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## Increasing Retirement Account Participation

Employers can greatly increase both participation and investment in 401(k) retirement accounts by automatically enrolling employees in the plans, boosting the default contribution rate and the employer match, and allowing all departing employees to retain their savings in a retirement fund rather than forcing some to liquidate their assets. These are among the findings of a study by **James Choi, David Laibson, and Brigitte Madrian — Plan Design and 401(k) Savings Outcomes** (NBER Working Paper No. 10486) — which focuses on improving the effectiveness of the widely-used accounts that have replaced guaranteed pensions as America's primary, privately-sponsored source of retirement income. “The central finding — that plan design matters in economically significant ways — places a tremendous burden on both employers and government regulators,” they write. “Whatever plan design an employer chooses will favor certain outcomes over others.”

For example, if the goal is to get more employees to open 401(k) plans, then employees should not be required to actively initiate participation. Rather, they should be enrolled automatically (while retaining the option to drop out) or at least be required to “actively indicate” by a specific date whether or not they want a 401(k). Companies with automatic or “active decision” enrollment procedures have a far higher percentage of their employees investing in 401(k) plans than do companies in which it's up to the employee make the first move, the authors observe. “If the goal of either employers or government regulators is to achieve the highest possible 401(k) participation rate, the single most effective intervention is automatic enrollment,” they write.

There is evidence that “facilitating enrollment” by requiring employees to make a decision one way or another by a date-certain may provide similar gains. In addition, the authors uncover other ways employers can boost participation, include initiating or increasing the company contribution to the plan, allowing employees to take out loans against their 401(k), and making sure that the menu of investment options is not so complicated as to discourage enrollment.

Choi, Laibson and Madrian also consider approaches that might prompt employees to put a higher percentage of their salaries into a 401(k). For example, one of the drawbacks of automatic enrollment is that under such systems employees are less likely

be influenced by the design of a particular 401(k). For example, they note that while it's important to provide employees with a menu of investment choices, there is evidence that the mix of offerings in certain plans prompts employees to skew their portfolio toward “more conservative assets, such as money market funds” over investments in assets, such as stocks, which might be more likely to fatten retirement savings.

Choi, Laibson and Madrian also caution that some plan designs may steer employees toward putting an “excessive” amount of their 401(k) savings into company stock. Some aspects of a plan's design — such as providing the employer contribution in company stock — can lead to situations in which

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to boost contributions beyond the default amount set by the employer. One way to address this problem, the authors contend, is to offer plans with a feature that, over a set period of time, automatically escalates the income percentage employees contribute. They cite a recent experiment in which, after three years, employees who had selected the automatic increase feature were contributing 11.6 percent of their pay to their 401(k) while those not using the feature were contributing 8.7 percent. They also observe that, just as it influences participation in 401(k) plans, initiating or boosting an employer match can result in higher employee contributions as well.

In addition, Choi, Laibson and Madrian encourage employers to think about how investment strategies can

more than half of an employee's retirement savings depend on the performance of company shares. (The authors note that under federal law “defined benefit” employee pension plans can contain no more than 10 percent of company stock, but 401(k) plans are exempt from this rule.)

Finally, Choi, Laibson, and Madrian observe that people are more likely to keep saving for retirement if they're not forced to convert their 401(k) into cash when they leave a particular job. For some time now, if departing employees have had less than \$5,000 in a 401(k), federal law allowed employers to force them to accept a cash payment. While employees can simply take this money and put it into a new retirement account, studies show that in most situations they tend to

spend the cash rather than re-invest it. The authors note that a new law set to go into effect this year requires employers to set up an individual retirement accounts (or IRAs) for departing employees with relatively small account balances (those between \$1000 and \$5000) rather than compelling them to liquidate their 401(k).

Drawing on their own research

and that of others, the authors conclude that while it may be tempting for employers to adopt a “laissez-faire” or hands-off approach to 401(k) plans — leaving it up to employees the enroll in the plans and managing their contributions and investment choices — the fact remains that even with this approach employers are still making choices that will influence the quantity

and quality of employee retirement savings. “In short, there is no escape,” they conclude. “Policymakers should also recognize the importance of plan design, as they can legislatively encourage and facilitate employer adoption of particular 401(k) designs that foster better retirement savings outcomes for employees.”

— Matthew Davis

## Who Gains from Innovation?

With the sharp rise in productivity growth over the last decade, economists have been curious about the extent to which the fruits of higher productivity are captured by innovating firms. Is the rapid technological change in the New Economy — with double-digit rates of productivity growth in computers and a phenomenal increase in new products and services via the Internet — leading to a similar rapid rise in the profits of New Economy firms?

In **Schumpeterian Profits in the American Economy: Theory and Measurement** (NBER Working Paper No. 10433), author **William Nordhaus** studies the impact of new technology on profits, emphasizing three important implications: first, understanding the role of innovation-driven profits in total profits; second, identifying the impact of innovation in stock market returns; and third, gaining greater understanding of technology's wealth effect on aggregate demand, as defined by Federal Reserve Chairman Alan Greenspan (an effect he labels the “Greenspan effect.”)

Nordhaus begins by considering the impact of technological change on prices and profits. Do technological improvements primarily result in lower prices for consumers or in higher profits for producers? If producers are able to capture (or appropriate) most of the social returns to innovation, then profits will rise and prices will fall relatively little.

How much of the profits from a new technology are captured by innovators will vary greatly across industries. For sectors where knowledge is in the public domain, such as weather forecasting, the new knowledge cannot be

appropriated and productivity improvements are passed on in lower prices. In other industries with well-defined products and strong patents, such as pharmaceuticals, producers may be successful in capturing a large fraction of social gains in “Schumpeterian profits.”

Nordhaus begins by developing a model for explaining the size of Schumpeterian profits. In this context, Schumpeterian profits are profits above those that are associated with the normal return to investment and risk-taking. The Schumpeterian profit margin, defined as the ratio of Schumpeterian profits to total revenues, is determined by three parameters: the rate of innovation-driven total factor productivity; the instantaneous appropriability ratio; and the

on Schumpeterian profits is 10 percent per year, then Schumpeterian profits would be 2½ percent of total sales. If the rate of profit on capital is 10 percent per year and the capital-output ratio is 2, then in this simple example, Schumpeterian profits would be half of the return to capital.

Another application of the model would be to the New Economy (computers, software, telecommunications, and similar industries). To what extent, he asks, did the phenomenal rise in the stock prices of New Economy firms in the late 1990s reflect rapid innovation and high appropriability in that sector. He suggests the following example: The new economy amounts to 5 percent of nominal output. Assume that, after

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depreciation rate on Schumpeterian profits. The only novel parameter is the instantaneous appropriability ratio, which measures the fraction of the social surplus that is captured by the innovator in the first year. Depreciation is particularly important for Schumpeterian profits because they are often eroded by such factors as the expiration or non-enforcement of patents, the ability of competitors to imitate or to innovate around original innovations, and the introduction of superior goods and services.

Nordhaus presents a numerical example of the outcome of the model. If the rate of innovation-driven total factor productivity is 2 percent per year, the instantaneous appropriability ratio is 50 percent, and the depreciation rate

1995, costless productivity growth in this sector shot up from 5 percent per year to 15 percent per year. The new economy would then be adding about \$75 billion in social surplus in the initial years. If the new entrepreneurs could capture 90 percent of the new economy surplus in Schumpeterian profits, then with other plausible parameters, the increase in value of new economy firms would be \$6 trillion. This in fact is close to the increase in value of new economy firms from 1995-2000.

But is this parable plausible? For the entire postwar period and for the nonfarm business sector, Nordhaus estimates that innovators are able to capture about 2.2 percent of the total surplus from innovation. This figure

results from an instantaneous appropriability estimated at 7 percent and a rate of depreciation of Schumpeterian profits of 20 percent per year. This number implies that Schumpeterian profits were 0.19 percent per year of the replacement cost of capital over the period 1948-2001.

Using these estimates for the New Economy suggests that entrepreneurs could capture only \$400 billion, not \$6 trillion. Nordhaus speculates that part of the New Economy bubble might have arisen because investors overestimated the appropriability of innovations in that sector. Indeed, there is some evidence that appropriability in New Economy sectors is even lower than in Old Economy sectors. The new economy's industries are marked by easy entrance and exit: bright ideas were readily funded, but

imitators are just as quick to follow. Additionally, information is expensive to produce but inexpensive to reproduce, a factor that will erode the value of intellectual property rights and reduce the durability of Schumpeterian profits in that sector.

Nordhaus next considers the role of Schumpeterian profits through the Greenspan effect, which Nordhaus defines as the impact of rising productivity on aggregate demand through the wealth effect on consumption. Nordhaus's calculations suggest that the Greenspan effect on aggregate demand through consumption is about one-quarter of the effect on potential output. In other words, the impact of productivity growth on potential output is about three times the effect on aggregate demand.

These estimates of Schumpeterian

profits may seem implausibly low, Nordhaus says, given the inventiveness of the American economy. But they do fit into one of the major puzzles of corporate America: Why is the rate of profit on corporate capital so low? The rate of profit after tax on non-financial corporations over the past 40 years has averaged 5.9 percent annually, which was very close to the cost of capital. How could the rate of profit be so low, considering that profits include so much (such as monopoly and Schumpeterian profits) and the denominator omits several important assets (such as land and intangible investments)? At least part of the answer lies in Nordhaus's finding that only 20 basis points of the rate of return to capital were attributable to Schumpeterian profits.

— Matt Nesvisky

## Do Fathers Prefer Sons?

In Asia, the preference of many parents for sons over daughters has led to some 80 million girls "missing" from what should be the normal balance between men and women in a society, perhaps because they have been aborted, neglected, or directly killed. Yet while Americans may read with some horror the fate of female embryos and infants in Asia, they may not realize that American parents, especially fathers, also favor boys over girls. This preference for sons is less severe and subtler than in Asia, but it has consequences nonetheless.

boys is quantitatively important. Although it manifests itself differently now than it did in the past, it remains significant today.

The statistical evidence based on the 1940 to 2000 U.S. Censuses shows that a first-born daughter is significantly less likely to be living with her father than is a first-born son. Three factors are important in explaining this difference. First, women with only daughters are less likely to marry than are women with only sons. Taking account of the size of families, women with only girls are 2 to 7 per-

cent more likely to have never been married than women with only boys. Strikingly, in terms of "shotgun marriages" — which follow a pregnancy in an unmarried couple — data from California show that for those who have an ultrasound test, first-time mothers carrying a boy are much more likely to be married at delivery. If the gender of the baby is not known, the odds of marriage are no different whether the child turns out to be a boy

or a girl. "This evidence suggests that fathers who find out their child will be a boy are more likely to marry their partner before delivery," Dahl and Moretti write.

Second, parents with girls are more likely to be divorced or separated than parents with boys. It may be that fathers like living with sons more than with daughters and, since fathers generally lose day-to-day access to their children in divorce, fathers in marginal marriages may be more likely to want to stay married if a child is a son. The effect is substantial, ranging from a 1 to 7 percent higher probability of divorce, with larger families seeing more divorce. This effect is present in every region of the United States and occurs across race and education levels. But it has declined over the past several decades, so that it seems to have disappeared by the year 2000.

A third possible manifestation of parental bias is that divorced fathers are 11 to 22 percent more likely to have custody of their sons in all-boy versus all-girl families, the authors find. This effect has become quantitatively more important over time as the number of children living with divorced fathers has increased. This difference in custody rates, as well as

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**In The Demand for Sons: Evidence from Divorce, Fertility, and Shotgun Marriage** (NBER Working Paper No. 10281), authors **Gordon Dahl** and **Enrico Moretti** show how this parental preference affects divorce, child custody, marriage, shotgun marriage when the sex of the child is known before birth, child support payments, and the decision of parents not to have any more children. They find that the bias for

cent more likely to have never been married than women with only boys. Strikingly, in terms of "shotgun marriages" — which follow a pregnancy in an unmarried couple — data from California show that for those who have an ultrasound test, first-time mothers carrying a boy are much more likely to be married at delivery. If the gender of the baby is not known, the odds of marriage are no different whether the child turns out to be a boy

the difference in marriage rates, has risen over time even as the divorce differential has declined. The result is that the overall gender differential in the probability of living without a father remains large in recent years.

Using a simple model, the authors show that each piece of empirical evidence, taken individually, is not sufficient to establish the existence of parental gender bias. For example, child psychologists and sociologists have found that a father's presence in the household is more important for boys than for girls. So, it is possible that parents of boys avoid or delay divorce because they recognize such possible harmful effects on their sons. Or, it may be that girls are more expensive to rear than boys. The authors therefore turn to revealed and stated preferences on fertility to help sort out parental gender bias from competing explanations for their findings.

In families with at least two children, they find, the probability of parents deciding on having another child is higher for all-girl families than for all-boy families. The magnitude of the effect increases for families with at least three children. Further, among divorced mothers, the probability of receiving child support is lower for those with two girls than for those with two boys.

The preference for boys, the authors find, seems to be largely driven by fathers. At least since 1941, men have told pollsters by more than a two-to-one margin that they would rather have a boy. Women have only a slight preference for daughters. Taking all of this evidence together, the authors conclude that parents in the United States do have a preference for boys over girls.

The authors also examine this question of preference for boys by

looking at five developing countries: China, Vietnam, Mexico, Colombia, and Kenya. Overall, they find, all-girl families are more likely to experience divorce and to have additional children than all-boy families. Divorced fathers are more likely to have custody of their sons. Mothers with daughters are more likely to be in a polygamous relationship, at least in Kenya.

The authors note that this preference for boys could matter more in the future. Technology already permits parents to choose a baby's sex, but the methods are now costly and unreliable. "As the cost of procedures falls and their reliability rises, the sex-ratio in the population may slowly become more male," Dahl and Moretti conclude. "More importantly, the bias for boys evidenced by our results may lead to worse outcomes for daughters."

— David R. Francis

## Capital Taxes are Passed on to Workers and Consumers

**I**n **What Do Aggregate Consumption Euler Equations Say About the Capital Income Tax Burden?** (NBER Working Paper No. 10262), author **Casey Mulligan** asks what effect U.S. capital income taxes have on consumption growth and on capital markets. He looks first at data from 1947 to 1997 on capital income tax revenue per dollar of capital income, and on the "wedge" between the pretax return on assets and the marginal rate of substitution of consumption over time. He finds that the wedge is fairly constant — meaning that consumption growth roughly tracked the expected pretax return on capital — before the tax cut by President John F. Kennedy. After the Kennedy tax cut, though, the pretax return on capital and growth in consumption moved in different directions. In subsequent years, the two series moved together again, both declining during 1970-83 and increasing from 1983 to 1997.

Mulligan concludes that capital taxation drives a wedge between consumption growth and the expected pretax return on capital. His second

(and related) conclusion is that capital taxes significantly distort capital markets, precisely because most of the medium- and long-term differences between expected consumption growth and the expected pretax capital return are linked to capital taxation.

Then Mulligan turns to the elasticity of capital supplied, which he considers a critical parameter for forecasting the impact of capital income taxes. Using 51 annual postwar obser-

Finally, Mulligan ponders the strongly negative correlation between the pretax return on capital and the aftertax share of capital income. The simplest and "possibly naive" explanation, Mulligan writes, is that firms respond to capital taxation by moving up their capital demand curve, thereby passing along the capital tax. But economists have been reluctant to adopt this interpretation, because capital tax rates seem to be correlated

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varations, he estimates how consumption growth changes (that is, the elasticity of consumption growth) with changes in expected asset returns. His results are fairly similar whether "the asset" considered is commercial paper or the S&P 500 — the supply elasticity of consumption is economically insignificant. But his results differ dramatically if the aftertax return on total capital is used instead: in that case, the elasticity of consumption growth is greater than one.

with non-tax determinants of economic activity. "What would the correlation be," asks Mulligan, "if we could control for non-tax determinants of the business cycle?" Given the wedge between consumption growth and pretax capital returns, capital income taxes seem to be passed on to workers and consumers through lower capital accumulation or higher price markups, or some combination thereof, Mulligan concludes.

— Carlos Lozada

## Forfeiture Laws, Policing Incentives, and Local Budgets

Federal drug-related civil forfeiture law dates back to the Comprehensive Drug Abuse Prevention and Control Act of 1970. Since then, the authority of law enforcement agencies to seize assets has expanded greatly. This practice, known as drug-related civil asset forfeiture, has been a source of considerable controversy, because the legal hurdles for forfeiture are lower than for criminal conviction, and because those subject to seizures can find it difficult to recover their property, even when they are found not guilty of related criminal charges.

For some localities, forfeitures have become a major revenue source for local police and prosecutors. Thus, law enforcement agencies may be motivated not only by the desire to deter crime, but also by the added incentive of potential proceeds from anti-crime policing. However, the reaction of local governments to these laws highlights a fundamental problem in the use of incentives to solve problems in the provision of public goods in a federal system. When several levels of government are involved in the provision of public goods, they may have competing goals and constraints. In the case of forfeitures, while the states may have introduced incentives to induce anti-drug policing, county governments also have jurisdiction over police

policy and police budgets. The counties have the ability to adjust their allocations to police, in effect undoing the incentives created by the state.

In **Finders Keepers: Forfeiture Laws, Policing Incentives, and Local Budgets** (NBER Working Paper No. 10484), authors **Katherine Baicker** and **Mireille Jacobson** find that local governments indeed capture a significant fraction of the seizures that police make by reducing their other

these policies.

More generally, these findings imply that the effectiveness of federal and state laws using financial incentives to influence agents' behavior is limited by the ability of local governments to divert funds to other uses. Ignoring this yields a misleading picture of the responsiveness of local agents to incentives and of the effectiveness of federal and state policies. Understanding the financial incentives

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allocations to policing. This undermines the statutory incentive created by seizure laws. Local governments are more likely to do this in times of fiscal distress. The police, in turn, respond to the real net incentives for seizures, once local offsets are taken into account, not simply to the incentives set out in statute. When de facto policies allow police to keep the assets they seize, they seize more. When local governments offset the value of those seizures in the budget allocations, the police seize less. Thus, a simple analysis of the effects of asset forfeiture laws, as they appear on the books, provides only a limited or even a distorted view of the effects of

faced by each agency and each level of government involved in the budget process is a crucial component of designing policies to affect the provision of public goods.

In their analysis, Baicker and Jacobson use data from several different sources, including information that they collected on the value of seizures made by police agencies through five individual state statutes. They also use publicly available data on forfeitures through the Department of Justice for all continental states, as well as local government spending, crime, and other variables.

— Les Picker

## Are Equity Investors Fooled by Inflation?

When examining the links between the U.S. economy and the stock market, many investment professionals rely on what is known as the “Fed model.” The model assumes that bonds and equities compete for space in investment portfolios; if bond yields increase, then stock yields must also rise in order to remain competitive. Thus, the Fed model relates the yield on stocks (as measured by the ratio of dividends or earnings to stock prices) to the yield on Treasury bonds

and to the relative risk premium of stocks versus bonds. The bond yield plus the risk premium equals a “normal” stock yield; over time, the Fed model posits, the actual yield on stocks will revert to this normal yield. In other words, if the actual stock yield exceeds the normal yield, then stocks are attractively priced. If the actual yield falls short of the normal yield, then stocks are overpriced.

Historically, the rate of inflation has been a major influence on nominal

bond yields. Therefore, the Fed model implies that stock yields and inflation must be highly correlated. Indeed, in the late 1990s, investment practitioners argued that declining stock yields — and rising stock prices — were justified by declining inflation. In **Inflation Illusion and Stock Prices** (NBER Working Paper No. 10263), authors **John Campbell** and **Tuomo Vuolteenaho** explore this link and evaluate the empirical performance of the Fed model over time.

Campbell and Vuolteenaho review stock market performance between 1927 and 2002, examining the impact of risk premiums and inflation on stock yields. They find that much of the volatility of the stock yield during the 1930s and 1940s was related to the volatility of the risk premium. As inflation increased during the late

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1930s and into the 1940s, the declining risk premium outweighed the dampening influence of rising inflation on stock prices. After World War II, the risk premium trended downward; but inflation rose steadily during the 1960s and 1970s, accounting for the depressed stock prices of the early 1980s. Finally, during the late 1980s and 1990s, part of the explanation for high stock prices can be found in the era's declining equity premium and declining inflation rate.

The historical influence of inflation on stock prices is mysterious because stocks are claims to the profits generated by the corporate capital stock, and thus are real assets that

should not be directly vulnerable to inflation. Why then does inflation seem to be so important for the stock market?

The authors consider three answers. First, inflation — or the central bank's response to inflation — damages the real economy and by extension the profitability of corpora-

tions. Second, inflation might make investors more risk-averse, thus driving up the risk premium. A third and more radical explanation is the one proffered by the late Franco Modigliani and Richard Cohn in a 1979 paper. Modigliani and Cohn contend that stock investors — and not their bond counterparts — are subject to “inflation illusion;” that is, they fail to understand the impact of inflation on nominal dividend growth rates and extrapolate historical nominal growth rates even in periods of changing inflation. From a rational investor's viewpoint, then, stock prices are undervalued when inflation is high, and can become overvalued when

inflation falls.

Using the S&P 500's dividend yield and regression analysis, the authors find the first two explanations lacking. High inflation is positively correlated with rationally expected long-run dividend growth. Therefore, inflation's negative effect cannot be explained through that channel, and inflation is largely uncorrelated with the subjective risk premium. Inflation is highly correlated with mispricing, however, supporting the Modigliani-Cohn argument that investors form subjective growth forecasts without taking inflation into account.

The Modigliani-Cohn hypothesis offers useful insights for investors and policymakers alike, the authors conclude. Investors need to know whether equities can serve as a hedge against inflation. “The Modigliani-Cohn hypothesis,” write Campbell and Vuolteenaho, “suggests that disinflation may itself generate mispricing by confusing stock market investors who are subject to inflation illusion.” Moreover, they explain, Modigliani-Cohn implies that stable inflation will reduce mispricing and thereby foster a more efficient stock market.

— Carlos Lozada

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