	0.1650	4.09	41.8

Table D.1 continued

Asset	Geometric Depreciation Rate	Price change % per year 1960-2005	Current $ Investment 2005 ($bn)
Land	-	10.13	-
Inventories	-	2.84	36.9
Government:	-	3.58	403.7
Federal, Non-Military	-	3.20	37.1
Structures	-	4.52	9.4
Office Buildings	0.0182	4.62	2.0
Commercial Building	0.0182	4.57	1.1
Health Care	0.0182	4.58	0.6
Education	0.0182	4.57	0.3
Public Safety	0.0182	4.58	0.3
Amusement	0.0182	4.58	0.2
Transportation	0.0285	4.60	0.2
Power	0.0285	4.39	0.7
Highways	0.0152	4.53	0.4
Conservation	0.0152	4.37	2.3
Other Structures	0.0182	4.44	1.4
Equipment and Software	0.1650	2.31	27.7
Software	0.3300	2.52	12.8
Federal, Military	-	2.75	78.8
Structures	-	5.22	5.9
Residential	0.0140	5.09	1.6
Industrial	0.0285	4.67	0.6
Military Facilities	0.0182	5.23	3.7
Equipment	-	2.41	72.9
Aircraft	0.1375	1.90	13.5
Missiles	0.1100	1.35	3.9
Ships	0.0550	4.27	9.8
Vehicles	0.0825	4.06	3.9
Electronics and Software	0.1650	2.23	12.8
Software	0.3300	2.52	5.9
Other Equipment	0.1650	2.05	23.0
State and Local	-	4.12	287.8
Structures	-	4.61	236.7
Residential Buildings	0.0182	4.65	6.4
Office Buildings	0.0182	4.64	21.6
Commercial Buildings	0.0182	4.61	0.4
Healthcare Buildings	0.0182	4.67	4.9
Education	0.0182	4.64	66.2
Public Safety	0.0182	4.62	4.4
Amusement	0.0182	4.62	6.7
Transportation	0.0152	4.64	19.4
Power	0.0285	4.43	6.4

Highways	0.0152	4.62	68.1
Sewer	0.0152	4.62	14.5
Water	0.0152	4.21	14.2
Conservation	0.0152	4.40	3.1
Other	0.0182	4.60	0.3
Equipment and Software	0.1110	1.91	51.1
Software	0.3300	2.26	10.9

Table D2. Investment by industry, primary BEA data (fixed nonresidential, 2000, $bn)

	BEA classifications (SIC)	IGEM indus.	Invest. 2000		BEA classifications (SIC)	IGEM indus.	Invest. 2000
	Private sector total		1263.3				
1	Farms	1	24.5	31	Trucking and warehousing	28	19.7
2	Agricultural svcs, forestry, fis	1	14.2	32	Water transportation	28	3.2
3	Metal mining	2	1.0	33	Transportation by air	28	33.3
4	Coal mining	3	3.3	34	Pipelines, except natural gas	28	1.9
5	Oil and gas extraction	4	41.5	35	Transportation services	28	10.4
6	Nonmetallic minerals, ex fuel	5	3.4	36	Telephone and telegraph	29	89.4
7	Construction	6	26.3	37	Radio and television	29	23.8
8	Lumber and wood products	11	4.1	38	Electric services (utilities)	30	41.4
9	Furniture and fixtures	12	2.0	39	Gas services (utilities)	31	15.1
10	Stone, clay, and glass	19	7.9	40	(Water and) Sanitary service	34	10.8
11	Primary metal industries	20	7.9	41	Wholesale trade	32	100.8
12	Fabricated metal products	21	9.0	42	Retail trade	32	76.2
13	Industrial machinery & equip	22	21.4	43	Depository inst. (Banking)	33	39.8
14	Electronic & other electric eq	23	25.1	44	Nondepository inst (Non-ba	33	73.5
15	Motor vehicles and equip	24	12.7	45	Security, commodity broker	33	19.8
16	Other transportation equip	25	6.8	46	Insurance carriers	33	29.8
17	Instruments and related prod	26	10.0	47	Insurance agents, brokers &	33	4.3
18	Miscellaneous manufacturing	27	1.7	48	Real estate	33	111.4
19	Food and kindred products	7	19.2	49	Holding & other investment	33	16.9
20	Tobacco products	8	0.6	50	Hotels & other lodging place	34	15.0
21	Textile mill products	9	3.6	51	Personal services	34	3.7
22	Apparel and other textile	10	1.3	52	Business services	34	91.4
23	Paper and allied products	13	10.3	53	Auto repair, services, parkin	34	23.3
24	Printing and publishing	14	14.2	54	Miscellaneous repair service	34	2.6
25	Chemicals and allied products	15	28.9	55	Motion pictures	34	6.6
26	Petroleum and coal products	16	5.0	56	Amusement & recreation sv	34	9.6
27	Rubber, miscellaneous plastic	17	11.3	57	Health services	34	25.8
28	Leather and leather products	18	0.2	58	Legal services	34	5.2
29	Railroad transportation	28	9.7	59	Educational services	34	2.1
30	Local, interurban passenger t	28	3.1	60	Other services, n.e.c.	34	26.0
				61	Households		
				62	Government		

Table D.3: Values of Capital Stock, and Capital Servic Flows, 2000 ($bil)

		Capital Stock	Capital Input	IT Capital Input
1	Agriculture	2,878	86.2	1.05
2	Metal Mining	43	3.8	0.14
3	Coal Mining	49	8.2	0.24
4	Petroleum and Gas	462	51.2	1.30
5	Nonmetallic Mining	33	5.8	0.21
6	Construction	206	73.5	5.43
7	Food Products	275	70.8	3.63
8	Tobacco Products	29	5.6	0.28
9	Textile Mill Products	72	6.1	0.54
10	Apparel and Textiles	43	7.1	0.63
11	Lumber and Wood	70	11.6	0.56
12	Furniture and Fixtures	35	8.5	0.63
13	Paper Products	162	30.0	1.40
14	Printing and Publishing	117	34.6	10.19
15	Chemical Products	382	102.1	6.60
16	Petroleum Refining	132	17.1	0.31
17	Rubber and Plastic	118	22.6	1.65
18	Leather Products	8	1.4	0.09
19	Stone, Clay, and Glass	86	18.3	1.21
20	Primary Metals	187	24.8	1.02
21	Fabricated Metals	150	43.7	3.36
22	Industrial Machinery	269	41.6	10.40
23	Electronic & Electric Equip	281	71.4	11.79
24	Motor Vehicles	156	34.2	1.47
25	Other Transportation Equip	169	13.9	3.16
26	Instruments	134	15.8	6.78
27	Miscellaneous Manufacturing	34	8.3	0.64
28	Transport and Warehouse	903	75.9	12.59
29	Communications	859	129.4	68.60
30	Electric Utilities	1,057	114.3	6.21
31	Gas Utilities	287	18.4	4.09
32	Trade	1,979	306.8	74.80
33	FIRE	5,850	675.6	115.39
34	Services	1,437	437.1	98.04
35	Government Enterprises	1,138	78.5	12.51
	Households	11,897	1,394.4	85.32
	Government	5,195	290.1	46.21
	35 Industry Median	162	30.0	1.65

Note: Household investment includes consumer durables and residential structures.

Table D4: Aggregate Investment, Capital Stock and Capital Services

	Investment		Capital Stock		Capital Services		
	Price	Quantity	Price	Quantity	Price	Quantity	Quality
1964	0.311	633.0	0.227	11732.7	0.310	1037.4	0.645
1965	0.314	703.1	0.230	12146.3	0.328	1091.9	0.656
1966	0.320	766.6	0.237	12668.4	0.331	1157.2	0.666
1967	0.328	754.5	0.242	13208.8	0.329	1220.7	0.674
1968	0.341	799.1	0.256	13715.3	0.312	1281.6	0.682
1969	0.356	820.6	0.273	14214.6	0.309	1344.7	0.690
1970	0.372	771.6	0.284	14685.3	0.318	1397.2	0.694
1971	0.390	824.8	0.299	15114.7	0.321	1444.8	0.697
1972	0.404	907.1	0.322	15554.5	0.364	1503.5	0.705
1973	0.423	995.4	0.353	16075.3	0.394	1578.5	0.716
1974	0.462	939.4	0.384	16654.7	0.411	1641.5	0.719
1975	0.514	843.8	0.426	17122.6	0.468	1687.8	0.719
1976	0.539	972.6	0.453	17507.0	0.500	1731.9	0.722
1977	0.573	1082.0	0.494	17941.0	0.535	1796.8	0.730
1978	0.614	1186.2	0.529	18493.2	0.570	1879.3	0.741
1979	0.667	1212.9	0.575	19112.8	0.624	1973.3	0.753
1980	0.725	1114.4	0.620	19672.5	0.609	2051.8	0.761
1981	0.793	1171.6	0.675	20164.4	0.658	2126.8	0.769
1982	0.834	1069.1	0.702	20570.1	0.681	2203.1	0.781
1983	0.839	1186.6	0.710	20866.8	0.733	2278.9	0.797
1984	0.852	1444.2	0.741	21290.0	0.795	2376.3	0.814
1985	0.860	1498.9	0.784	21841.8	0.792	2499.7	0.835
1986	0.873	1554.6	0.807	22381.0	0.734	2627.0	0.856
1987	0.891	1602.3	0.843	22872.6	0.787	2750.0	0.877
1988	0.908	1648.1	0.888	23342.1	0.879	2860.5	0.894
1989	0.929	1698.6	0.934	23845.2	0.879	2966.9	0.907
1990	0.944	1676.8	0.943	24310.9	0.881	3066.4	0.920
1991	0.958	1575.0	0.946	24689.0	0.868	3144.6	0.929
1992	0.960	1667.8	0.945	25039.7	0.882	3220.1	0.938
1993	0.973	1775.6	0.947	25448.0	0.876	3314.1	0.950
1994	0.990	1945.9	0.951	25943.4	0.942	3427.6	0.964
1995	1.003	2006.1	0.984	26513.4	0.968	3561.7	0.980
1996	1.000	2161.3	1.000	27120.2	1.000	3718.6	1.000
1997	0.991	2380.0	1.034	27791.2	1.018	3900.5	1.024
1998	0.977	2605.5	1.065	28566.7	0.992	4133.6	1.055
1999	0.972	2834.9	1.108	29389.1	0.971	4365.5	1.083
2000	0.977	2997.1	1.181	30236.5	0.978	4631.4	1.117
2001	0.979	2907.4	1.212	31187.0	0.949	4835.4	1.131
2002	0.976	2947.9	1.230	31827.9	1.014	4998.8	1.145
2003	0.974	3070.1	1.258	32297.4	1.010	5145.2	1.162
2004	0.993	3301.7	1.313	32797.3	1.036	5293.4	1.177
2005	1.016	3466.0	1.389	33383.4	1.160	5450.3	1.191

Note: All prices are normalized to 1.0 in 1996 and all quantities are measured in 1996 dollars, measured in billions.

Table D.5: Growth Rates of Capital Services, Stock, and Quality, 1960-2000

		Capital Input	Capital Stock	Capital Quality
1	Agriculture	0.79	0.40	0.40
2	Metal Mining	2.28	1.84	0.45
3	Coal Mining	2.38	3.09	-0.71
4	Petroleum and Gas	2.35	2.13	0.22
5	Nonmetallic Mining	3.06	2.87	0.19
6	Construction	3.01	2.75	0.25
7	Food Products	2.51	2.10	0.40
8	Tobacco Products	2.50	1.84	0.66
9	Textile Mill Products	1.99	1.00	0.98
10	Apparel and Textiles	3.22	3.05	0.18
11	Lumber and Wood	2.88	2.14	0.74
12	Furniture and Fixtures	3.61	3.23	0.38
13	Paper Products	3.47	2.92	0.55
14	Printing and Publishing	4.73	3.69	1.04
15	Chemical Products	3.93	3.50	0.43
16	Petroleum Refining	1.77	1.30	0.47
17	Rubber and Plastic	5.09	4.44	0.65
18	Leather Products	0.46	0.09	0.37
19	Stone, Clay, and Glass	2.49	1.77	0.73
20	Primary Metals	1.38	0.75	0.63
21	Fabricated Metals	3.11	2.66	0.45
22	Industrial Machinery	5.65	4.21	1.44
23	Electronic & Electric Equip	6.20	5.23	0.97
24	Motor Vehicles	2.92	2.58	0.34
25	Other Transportation Equip	4.54	2.50	2.04
26	Instruments	6.98	5.08	1.90
27	Miscellaneous Manufacturing	3.19	2.66	0.53
28	Transport and Warehouse	1.84	0.40	1.44
29	Communications	6.56	5.56	1.00
30	Electric Utilities	3.28	2.50	0.78
31	Gas Utilities	2.90	2.16	0.74
32	Trade	6.21	4.17	2.04
33	FIRE	4.22	2.84	1.38
34	Services	6.36	4.78	1.58
35	Government Enterprises	4.18	3.92	0.25
	Households	3.92	2.56	1.36
	Government	2.72	2.28	0.44
	35 Industry Median	3.11	2.66	0.63

Note: All variables are average annual growth rates, in percentages.

Table D6: Growth of Total, IT, and Non-IT Capital Services, 1960-2005 (% per year)

		Total	IT Capital	Non-IT
1	Agriculture	0.99	20.40	0.93
2	Metal Mining	2.09	17.23	1.83
3	Coal Mining	2.20	17.05	2.02
4	Petroleum and Gas	2.40	22.64	2.22
5	Nonmetallic Mining	2.85	18.08	2.64
6	Construction	3.17	22.97	2.70
7	Food Products	2.15	21.95	1.72
8	Tobacco Products	2.16	17.77	1.77
9	Textile Mill Products	1.27	20.86	0.67
10	Apparel and Textiles	2.71	19.50	2.16
11	Lumber and Wood	2.58	19.28	2.22
12	Furniture and Fixtures	2.80	20.23	2.19
13	Paper Products	2.88	19.83	2.49
14	Printing and Publishing	4.48	25.65	2.49
15	Chemical Products	3.56	23.26	3.08
16	Petroleum Refining	1.73	18.08	1.48
17	Rubber and Plastic	4.57	23.17	3.90
18	Leather Products	0.55	15.21	0.10
19	Stone, Clay, and Glass	2.28	22.02	1.48
20	Primary Metals	0.84	19.35	0.48
21	Fabricated Metals	2.76	21.54	2.17
22	Industrial Machinery	5.15	22.32	3.00
23	Electronic & Electric Equip	5.44	13.19	4.17
24	Motor Vehicles	2.67	22.51	2.26
25	Other Transportation Equip	3.32	24.59	1.69
26	Instruments	6.20	23.61	3.75
27	Miscellaneous Manufacturing	2.75	20.20	2.12
28	Transport and Warehouse	2.28	14.70	1.53
29	Communications	6.17	7.62	4.73
30	Electric Utilities	3.18	14.98	2.86
31	Gas Utilities	2.80	24.16	1.88
32	Trade	6.34	26.91	4.46
33	FIRE	3.29	17.11	2.54
34	Services	6.83	21.03	4.64
35	Government Enterprises	4.01	17.74	3.26
	35 Industry Median	2.80	20.23	2.22

Note: IT capital includes computer hardware, computer software, and telecommunications equipment. Non-IT capital includes all other assets, including inventories and land.

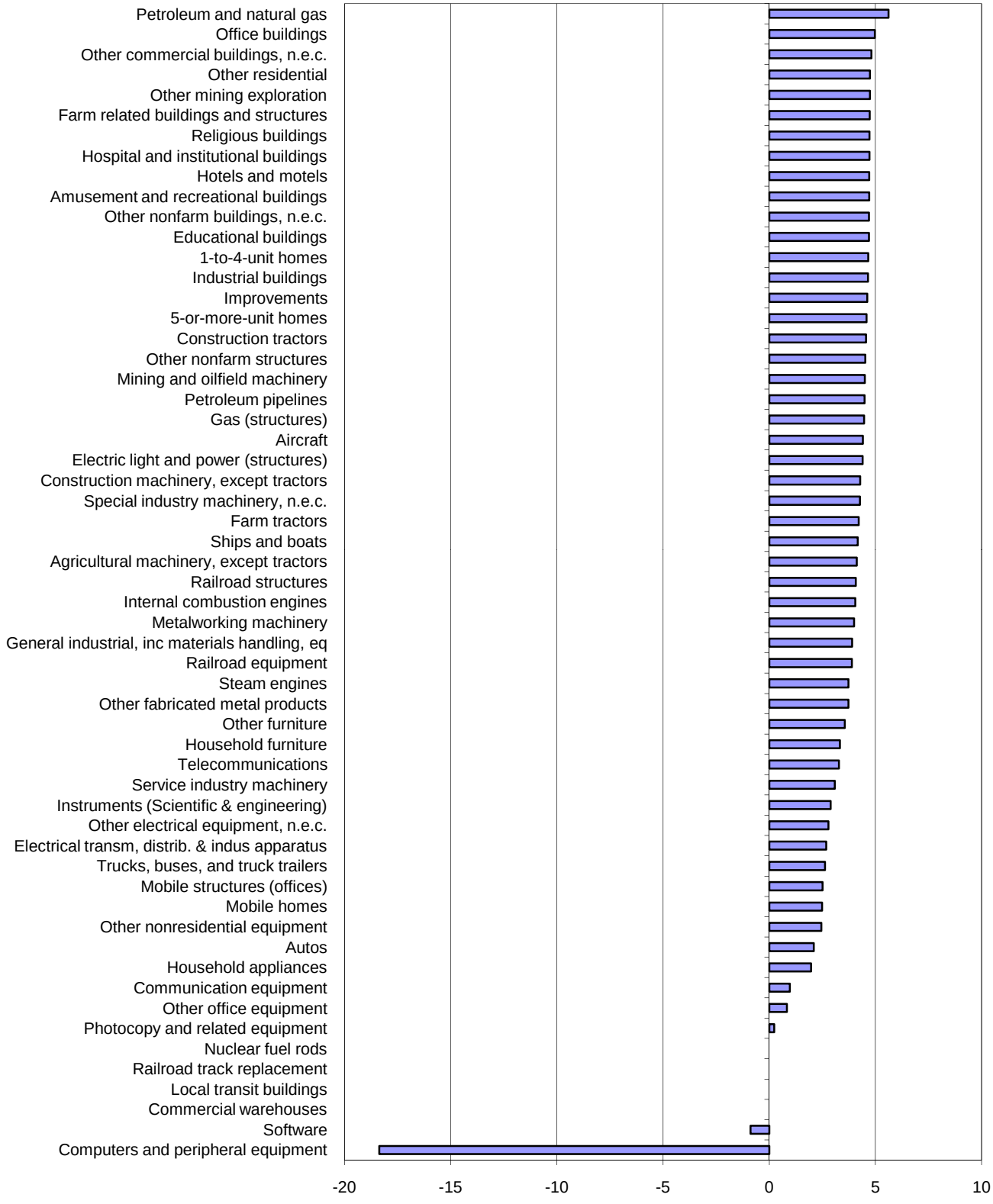
Table D7: Growth of Capital Stock, acceleration post-1995 (% per year)

		1960-2000	1960-73	1973-95	1995-2000
1	Agriculture	0.40	0.65	0.28	0.32
2	Metal Mining	1.84	3.41	1.42	-0.66
3	Coal Mining	3.09	3.60	3.29	1.25
4	Petroleum and Gas	2.13	1.88	2.46	0.95
5	Nonmetallic Mining	2.87	4.84	1.58	3.39
6	Construction	2.75	4.17	1.28	6.16
7	Food Products	2.10	2.35	1.81	2.61
8	Tobacco Products	1.84	2.59	2.08	-0.86
9	Textile Mill Products	1.00	2.55	0.26	0.10
10	Apparel and Textiles	3.05	5.74	2.30	-0.75
11	Lumber and Wood	2.14	3.84	1.21	1.90
12	Furniture and Fixtures	3.23	4.89	2.55	2.52
13	Paper Products	2.92	3.56	2.87	1.08
14	Printing and Publishing	3.69	4.72	3.27	2.93
15	Chemical Products	3.50	4.57	2.89	2.91
16	Petroleum Refining	1.30	1.83	1.49	-1.30
17	Rubber and Plastic	4.44	6.65	3.18	4.57
18	Leather Products	0.09	1.74	-0.48	-1.81
19	Stone, Clay, and Glass	1.77	2.68	0.85	3.90
20	Primary Metals	0.75	2.42	-0.22	0.27
21	Fabricated Metals	2.66	4.06	1.94	2.50
22	Industrial Machinery	4.21	5.10	3.77	4.51
23	Electronic & Electric Equip	5.23	5.50	4.98	6.55
24	Motor Vehicles	2.58	3.82	1.77	3.03
25	Other Transportation Equip	2.50	3.30	2.24	1.06
26	Instruments	5.08	6.25	4.60	3.86
27	Miscellaneous Manufacturing	2.66	4.59	1.71	2.02
28	Transport and Warehouse	0.40	-0.06	0.19	2.67
29	Communications	5.56	6.56	4.82	6.26
30	Electric Utilities	2.50	3.39	2.24	0.83
31	Gas Utilities	2.16	3.25	1.47	2.38
32	Trade	4.17	4.41	3.93	4.67
33	FIRE	2.84	3.67	2.48	2.47
34	Services	4.78	5.53	4.12	6.04
35	Government Enterprises	3.92	5.59	3.47	2.30
	Households	2.56	2.90	2.39	2.51
	Government	2.28	3.02	1.95	1.61
	35 Industry Median	2.66	3.82	2.24	2.47

Table D8: IT Capital Share of Total Capital Input

		1973	1990	1995	2000	2005
1	Agriculture	0.03	0.36	0.92	1.01	0.83
2	Metal Mining	0.92	1.69	5.66	3.54	3.65
3	Coal Mining	0.00	0.63	3.52	2.88	2.97
4	Petroleum and Gas	0.94	1.89	2.92	2.53	1.83
5	Nonmetallic Mining	0.00	1.22	3.05	3.55	3.67
6	Construction	0.83	1.67	6.79	7.53	7.86
7	Food Products	2.72	3.85	4.43	5.12	5.37
8	Tobacco Products	4.79	4.84	4.75	4.90	5.13
9	Textile Mill Products	4.58	4.76	9.61	8.82	5.95
10	Apparel and Textiles	3.85	4.95	8.55	8.94	9.64
11	Lumber and Wood	1.22	2.53	3.69	4.80	4.08
12	Furniture and Fixtures	1.34	7.47	8.19	7.45	7.32
13	Paper Products	1.60	3.83	4.32	4.68	5.04
14	Printing and Publishing	4.22	17.09	26.74	29.17	30.20
15	Chemical Products	0.96	5.03	6.08	6.45	5.65
16	Petroleum Refining	1.80	2.07	3.00	1.79	1.54
17	Rubber and Plastic	3.97	5.79	7.51	7.31	7.84
18	Leather Products	7.49	3.10	3.65	6.18	6.67
19	Stone, Clay, and Glass	1.94	7.34	5.38	6.71	6.67
20	Primary Metals	1.94	4.01	4.29	4.10	2.52
21	Fabricated Metals	2.17	5.16	7.04	7.69	7.67
22	Industrial Machinery	12.67	16.38	19.80	25.00	23.60
23	Electronic & Electric Equip	10.12	15.47	15.51	16.52	16.46
24	Motor Vehicles	1.36	3.89	4.49	4.30	5.32
25	Other Transportation Equip	3.46	33.14	17.47	22.00	20.94
26	Instruments	3.72	30.67	45.34	39.12	40.15
27	Miscellaneous Manufacturing	4.43	5.44	6.92	7.74	7.82
28	Transport and Warehouse	2.17	8.37	13.17	14.35	13.15
29	Communications	62.51	54.23	57.11	53.67	46.79
30	Electric Utilities	0.76	6.59	5.68	4.52	4.91
31	Gas Utilities	0.51	11.78	19.10	22.15	24.04
32	Trade	3.34	18.10	22.05	23.05	22.04
33	FIRE	2.84	5.71	8.45	9.93	9.99
34	Services	6.40	25.18	21.45	25.15	29.99
35	Government Enterprises	2.75	9.56	10.53	15.09	16.38
	35 Industry Median	2.17	5.16	6.92	7.45	7.32

Figure D1: Average Price Change by Asset, 1960-2005



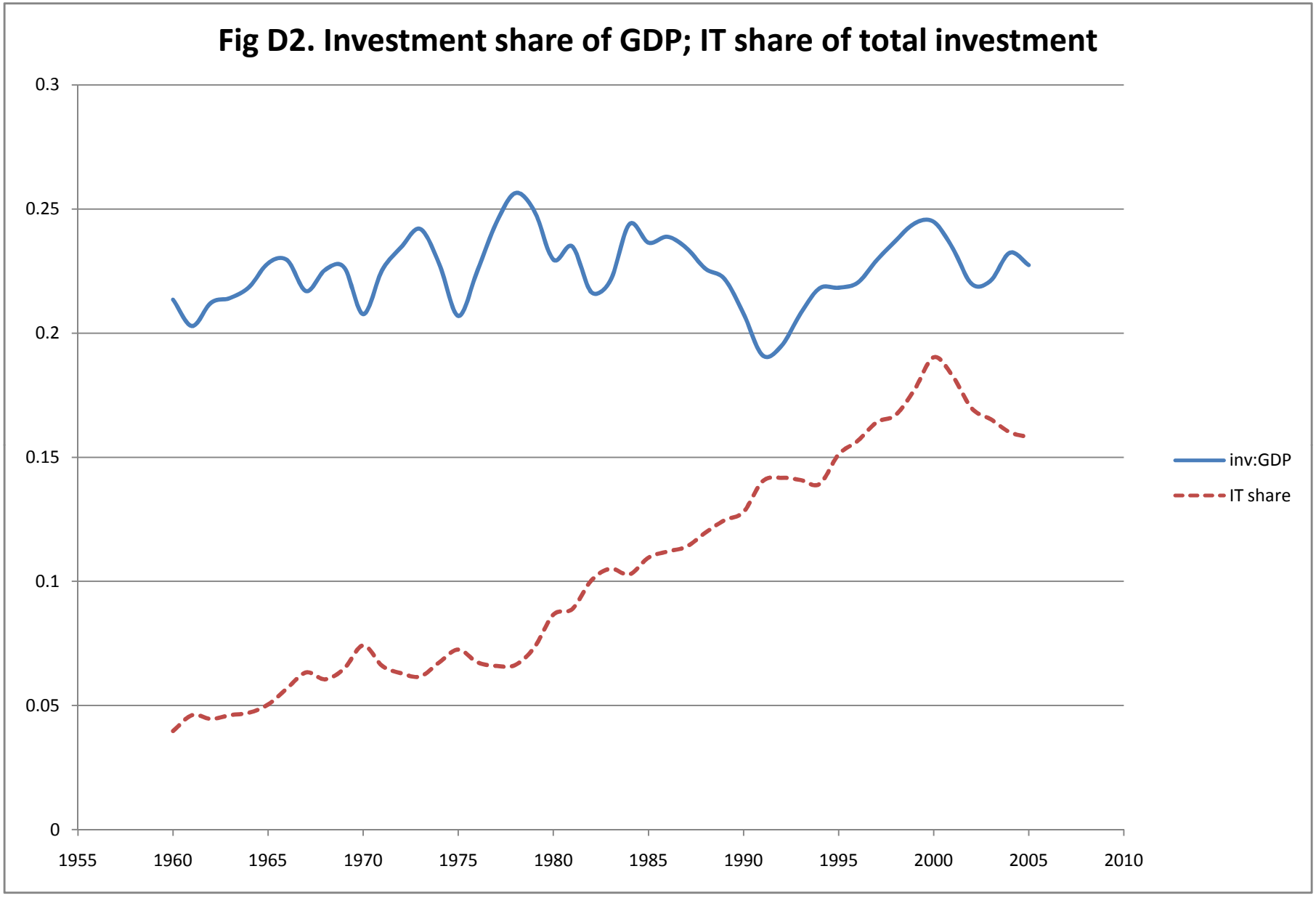


Fig D2. Investment share of GDP; IT share of total investment
0.3
0.25
0.2
0.15
0.1
0.05
0
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
inv:GDP
IT share