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Environmental Reg's Reduce Productivity

Environmental regulation generally is felt to be the most costly type of government regulation introduced in the 1960s and 1970s: the EPA budget represents about one-third of the total federal regulatory budget, and the manufacturing sector reported over \$17 billion in operating costs and \$6 billion in capital expenditures for pollution abatement in 1990. Now, a new study for the NBER finds that these regulations also have a higher cost than previously estimated in terms of productivity.

In **Environmental Regulation and Manufacturing Productivity at the Plant Level** (*NBER Working Paper No. 4321*), **Wayne Gray** and **Ronald Shadbegian** analyze the impact on productivity of pollution abatement expenditures and other measures of environmental regulation. Focusing on plants in the paper, oil, and steel industries in 1979–85, they find that the more regulated plants have significantly lower levels of productivity and productivity growth than the less regulated plants. In fact, a \$1 increase in a plant's compliance costs appears to reduce total factor productivity (TFP) by between \$3 and \$4.

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Gray and Shadbegian analyze productivity data for 122 pulp and paper mills, 107 oil refineries, and 60 steel mills. They find that the paper industry experienced the greatest productivity growth over the period: TFP grew by 4 percent per year, while labor productivity (LP) grew by 4.7 percent per year. Produc-

tivity in the steel industry declined during the period, by 1.9 percent per year for TFP and 0.4 percent per year for LP. In the oil industry, TFP grew by 1.9 percent per year, and LP by 0.2 percent per year.

New investment was higher in the oil and paper industries than in steel: about 11 percent of the 1982 capital stock, versus about 7 percent. The authors also observe that the average paper and steel mill spent 1.9 percent of their total costs on pollution abatement, versus about 0.8 percent of total costs for the oil refineries.

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Gray and Shadbegian find that a plant's pollution abatement costs are negatively associated with its TFP level and growth rate and its LP growth rate. “Plants spending a greater fraction of their total costs for pollution abatement have significantly lower TFP levels than other plants, and plants with increases in their pollution abatement cost shares have slower TFP growth rates,” they write. These results hold even after controlling for plant-specific factors that influence TFP.

High State Taxes Discourage Foreign Investment

According to a new NBER study by **James Hines**, those states that impose relatively high income taxes on corporations discourage foreign direct investment, especially from such countries as France and Germany that do not allow credits for foreign taxes paid. Contrarily, low tax rates can encourage foreign companies to expand or build new plant and equipment in a state. All other things equal, Hines finds, a 1 percent higher state corporate tax rate is associated with a decrease of 7 to 9 percent in the share of manufacturing investment by foreign investors from countries without foreign tax credit systems, relative to investors from nations with tax systems that *do* allow for the crediting of U.S. taxes against their domestic tax obligations.

In **Altered States: Taxes and the Location of Foreign Direct Investment in America** (*NBER Working Paper No. 4397*), Hines writes that it does not follow that a 5 percent boost in tax rates would reduce investment from some sources by 40 percent, but the effect nevertheless would be large. "State taxes significantly influence the pattern of foreign direct investment in the United States," he concludes.

State corporate income taxes vary in rates and design. Currently, five states exempt corporate income from direct taxation. The other 45 states tax corporate income at rates that range from 3.4 percent to 12 percent. State corporate income taxes apply only to income earned within the taxing state.

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Hines points out that foreign investors in the United States pay taxes on their investment income at roughly the same rates as U.S. investors. Because of a complicated interaction of foreign and domestic tax rules, though, investors from certain foreign countries receive home-country credits for their income taxes paid in the United States. Consequently, in theory at least, they have little or no incentive to avoid American tax obligations.

To illustrate how a foreign tax credit works, consider a Japanese investment in the United States that earns \$100 in profits. It is taxed by Washington at the statutory U.S. corporate tax rate of 35 percent. The national corporate tax rate in Japan is 37.5 percent. The firm pays \$35 to the U.S. government, and has an obligation of \$37.50 to the Japanese government. But to avoid double taxation, the Japanese government grants a foreign tax credit equal to \$35, making the firm's net tax obligation to Japan equal to \$2.50. Similar credits would be granted for state taxes.

But some other countries effectively exempt the foreign earnings of their companies from domestic taxation. Thus, foreign taxes paid represent a cost to investors from these "exemption countries" that might be avoided in part by investing in low-tax states.

Previous researchers have had difficulty finding any effect of state taxation on business location. For example, both New York and California have high tax rates, and yet both states have high foreign investment rates. But New York has the nation's largest financial center in Manhattan, and California has Silicon Valley. Hines attempts to neutralize such regional attributes by comparing only the investment of foreign companies able to take credit for U.S. taxes in calculating their taxes due at home with those companies whose home countries exempt foreign earnings from domestic taxation.

Hines looks at U.S. investments from seven countries: Australia, Canada, France, Germany, Japan, Switzerland, and Britain. These countries accounted for 78 percent of the investment in manufacturing property, plant, and equipment controlled by foreign investors in the United States in 1987, the date of the last comprehensive survey by the Department of Commerce.

Looking at 25 low-tax U.S. states versus 25 high-tax U.S. states, Hines finds that investors from both exemption countries (Australia, Canada, France, Germany, and Switzerland) and foreign tax credit countries (Japan and Britain) invest in low-tax states more than in proportion to their populations, and invest in high-tax states less than in proportion to their populations. However, the difference is much more pronounced for exemption investors, as the theory of tax avoidance predicts.

Comparing five states with no corporate tax with the 12 states whose tax rates exceed 8.8 percent, Hines finds that the tax effect on investment is even more dramatic. Investors from exemption countries have investments in low-tax states more than in double proportion to the states' populations, while they have investments in high-tax states less than in proportion to their population. By contrast, investors from tax credit countries exhibit a lower ratio of investment share to population share in the low-tax states than they do in the high-tax states. Again, this behavior is consistent with the influence of tax incentives on investment ownership.

Hines confirms that “even small variations in local tax rates may have an important effect on capital flows, and by implication, on the economy as a whole.” But he cautions that because of the nature of equilibrium in local capital markets, a reduction in state taxes might not boost foreign investment in the short, or even the long run. Rather, it might merely encourage German investors to sell their local assets to British investors. Furthermore, states offer various other concessions to attract foreign investment. Nonetheless, Hines writes, “tax and other considerations that influence ownership patterns are also likely to influence real investment patterns, though perhaps not with the same magnitude that they influence ownership.”

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paired that they are better off staying in their old house rather than attempting to move. For example, imagine a family with a house initially worth \$100,000, an outstanding mortgage of \$85,000, and no other assets. Then suppose that the family would like to move to the next town, perhaps because the public schools are better. The purchase of a new house requires a minimum downpayment of 10 percent. If house prices stay where they are, the family can sell its old house, pay off the mortgage, and still have \$15,000, more than enough to make a downpayment on a new house of comparable size.

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Study Explains Volatility of House Prices and Volumes

What explains fluctuations in house prices, and why is there more intense trading activity (that is, a higher volume of sales and a shorter average waiting time from listing to sale) in rising markets than in falling markets?

In a new study for the NBER, Research Associate **Jeremy Stein** demonstrates a connection between house prices, downpayments, and housing demand. He shows that there are self-reinforcing effects from economic shocks to house prices: if an initial shock knocks prices down, the ensuing losses on existing homes compromises the ability of would-be movers to make downpayments on new homes. This in turn leads to a lack of demand, which further depresses prices, and so on.

In **Prices and Trading Volume in the Housing Market: A Model with Downpayment Effects** (*NBER Working Paper No. 4373*), Stein concludes that these effects can have significant consequences for house prices and can contribute to dramatic boom-to-bust movements in house prices. His analysis shows that these downpayment effects have a greater impact on price volatility when a large fraction of the population is highly leveraged—that is, owns homes with high loan-to-value ratios.

Stein also provides a simple explanation for the observed positive relationship between the level of house prices and the trading volume. As house prices fall, some potential movers find their liquidity so im-

But if house prices fall by 10 percent, then the family will have only enough to make a downpayment of \$5000. Rather than moving to a much smaller house, they may choose to stay where they are. Or, they may try “fishing”: listing their current house at an above-market price in the hope of getting lucky and raising enough money to make a reasonable downpayment. In a period of low liquidity, the alternative to “fishing” is not moving at all. In contrast, when prices and liquidity are higher, the individual can move to the desired location more promptly and with certainty. These arguments suggest that both the volume of trade and the length of time that houses remain on the market will be related to the level of prices.

The standard analyses treat the housing market much like any other asset market. In this framework, house prices are forward looking, and depend solely on current and future costs of capital, rents, construction costs, and the like. However, this “efficient markets” approach does not explain the dramatic boom-to-bust episodes that have occurred at both the country and regional levels.

Explanations involving less than fully rational behavior also have been advanced to explain the link between the level of house prices and the volume of sales. Certain sellers have expectations that adapt slowly, or they simply refuse to recognize reality in depressed markets, and therefore they do not cut their house prices to appropriate levels. A similar line of reasoning also is advanced to explain why houses tend to stay on the market longer in times of falling prices.

But Stein’s analysis of the housing market that is developed in this paper does not depend on irrational behavior. It begins with the fact that the purchase of a house typically requires a significant downpayment.

This implies that the demand for houses will be affected by buyer liquidity. Moreover, in order to support strong housing demand, many individuals must be liquid. One buyer with \$300,000 of liquidity probably will not demand as much housing as ten buyers with \$30,000 each, since most people want only one or two houses. Unlike in the stock market, therefore, a few “deep pockets” in the economy cannot counteract a widespread shortage of liquidity. Furthermore, houses represent a substantial fraction of household net worth. And, approximately two-thirds of all American households own their own homes. This means that an external shock to house prices can have a large and broad-based impact on household liquidity.

Universal Banking Lowers Financing Costs

An important aspect of the current policy debate about banking reform is whether banking powers should be expanded to include equity underwriting. Although some U.S. banks recently have been permitted a limited amount of such underwriting, the universal banking rules have allowed German banks to do equity underwriting and similar activities for more than a century.

Now, a new study for the NBER by **Charles Calomiris** compares the universal German banking system of 1870–1914 with its constrained American counterpart. In **Corporate Finance Benefits from Universal Banking: Germany and the United States, 1870–1914** (*NBER Working Paper No. 4408*), Calomiris finds that limitations on bank consolidation and branching effectively narrowed the scope of U.S. commercial banks, limited their involvement in financing large-scale industry, and increased the costs of issuing securities. In contrast, large-scale universal banks that had long-term relationships with firms financed German industry during that same period. The low costs of German industrial finance were reflected in lower investment banking spreads on securities and a higher propensity to issue equity relative to the United States.

The period that Calomiris studies was the “second industrial revolution”: both countries were investing heavily in new techniques for producing chemicals, steel, railroads, and electrical machinery. Both financial systems were called upon to finance the production and distribution of these new products with large amounts of capital. But the two banking systems were quite different.

In Germany, banks have long been insiders of the firm. Further, banks typically hold or control large amounts of junior claims on firms, and exert direct corporate governance over management. In the United States, banks are not involved directly in governing firms, and bank claims on firms tend to be the most senior claims in the economy.

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The American financial system around 1900 was divided into commercial banks and investment banks. Commercial banks did not have the resources to finance large-scale industrial enterprises, or did so indirectly through their holdings of corporate bonds. After 1880, investment banks were the industrial financiers, underwriting industrial credit mainly through long-term debt issues.

In Germany, a few large banks operated nationwide branching networks. They lent directly to firms through short-term credit, underwrote firms’ securities issues, and placed issues largely through their trust departments. Calomiris argues that long-term relationships between universal banks and firms minimized the costs associated with monitoring and controlling the use of funds, and distributing junior securities to investors willing to hold them.

“From 1900 to 1913,” he writes, “the volume of net bond issues (net of retirements) in the United States was roughly the same as stock issues. During the same period in Germany, gross bond issues were roughly half the volume of equity issues. Looking at balance sheets of nonfinancial corporations in the two countries in 1912, bonds and notes accounted for more than half of the book value of corporate equity in the United States, but only 10 percent in Germany,” Calomiris observes.

The high cost of issuing equity in the United States explains its relative dearth, according to Calomiris. This cost is reflected in investment bankers’ spreads on common stock issues (the difference between the market value of the securities issued and the value received by the issuing firm).

For the German electrical and metal manufacturing industries between 1893 and 1913, bankers’ commissions on common stock issues averaged under 4 percent, and did not vary according to firm size or the size of issue. In the United States, in contrast, even as late as the 1940s, banker spreads averaged nearly 20 percent for common stocks, and the costs were largest for smaller companies and smaller issues.

Calomiris emphasizes that a 20 percent spread indicates that a firm receives only 80 cents of every dollar of claims it issues. Spreads in the United States for more senior securities were lower, but access to these markets was limited to large, established firms. Spreads for preferred stocks averaged roughly 10 percent, and for bonds, 5 percent.

Since German bankers' spreads on equity were less than one-fourth those in the United States during this period, small German firms were able to issue equity for less than what large American corporations paid for issuing bonds, he concludes.

Dealing with Currency Risks in International Bond Portfolios

Are there identifiable patterns in exchange rate movements that can be exploited for profit? And, since investment portfolios now include foreign-currency-denominated bonds as well as dollar-denominated bonds, how can investors manage the currency risk in international bond portfolios to improve the risk–return performance?

In a new study for the NBER, **Richard Levich** and **Lee Thomas** conclude that the application of well-known technical trend-following rules could have resulted in persistent profits in the currency markets between 1976 and 1990. Further, applying these same rules to dealing with currency risk can substantially improve the risk–return trade-off to investors holding international bond portfolios, they find.

In **Internationally Diversified Bond Portfolios: The Merits of Active Currency Risk Management** (*NBER Working Paper No. 4340*), Levich and Thomas use data on exchange rates for five currencies (Canadian, German, Japanese, Swiss, and British) for 1976–90. In tests based on ten different technical trading rules, the authors find that profit opportunities were persistently available in currency trading.

Using this information, Levich and Thomas then analyze how to manage the foreign currency risk that may adversely affect performance for U.S. dollar-based investors. They note that from the point of view of the U.S. investor, the return on a foreign bond has two components: the return on the bond expressed in terms of the foreign currency, and the return on the foreign currency itself. Historically, the changes in exchange rates have been a volatile component of the total return on these bonds.

Levich and Thomas show that when one-month forward currency contracts are used selectively to hedge returns on a portfolio of ten-year foreign government bonds, the trade-off between average monthly return and volatility on the portfolio improves. For example, between 1976 and 1990, the ratio of excess-returns-to-volatility was 0.12 for an investment in ten-year U.S. Treasury bonds. The same performance ratio for an evenly weighted global portfolio, completely unhedged against currency risk, was 0.29; for the same type of portfolio, fully hedged against currency risk, it was 0.41. In other words, the ratio of returns-to-volatility is larger in a global portfolio than in a portfolio of U.S. Treasury bonds, and can be improved by currency hedging.

However, this performance ratio rises to 0.75 for the global portfolio with a tactical currency hedge, which permits selective hedging based on the technical rules. And, the ratio rises to 1.23 for the global portfolio with the currency overlay, which permits a more aggressive application of selective currency hedging based on the technical rules. These results remain fairly consistent, even over shorter intervals within the entire 14-year sample period.

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While past results are never perfect indicators of future investment relationships, Levich and Thomas conclude that currency behavior has been characterized by identifiable and profitable patterns for much of the floating exchange rate period.

Health Insurance Availability Encourages Retirement

“Continuation of coverage” mandates—state and federal laws that allow individuals to continue to purchase health insurance from their former employers—significantly increase retirement rates, according to a new NBER study by **Jonathan Gruber** and **Brigitte Madrian**. A year of such coverage increases retirement rates by 20 percent, they find.

In **Health Insurance Availability and the Retirement Decision** (*NBER Working Paper No. 4469*), Gruber and Madrian estimate changes in retirement behavior that result from differences in the timing and

generosity of these laws in different states. Surprisingly, they find that the higher rates of retirement are not concentrated around age 65, near Medicare eligibility: the retirement increase is uniform over the ages of 55 to 64. This may indicate that continuation mandates also are used by younger “retirees” as a bridge to another job. They also find that continuation coverage increases the probability of early retirees being insured by nearly 5 percent.

“Future policies aimed at providing health insurance for all Americans could lead to ‘a large increase in the rate of early retirement.’”

In the past, many studies of retirement behavior have focused on the effects of programs such as Social Security, without taking into account the availability of health insurance. That is surprising, considering the large effect one’s health often has on the decision to retire, the authors note. Early retirees fall outside the two largest systems of health insurance coverage in America: employer-based health insurance and Medicare. So the availability of health insurance after retirement, but before qualification for Medicare’s

coverage at age 65, factors into an individual’s decision to retire. Indeed, increasing the age of Medicare eligibility may have a more significant effect on retirement rates than changing the age of Social Security eligibility.

Gruber and Madrian note that people aged 55–64 who wish to retire face “large and uncertain” health insurance costs before they are eligible for Medicare. They also face the difficulty and increased expense of switching to an individual—rather than an employer-based insurance policy. Individual policies can be far costlier than employer-based policies, which “pool” employees, spreading the risk and cost among them. Individual health insurance also is costlier to retirees because it is often age-rated. By making the retiree’s previous health insurance package available, continuation mandates effectively subsidize retirement, making early retirement more attractive.

Finally, Gruber and Madrian suggest that future policies aimed at providing health insurance for all Americans could lead to “a large increase in the rate of early retirement.” The authors estimate that if national health insurance were financed by a 10 percent payroll tax, the resulting increase in retirement would lower tax revenue by at least \$800 million.



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