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## Who Bears Aggregate Fluctuations and How?

In **Who Bears Aggregate Fluctuations and How?** (NBER Working Paper No. 14665), **Jonathan Parker** and **Annette Vissing-Jorgensen** analyze the exposure of high-income households to aggregate booms and busts and find a significant break with the past in regard to who bears aggregate risk. The income—especially the wage income—of rich households is now more vulnerable to aggregate fluctuations than that of poorer households and the consumption of high-income households varies more with aggregate fluctuations in part because the income of these households varies more. This has clear implications for the effects of recent recessions on consumption inequality. Specifically, because total inflation-adjusted growth in per capita consumption during the past year was about 3 percentage points below its historical mean, the authors predict that the ratio of consumption of the top 10 percent to the bottom 80 percent of the income distribution has fallen by about 15 percentage points relative to trend.

Parker and Vissing-Jorgensen base this study on two somewhat disparate strands of prior research. One, which documents increases in income and consumption inequality over the past 25 years, focuses on the extent to which income shocks are insured. This literature pays relatively little attention to the extent to which that insurance differs across households. The second line of research involves asset pricing. It has documented that equity risk is borne disproportionately by households with large stock market wealth. This work looks mainly at differences in the relative variations of consumption growth with equity returns, not with

aggregate fluctuations more generally. That difference is significant, because the share of aggregate income that comes from labor is roughly double the share coming from capital. As with the literature on consumption inequality, this research is limited by underrepresentation of households with very high

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consumption in standard datasets.

Parker and Vissing-Jorgensen present five main results. First, the consumption growth of high-consumption households is significantly more exposed to aggregate fluctuations than that of the typical household in the Consumer Expenditure (CEX) Survey (which was published annually from 1982–2004 by the U.S. Bureau of Labor Statistics.) The exposure to aggregate consumption growth of households in the top 10 percent of the consumption distribution in the CEX is about five times that of the average household.

Second, this pattern predicts that there was a significant decline in consumption inequality over the past year. With real aggregate per capita consumption growth about 3 percentage points less than its historical mean of 2 percent during the past year, the ratio of consumption of the top 20 percent to the bottom 80 percent is expected to fall by about 9 percentage points, relative to its evolution under trend growth.

Third, using income data from tax return studies, the researchers provide evidence on the channels that lead to higher exposure for high-consumption households. In the

period covered by the CEX, they suggest, the greater *income* exposure of rich households to aggregate consumption-and-income fluctuations is a likely contributor to their higher *consumption* exposure. High-income households (the top 1 percent) earn more than half of their non-capital-gains income from wage

income, and their wage income is far more exposed to aggregate fluctuations than that of lower-income households.

Fourth, Parker and Vissing-Jorgensen find even more exposure to aggregate fluctuations for very high-income households (the top 0.01 percent) than for other high-income households. This suggests that the consumption estimates in this study may understate the exposure of very high-consumption households thought to be omitted from the CEX.

Finally, the authors find a striking change over time in the exposure of the incomes of high-income households to aggregate fluctuations. Parker and Vissing-Jorgensen note that prior to the last 25 years, the incomes of high-income households were *not* more exposed to aggregate fluctuations. High-income households traditionally have had less of their income from wages and more from dividends, relative to the more recent period, suggesting higher exposure of the very high-income households to stock market fluctuations pre-1982. More importantly, in the earlier period the incomes of high-income households have had about the same sensitivity to aggregate consumption as the income

of all households, and a lower sensitivity to aggregate income. This is mainly because of lower exposure of the wage income of the

rich to changes in aggregate fluctuations in the earlier period and because of lower exposure of non-wage income (disproportionately

earned by the rich) to changes in aggregate income in the earlier period.

— Matt Nesvisky

## The Internet, Wages, and Consumer Welfare

The advent of the Internet has had an undeniable impact on the landscape of American business. From dial-up to broadband, with each evolution the Internet has been hailed by some economists and downplayed by others. Widespread evidence indicates that investment in information technology (IT) in the 1990s produced gains in U.S. productivity and economic growth at the national, industry, and firm levels. Equally substantial evidence raises questions about whether the benefits of IT investment were experienced everywhere. In particular, new IT investments had the greatest effects on productivity for industries that were already IT-intensive and for workers with more education and skills. Yet, those findings do not address the issue of the effect of the Internet on regional wages in the United States. Specifically, did wages converge or diverge because of frontier use of IT?

This question had special relevance in the 1990s because the new IT investments of that era — and particularly the rise of the commercial Internet — facilitated long-distance communication. One view hails the Internet as a great enabler of economic growth, particularly for low-density regions, because increased communication breaks the link between local investment, productivity, and wage growth, leading to wage convergence across regions. A contrasting perspective casts the Internet as a technology that exacerbates existing inequalities in wages between urban/rural and frontier/mainstream users of IT, and consequently leads to wage divergence across regions.

In **The Internet and Local Wages: Convergence or Divergence?** (NBER Working Paper No. 14750), authors **Chris Forman, Avi Goldfarb, and Shane Greenstein** closely examine the relationship between business use of advanced Internet technology and regional variation in U.S. wage growth between 1995 and 2000. They find that business use of advanced Internet technology is associated with wage growth, but they find no evidence that the Internet contributed to regional wage convergence.

Their most interesting finding suggests that the Internet instead caused a divergence of wages. Wage growth and advanced Internet use were more strongly correlated in counties that already were doing well on a variety of

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“Broadband’s deployment created between \$8.3 and \$10.6 billion of new GDP in 2006.”

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measures. In particular, advanced Internet use was especially correlated with wage growth in the 180 counties that, as of 1990, had a population over 100,000 and were in the top quartile in income, education, and fraction of firms in IT-intensive industries.

Overall, while the Internet explains just 1 percent of the wage growth in the average county in their sample, it explains 25 percent of the difference in wage growth between the 180 counties that were already doing well and all other counties. The authors also find little evidence that use of advanced Internet technologies was associated with growth in either employment or establishments.

Because these results suggest a considerable divide in the benefits of advanced Internet use across urban and rural areas, the researchers feel that the debate about the economic impact of IT must focus on regional variation. Efforts to subsidize rural Internet development would have little impact, they claim, because there is little evidence that the Internet has much impact in rural areas. This runs counter to the motivation for a wide array of policies encouraging Internet business use outside of urban areas, including policies to subsidize rural broadband development.

In a related paper, **The Broadband Bonus: Accounting for Broadband Internet’s Impact on U.S. GDP** (NBER Working Paper No. 14758), **Greenstein** and **Ryan McDevitt** examine broadband’s economic contribution through its replacement of dial-up Internet access. In September 2001, approximately 45 million U.S. households accessed the Internet through a dial-up connection, while only 10 million used a broadband connection. By March 2006, approximately 47 million households had broadband

connections, while 34 million used dial-up. The authors find that while broadband accounted for \$28 billion of GDP in 2006 (out of \$39 billion in total for Internet access), approximately \$20 to \$22 billion of that

was associated with household use. Of that amount, the authors estimate, broadband’s deployment created between \$8.3 and \$10.6 billion of new GDP.

Greenstein and McDevitt also find that increased broadband use raised consumer surplus by between \$6.7 and \$4.8 billion. Consumer surplus is the benefit to consumers from purchasing a product at a price that is less than they would be willing to pay. In both cases, this benefit is above and beyond what dial-up would have generated. The authors’ estimates of the consumer benefits generated from upgrading to broadband are much lower than those typically quoted by Washington-based policy analysts. These estimates also differ from the CPI (Consumer Price Index) for Internet access. The findings of this study correct a historically inaccurate inference about the pricing of Internet access and lead to the conclusion that the official index’s timing of price decline is actually several years too late.

Finally, the authors help to inform understanding about why the national policy of the last decade has had the effects it did. Initially, most federal policy sought to subsidize the deployment of dial-up technologies to less-served areas and users; but, at the outset of the millennium, policy changed. The new policies relied largely on the private incentives of private actors to deploy broadband technologies, without subsidy or any regulatory intervention. In retrospect, these policies seem to have promoted wire line-based broadband diffusion. Yet, this outcome is puzzling in light of the lack of price change measured in the CPI. The authors’ findings resolve this puzzle. Price indexes undervalued the gains to users, and these gains were precisely what motivated the upgrade at many households.

— Lester Picker

## Immigration and Wage Inequality

How does immigration affect the economic opportunities of American workers? A controversial topic for decades, this question has become extremely important as approximately 1.25 million immigrants per year arrived in the United States between 2000 and 2005, with a third or more of them undocumented and with low education and skills. Is the impact of these new arrivals on native wages related to the widening U.S. wage gap between high- and low-skilled workers?

In **Immigration and Inequality** (NBER Working Paper No. 14683), Research Associate **David Card** uses both cross-city and time-series data to show that immigration accounts for just a small share — about 5 percent — of the rise in overall U.S. wage inequality between 1980 and 2000. Card's results further support earlier research showing that the competitive effects of immigrant inflows are

concentrated among the immigrants themselves. While the impact of recent immigrant inflows on the relative wages of U.S. natives is small, the effects of immigration on overall wage inequality (that is, among both immi-

grant and native workers) are larger than on wage inequality among U.S. natives alone. That reflects the concentration of immigrants in the very high or very low skill categories, and the higher residual inequality among immigrants than natives.

Using data from Chicago, Detroit, Philadelphia, Los Angeles, and other cities, Card draws three conclusions. First, workers with less than a high school education are perfect substitutes for those with a high school education. In other words, dropouts

and high school graduates, whether immigrants or natives, compete for the same jobs (although high school graduates earn somewhat more per hour). Second, workers with a “high school equivalent” education and

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those with a “college equivalent” education are imperfect substitutes. The former simply do not have access to the same jobs, opportunities, or wages as the latter group. Third, within broad education classes, immigrants and natives similarly are imperfect substitutes. “Immigrant arrivals have hardly distorted the relative fraction of college-equivalent workers in the economy and have therefore had little impact on the college-high school wage gap,” he writes.

— Sarah H. Wright

## Regulation of Pollution Sources

For political and practical reasons, environmental regulations sometimes treat point-source polluters, such as power plants, differently from mobile-source polluters, such as vehicles. **Meredith Fowlie**, **Christopher Knittel**, and **Catherine Wolfram** analyze this regulatory asymmetry in the case of nitrogen oxides (NO<sub>x</sub>), the air pollutant that has proven to be the most resistant to regulatory control in the United States.

In **Sacred Cars? Optimal Regulation of Stationary and Non-stationary Pollution Sources** (NBER Working Paper No. 14504), they note that large scale, market-based air pollution regulations — such as the Acid Rain Program and the Nitrogen Oxide (NO<sub>x</sub>) Budget Program — have successfully taken advantage of significant gains from trade among large industrial point-sources of pollution. Still, they suggest that there is significant potential for efficiency improvements from coordinating abatement activity across mobile- and point-source pollution types. The authors estimate that the total compliance costs currently incurred are almost 10 percent (or nearly \$2 billion) higher than the minimum costs required to achieve the

combined reductions mandated by the two programs they study. Specifically, the current regulations require too much reduction from power plants and too little from passenger vehicles.

The authors acknowledge that the cost inefficiency is slightly lower in percentage

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terms than estimates for intra-sector gains from the adoption of market-based policies. However, because the combined costs of programs across sectors will be larger than the cost of any single program, the efficiency gains in dollar terms are likely to be higher.

There are several reasons why the authors' estimates represent a lower bound on the productive inefficiencies present in regulating NO<sub>x</sub>. First, there is strong evidence to suggest that other mobile sources, such as on- and off-road diesel, have lower marginal abatement costs than passenger vehicles. Also, their results are based on comparing a market-based program for power plants with a command-and-control standard for motor vehi-

cles. This makes the estimates of the marginal cost of abating NO<sub>x</sub> emissions from vehicles an upper bound on the true marginal cost if a more market-based approach were adopted. For instance, if regulators were able to pass a “NO<sub>x</sub> tax” the market might uncover a number of less expensive abatement strategies,

such as driving less or retiring old vehicles.

The authors note that their findings are particularly relevant to the ongoing debate over how to design policies to address climate change. There is tremendous pressure on regulators to find ways to keep the economic costs of achieving proposed greenhouse gas reduction targets to a minimum. In theory, an economy-wide tax or cap-and-trade program should ensure that marginal abatement costs are equal across all sources. Several of the proposed pieces of climate change legislation would have point and mobile sources of greenhouse gas emissions regulated under the same market-based regulatory program. Others have argued that the transportation

sector, which accounts for 27 percent of total U.S. greenhouse gas emissions, should be reg-

ulated separately from large point sources. The authors' findings illustrate the potential

for inefficiency when sectors and source types are regulated separately.

—Lester Picker

## The Euro, Wages, and Prices

A new study, **The Euro and Structural Reforms** (NBER Working Paper No. 14479), by **Alberto Alesina**, **Silvia Ardagna**, and **Vincenzo Galasso** concludes that adoption of the Euro has speeded up deregulation in the nations that participate in this common currency. While various reforms have been far more effective in deregulating product than labor markets, there are signs that wage and salary hikes eased in the run-up to adopting the single currency. The authors write that “in countries preparing to enter the Euro during the period from 1993 to 1998, there have indeed been signs of substantial wage moderation and a slowing down of the adjustment of nominal wages to past inflation.” They explain this as “part of the macro-economic efforts to meet the criteria to enter the monetary union.”

The authors find that product and labor deregulation are linked. It is easier to change labor markets if product markets are deregulated first. It is also easier to deregulate product markets, which often means layoffs at less competitive companies, if nations already have made it easier for companies to fire people and, especially, created a safety net of unemployment benefits.

This study comes at a particularly sensitive time because the current recession is boosting unemployment in EU nations that, thanks to the Euro, can no longer devalue their currencies to cushion the blow. “[T]he recent financial crisis may have generated a political movement in some countries against deregulation and in favor of a return to easy and long-term state intervention,” the authors

caution. “It is hard to predict how much the tides will move towards re-regulation.”

In some ways, it is surprising that the Euro has played a key role in structural reform. It was always viewed as the last step in a process of European integration. The

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earlier introduction of the European Single Market (ESM) in 1992 established the legal framework for the freer flow of trade in the European Union (EU), while the Euro itself had no direct legal impact on such policies. Moreover, the process of deregulation started in both EU and non-EU nations before the new currency came into being.

From 1975 to 2003, deregulation took place in all 21 nations the authors studied and in every sector of the economy. The group of non-EU nations (Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States) deregulated the least, but they started the period with less regulation than the EU nations. The nations that joined the EU but did not adopt the Euro (Denmark, Sweden, and the United Kingdom) deregulated the most.

Between 1999 and 2003, though, the Euro-adopting nations (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain) picked up the pace of reform. For them, the adoption of the Euro had an effect that was about three times larger than that of the move

to the ESM. The Euro was the key to deregulating communications and energy, while the ESM had a large impact on transportation industries. All of these moves have caused the Euro and non-Euro advanced economies to converge in terms of regulatory levels. The

authors conclude “... the results of our econometric exercise have moved us from our prior assumptions towards believing that the Euro might indeed have had an effect in—if not promoting, at least weakening the opposition to—product market reforms.”

The Euro's impact on labor markets has been more nuanced. By looking at the 1985 to 2003 period, the authors find that the index of reform in labor markets changed far less than it did for product markets. During this period, several countries nevertheless developed a secondary labor market in which workers had only temporary contracts and rigidities were few or nonexistent. Also, in the 1993–9 run-up to adopting the Euro, some nations experienced substantial wage moderation, which is consistent with the fiscal and inflationary discipline that they undertook to qualify for the monetary union. Several nations held down raises in government salaries during this period. After Euro adoption, they felt no such constraint, and the single currency had no more effect on wage moderation.

—Laurent Belsie

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