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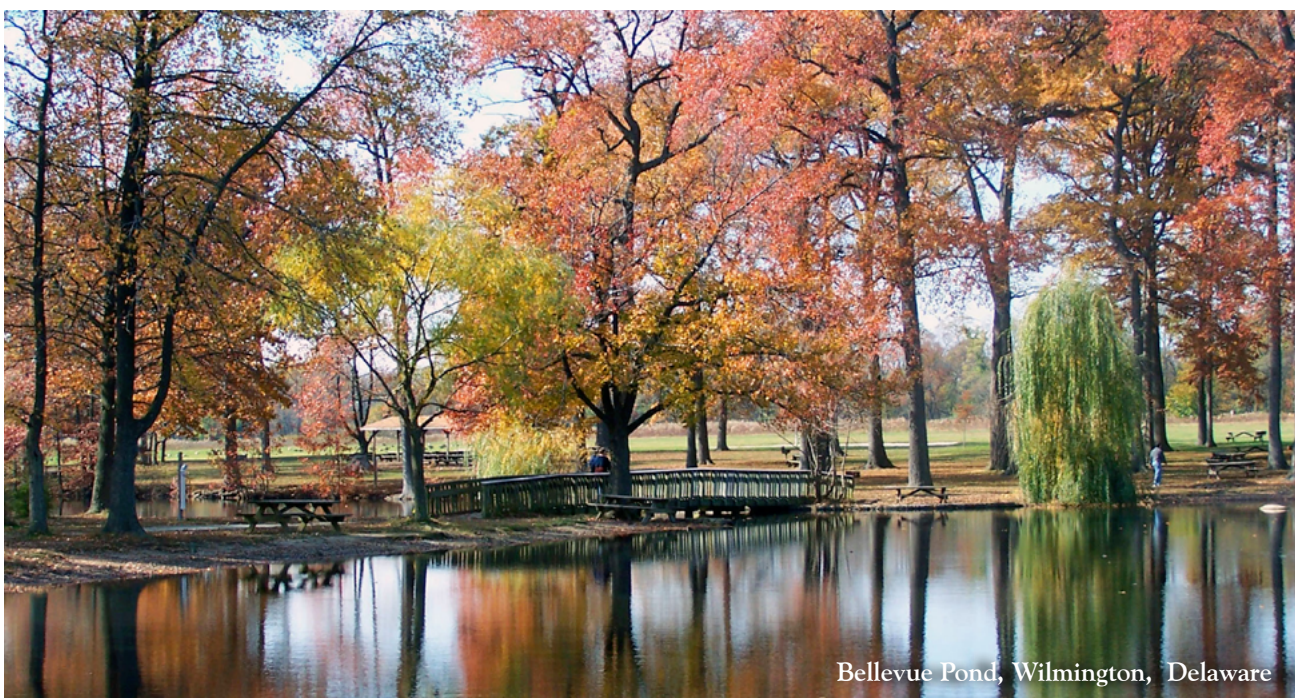PHOTO BY NOEL SARAH DIETRICH

A Bit of a Miracle No More: The Decline of the Labor Share

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A Bit of a Miracle No More:
The Decline of the Labor Share

BY ROC ARMENTER

How is income divided between labor and capital? Every dollar of income earned by U.S. households can be classified as either labor earnings — wages and other forms of compensation — or capital earnings — interest or dividend payments and rent. The split between labor and capital income informs economists' thinking on several topics and plays a key role in debates regarding income inequality and long-run economic growth. Unfortunately, distinguishing between labor and capital income is not always an easy task.

Until recently, the division between labor and capital income had not received much attention. The reason was quite simple: Labor's share never ventured far from 62 percent of total U.S. income for almost 50 years — through expansions, recessions, high and low inflation, and the long transition from an economy primarily based on manufacturing to one mainly centered on services. As it happened, the overall labor share remained stable as large forces pulling it in opposite directions canceled each other out — a coincidence that John Maynard Keynes famously called "a bit of a miracle." But the new millennium marked a turning point: Labor's share began a pronounced fall that continues today.

Why did the labor share lose its "miraculous" stability and embark on a steep decline? To investigate this shift, economists must first be sure they are measuring the labor share correctly. Could measurement problems distort our understanding of what has happened to the labor share over time? In this article, I explain the inherent challenges in measuring the labor share and introduce several alternative definitions designed to address some of the measurement problems. As we will see, the overall trend is confirmed across a wide range of definitions.

Economists do not yet have a full understanding of the causes behind the labor share's decline. We can make some progress, though, by noting the impact of wage and productivity trends and shifts between industries. Finally, I discuss several popular hypotheses, based on concurrent phenomena, such as widening wage inequality and globalization, that may account for the labor share's sharp decline.

MEASURING THE U.S. LABOR SHARE

By construction, all income accounted for in the U.S. economy must be earned either by capital or labor.[1] In some cases, we can easily see whether our income comes from labor or capital: when we earn a wage or a bonus through our labor or when we earn interest from our savings or investment account, which is attributed to capital income, despite the fact that most of us would not think of ourselves as investors. However, it is not always immediately apparent that *all* income eventually accrues to either capital or labor. For example, when we buy our groceries — creating income for the grocer — we are only vaguely aware that we are also paying the producers, farm workers, and transporters as well as for the harvesters, trucks, trains, coolers, and other capital equipment involved in producing and distributing what we purchase. However, when the Bureau of Economic Analysis (BEA) constructs the national income and product accounts, it combines data from expenditures and income to ensure that every dollar spent is also counted as a dollar earned by either capital or labor.

Of course, nothing is ever so simple when it comes to economic statistics. First, we lack the detail necessary to split some components of the income data between labor and capital returns. As I will show, the foremost example is the income of self-employed workers, who simply collect the income of

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their business without distinguishing whether it resulted from their work or their investment. In addition, the housing and the government sectors have their total income arbitrarily assigned as labor and capital income, respectively, in the national income accounts. The Bureau of Labor Statistics (BLS) publishes the most widely used estimate of the labor share, which combines several data sources and estimates in order to get around some of the measurement problems. However, these problems remain significant enough that economists routinely create alternative definitions and compare results across them, since a single definition of the labor share is unlikely to fit all purposes.

And what would these purposes be? First, workers and investors respond differently to the same economic conditions and policies. So if we wish to understand how aggregate output will respond, we need to know how to weigh the responses of workers and investors. Second, assets are notoriously unevenly distributed across households; hence, an increase in the share of income earned by capital contributes to income inequality, as richer households would receive an even larger share of total income. Third, the tax code treats labor and capital income differently. Labor income is subject to payroll taxes and the usual income tax rate schedule. Corporate profits (the main source of capital income) are subject to corporate taxes as well as dividends and capital gains taxes when profits are distributed to households. A shift in the labor share will impact not only tax revenues but also how the burden of taxation is distributed across households. Economists also need an estimate of the labor share when determining how much of economic growth can be attributed to labor force growth, capital accumulation, or technological changes — which in turn are key inputs for long-term growth forecasts.

Components of income. The BEA measures output, or gross value added, two different ways in its national income and product accounts (NIPA).[2] The *expenditure approach* aims to measure the total amount spent on goods and services throughout a year; the *income approach* instead adds up all the income earned by households. In theory, both measures should yield the same number. In practice, alas, they do not. The discrepancy is due to data limitations and measurement error, though the discrepancy is quite small.

The labor share is measured using the income approach. Every dollar of output must be earned by *factors of production* and distributed to households. What exactly is a factor of production? Were we to measure the output of a factory, we would count as factors of production the workers and managers, all the equipment, the building and land occupied by the factory as well as the electricity, security service, and all the other intermediate inputs used. But because we are measuring the output of the whole economy, we must recognize that the intermediate goods, utilities, and services were produced by some other firm, which in turn uses its own factors of production. Were we to check with, say, the firm producing electricity, we would once again find some workers and managers, equipment, and so on. Now, we could try to track each and every input of production in the U.S., but we would quickly realize that the only factors of production whose income accrues directly to households are labor and capital.

The BEA classifies output into seven groups, as detailed in the table. The second column provides the share of each component relative to the total for 2013. The classification of most income sources as capital or labor income is quite unambiguous. For example, compensation of employees clearly accrues to labor, while corporate profits, rental income, and net interest income are returns to capital. Of the three remaining components, the main challenge is proprietor's income.[3]

Proprietor's income is defined as the income of sole proprietorships and partnerships — in other words, the income of self-employed individuals.[4] There is no question that their income is the result of both labor and capital. For example, a freelance journalist may work long hours to document and write a story using a computer and a camera that she or he financed through savings. However, self-employed individuals have no need, economic or fiscal, to distinguish between wages and profits. However, economists do.

The main BLS measure. The BLS is well aware of these problems and goes to great lengths to disentangle proprietor's income into its labor and capital income components. First, the BLS uses its data on payroll workers to compute an

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Income Components of Economic Output*

	Share of total 2013 output
Compensation of employees	52.4%
Corporate profits	10.1%
Rental income	3.5%
Net interest income	4.0%
Proprietor's income	7.9%
Indirect taxes less subsidies	6.5%
Depreciation	15.6%
Total	**100.0%**

Source: Bureau of Economic Analysis.
* Also often referred to by the BEA and others as gross value added.

Other Measurement Challenges

Measurement problems with the labor share of income do not end with proprietor's income. Fortunately, none substantially alter the conclusions reached regarding the postwar evolution of the labor share.

Government and housing sectors. In the national accounts, the value added by the government is almost exclusively assigned to labor. The only portion to accrue to capital is the consumption of fixed capital, or depreciation. Yet, there is no question that capital is a factor of production for government services, so the BEA is clearly overstating the labor share in this sector. The national accounts also arbitrarily assign to labor all the output from owner-occupied housing — except that in this case it is assigned to capital income.* There is again no question that housekeeping demands quite a bit of labor, so we are now understating the labor share in this sector. The BLS, as well as most researchers, computes the labor share of income excluding both sectors.

Indirect taxes. Most U.S. states and even some cities levy sales taxes. Thus, the government captures part of the income generated by output without being a factor of production. It is fortunately quite straightforward to compute the fraction of the sales tax "paid" by workers and investors: We just need to impute the observed split between labor and capital income for the after-tax income.

Depreciation. The depreciation, or consumption of fixed capital, is merely compensation for the physical wear and tear of capital. It is thus naturally assigned exclusively to capital income. However, it is fair to point out that workers are also subject to wear and tear! Yet, there is no entry for labor depreciation in the national accounts.

* Without a market for government goods and services, the BEA must rely on cost data to value government output.

average hourly wage. The BLS then assumes that a self-employed worker would pay himself or herself the implicit wage rate. Then, using data on hours worked by self-employed workers, it obtains a measure of the labor compensation for self-employed individuals simply by multiplying the average hourly wage by the number of hours worked by the self-employed. The result is then assigned to labor income. The rest of the proprietor's income is considered capital income.[5]

Figure 1 plots the BLS's *headline* labor share at an annual frequency from 1950 to 2013.[6] Up until 2001, the labor share displayed some ups and downs, and perhaps a slight downward trend, but it never strayed far from 62 percent. From 2001 onward, though, the labor share has been steadily decreasing, dropping below 60 percent for the first time in 2004 and continuing its fall to 56 percent as of 2014.[7]

An alternative measure. Michael Elsby, Bart Hobijn, and Aysegul Sahin have pointed out that some of the fall in the labor share in the past 15 years is due to how the

BLS splits proprietor's income. Indeed, until 2001, the BLS's methodology assigned most of proprietor's income to the labor share, a bit more than four-fifths of it. Since then, less than half of proprietor's income has been classified as labor income.

How important is this shift? It is fortunately very easy to produce an alternative measure of the labor share in which a constant fraction of proprietor's income accrues to labor. Setting that fraction to its historical average prior to 2000 — 85 percent — we can figure out what would be the current labor share under this alternative assumption. Figure 2 contrasts the previous headline number against this alternative measure from 1980 onward. First, we confirm that through 2000, both the headline and the alternative measure pretty much coincide. Since 2001, though, they diverge, with the drop being noticeably smaller in the alternative measure. Indeed, this divergence suggests that at least one-third and possibly closer to half of the drop in the headline labor share is due to how the BLS treats proprietor's income.

Alternatively, we can also proceed by the centuries-tested scientific method of ignoring the problem altogether and compute the compensation or payroll share instead of the labor share. That is, we can assume that none of proprietor's income accrues to labor. This is actually a quite common approach, since detailed payroll data exist for all industries, allowing us to pinpoint which sectors of the economy are responsible for the dynamics of labor income. The compensation share is, obviously, lower than the labor share — but its evolution across time is very similar: stable until the turn of the millennium and a decline since then.

Yet another measure. There is yet another possible way to circumvent the ambiguity regarding proprietor's income. The data allow us to zoom in to the nonfinancial corporate

FIGURE 1

Labor's Share Began Shrinking Around 2001
Headline labor income share.
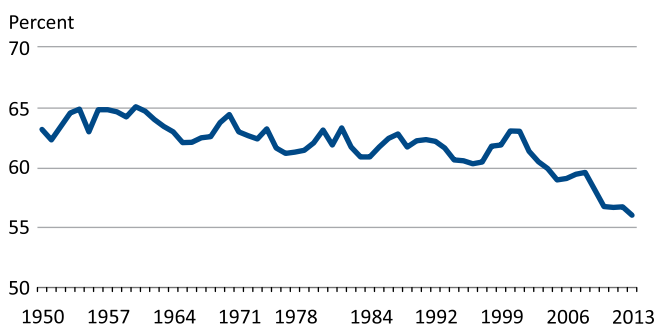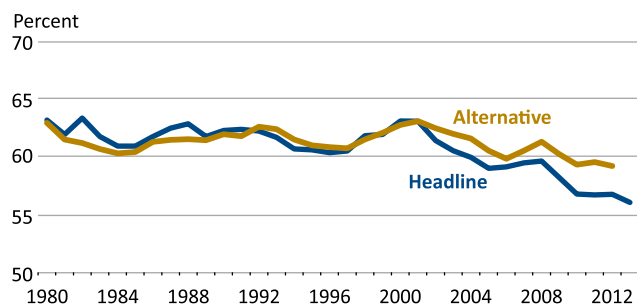
Source: Bureau of Labor Statistics.

Change in Methodology in 2001 Is Evident
Labor income share, headline versus alternative measure including all proprietor's income.
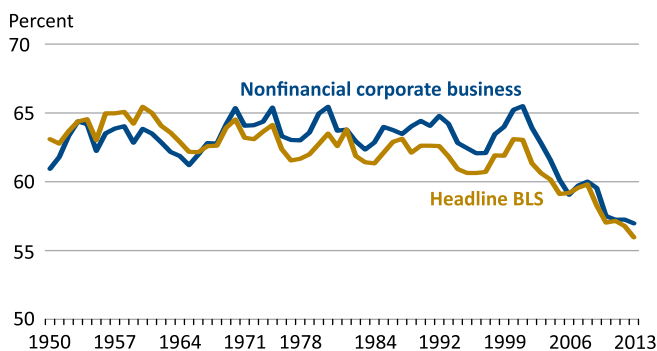

Sources: Bureau of Labor Statistics and author's calculations.

Drop Is Clear Even Without Proprietor's Income
Labor income share, headline versus labor income share from nonfinancial corporate sector.

Sources: Bureau of Labor Statistics, Bureau of Economic Analysis, and author's calculations.

business sector. By law, corporations must declare payroll and profits separately for fiscal purposes, so there is actually no proprietor's income. The downside is, of course, that we are working with only a subset of the economy, albeit a very large one.[8]

Figure 3 plots the BLS headline measure and the labor share of income of the nonfinancial corporate sector from 1950 to the latest data available. The two series overlap for most of the period, though the headline labor share was consistently about 1 percentage point below that of nonfinancial firms from 1980 onward. In any case, the message since 2000 is unmistakable: The large drop in the headline measure is fully reflected in this alternative measure.

So, despite the inherent measurement problems, the data are clear: First, the labor share was stable from 1950

to at least near the end of the 1980s. Second, it has fallen precipitously since 2001. While the exact magnitude of the drop may be open to debate, there is no doubt that the downward trend in the labor share since 2001 is unprecedented in the data and, at the time of this writing, shows no signs of abating.

A BIT OF A MIRACLE: 1950-1987

We now take a closer look at the period in which the labor share was stable — roughly from the end of World War II to the late 1980s — by breaking it down by sector. In doing so, we will understand the logic behind the "bit of a miracle" quip. The cutoff date is necessarily 1987, since the industry classification changed in that year. Fortunately, it is also the approximate end of the stable period for the labor share.

Since the end of WWII, the U.S. has gone through large structural changes to its sectorial composition. The most significant was the shift from manufacturing to services. In 1950, manufacturing accounted for more than two-thirds of the nonfarm business sector. By 1987, manufacturing was just half of the nonfarm business sector. Over the same period, services increased from 21 percent to 40 percent of the nonfarm business sector.[9]

The reader would not be surprised to learn that different sectors use labor and capital in different proportions. In 1950, the manufacturing sector averaged a labor share of 62 percent, with some subsectors having even higher labor shares, such as durable goods manufacturing, with a labor share of 77 percent.[10] Services instead relied more on capital and thus had lower labor shares: an average of 48 percent.

Thus, from 1950 to 1987, the sector with a high labor share (manufacturing) was cut in half, while the sector with a low labor share (services) doubled. The aggregate labor share is, naturally, the weighted average across these sectors. Therefore, we would have expected the aggregate labor share to fall. But as we already know, it did not. The reason is that, coincidentally with the shift from manufacturing to services, the labor share of the service sector rose sharply, from 48 percent in 1950 to 56 percent in 1987. Education and health services went from labor shares around 50 percent to the highest values in the whole economy, close to 84 percent.[11] In manufacturing, the labor share was substantially more stable, increasing by less than 2 percentage points over the period.

And this is the "bit of a miracle" — that the forces affecting the labor share across and within sectors just happened to cancel each other out over a period of almost half a century.

A BIT OF A MIRACLE NO MORE: 1987-2011

I start by repeating the previous exercise, now over the period 1987 to 2011. As it had from 1950 to 1987, the manufacturing sector kept losing ground to the service sector, albeit at a slower rate. By 2011, services accounted for more than two-thirds of U.S. economic output and an even larger fraction of total employment. However, the differences in the labor share between the two sectors were much smaller by the early 1990s, and thus the shift from manufacturing to services had only small downward effects on the overall labor share.

We readily find out which part of the economy is behind the decline of the labor share once we look at the change in the labor share within manufacturing, which dropped almost 10 percentage points. Virtually all the major manufacturing subsectors saw their labor shares fall; for nondurable goods manufacturing it dropped from 62 percent to 40 percent. The labor share within the service sector kept increasing, as it had before 1987, but very modestly, only enough to cancel the downward pressure from the shift across sectors. Indeed, had the labor share of income in manufacturing stayed constant, the overall labor share would have barely budged.

Note that in one sense, the bit of a miracle actually continued from 1987 onward: As manufacturing continued to shrink, decreasing the share of income accruing to labor, services picked up the slack by increasing their share of income accruing to labor, albeit more modestly than before. What ended the "miracle" was the precipitous decline in the labor share within manufacturing.

Wages and productivity. It is worth investigating a bit further what determinants are behind the fall in the labor share within manufacturing, since it played such an important role in the decline of the overall labor share. To this end, note that the change in the labor share in a particular sector is linked to the joint evolution of wages and labor productivity. Consider a machine operator working in a factory for one hour to produce goods that will have a gross value to the factory owner of $100. If he is paid $60 per hour, labor's share is approximately 60 percent. For the labor share to change, there are only two possibilities: Either the value of the goods produced must change or the hourly wage must. Conversely, for the labor share to stay constant, the value of the goods and the hourly wage have to move in unison.[12]

So which one — productivity or wages — brought down the labor share in manufacturing? Fortunately, we do have reliable data on output, wage rates, and hours worked in manufacturing. Figure 4 displays the evolution of labor productivity (that is, output per hour) and wage rates from 1950 onward.[13] Both series are set such that their value in 1949 equals 100.[14] Once again we see two clearly separate periods. Until the early 1980s, labor productivity and wages grew at a very similar rate — if anything, the wage rate outpaced productivity, which, as described earlier, implies that the labor share in manufacturing inched up. By mid-1985, labor productivity took off, while wage growth was very sluggish. Since then, the gap between productivity and wages has kept growing, depressing the labor share.

Because an index is used to scale both series, it is a tad difficult to grasp from the figure whether labor productivity accelerated or wage rates stagnated from the 1980s onward. The answer is both things happened. In the 1980s, productivity grew at about its long-term trend rate, but wages were virtually flat, growing less than half a percentage point a year on average over the decade. Wage growth recovered in the 1990s, but productivity actually took off, further increasing the gap. Overall, though, it appears that the fall in the labor share is explained mainly by the sluggish growth of wages rather than above-trend labor productivity.

CONCURRENT PHENOMENA

What is the ultimate cause behind the decline of the labor share in the U.S.? The honest answer is that economists have several hypotheses but no definite answer yet.[15] Rather than go over the sometimes-intricate theories behind these

FIGURE 4
Productivity Rose While Wage Growth Stalled
Labor productivity and wages in the manufacturing sector.

Index 1949 = 100
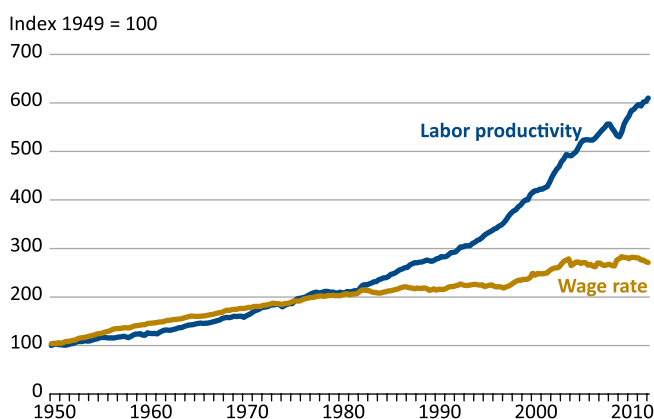
Sources: Fleck, Glaser, and Sprague (2011) and author's calculations.

hypotheses, I will discuss the main observation or phenomenon anchoring each one.

Capital deepening. This is by far the most popular hypothesis: Workers have been replaced by equipment and software. Who has not seen footage of robots working an auto assembly line? Older readers may remember when live tellers and not ATMs dispensed cash at banks. Software is now capable of piloting planes and, even more amazingly, doing our taxes!

There is more behind this hypothesis than anecdotes. Loukas Karabarbounis and Brent Neiman document a fall in equipment prices. Lawrence Summers proposes that capital should be viewed as at least a partial substitute for labor — more and more so as technology develops. In both models, the idea is similar: Better or cheaper equipment replaces workers and redistributes income from labor to capital. The result is that production becomes more intensive in capital, which is why these theories are often referred to as *capital deepening*.

It is important to understand that the capital deepening mechanism must operate at the level of the overall economy. So, when we see a robot replace, say, five workers, we need to remember that the production of the robot itself involved workers, so we are swapping auto assemblers with robot assemblers. It is, of course, still possible that the robot tilts income toward capital, but it is not a foregone conclusion.

The main challenge to capital deepening is that if a sector is substituting robots for workers to save money or improve the quality of the good being produced, the remaining workers should therefore become more productive and, overall, the sector should be expanding. In other words, capital deepening can reduce the labor share of income, but it does so by making labor productivity accelerate rather than making wages stagnate. As we saw earlier, this does not fit the actual picture of the manufacturing sector at all.[16]

Income inequality. The increase in income inequality in the U.S. has lately received a lot of attention. The decline of the labor share is a force toward income inequality because capital is more concentrated across households than labor is.[17]

It should be noted, though, that the main driver of the increase in income inequality is not capital income but rather wages themselves, particularly at the very top of the pay ladder.[18] As Elsby and his coauthors document, the increase in top wages has actually sustained the labor share. In other words, the decline in the labor share actually understates the increase in income inequality.

An interesting question is whether whatever is driving up inequality is also driving down the labor share. Several economists have proposed that technological change is skill biased — that is, it augments productivity more for highly skilled workers than for low-skilled workers. Combined with the idea that capital helps highly skilled workers be more productive but makes unskilled workers redundant, skill bias can explain both the increase in wage inequality and the decline in the labor share.[19]

Let us return once more to the car manufacturer example. The robot may be replacing five unskilled workers but may require a qualified operator. The demand for unskilled workers falls, and so do their wages; but the demand for qualified operators increases, and so do their wages. So it is possible to have an increase in wage inequality while factories undergo capital deepening.

Globalization. Another popular hypothesis links the fall in the labor share with the advent of international trade liberalization. There is no question that there has been a

> The decline in the labor share actually understates the increase in income inequality.

substantial increase in trade by U.S. firms in the past few decades. In particular, firms have shifted parts of their production processes to foreign countries to take advantage of cheaper inputs — which, from the perspective of a country like the U.S. that has more capital than other countries, means cheap labor. Industries that are more intensive in labor, such as manufacturing, will be more likely to outsource their production processes abroad, and thus the remaining factories are likely to be the ones that rely more on capital.

Surprisingly, there is not a lot of evidence to support this view. The main challenge to the hypothesis is that U.S. exports and imports are very similar in their factor composition. That is, were trade driving down the labor share, we would observe the U.S. importing goods that use a lot of labor and exporting goods that use a lot of capital. Instead, most international trade involves exchanging goods that are very similar, such as cars.[20] Another prediction of the globalization theory is that countries the U.S. exports to should see their labor shares increase and — as noted in

the accompanying discussion, *What About Other Countries?* — it appears that the decline in the labor share is a global phenomenon.

Some studies, though, do support this hypothesis. Elsby and his coauthors find some evidence that the labor share fell more in sectors that were more exposed to imports. There is a large body of literature on the impact of trade on wage inequality that only recently has started to consider the impact on the labor share.[21]

CONCLUSIONS

Despite several measurement issues and alternative definitions associated with the labor share, the message is quite clear: The 2000s witnessed an unprecedented drop in the labor share of income. Exploring the early period, we saw that the U.S. economy had been able to accommodate the surplus workers from manufacturing only until the late 1980s. We also saw that the stagnation of wages, rather than accelerated labor productivity, has been behind the drop in the labor share from 2000 onward. The review of possible hypotheses behind the decline in the U.S. labor share was, admittedly, quite inconclusive: Economists do not yet have a full grasp of the underlying determinants. ■

NOTES

[1] A small share of income is directly captured by the government, as I discuss in more detail later.

[2] The Bureau of Economic Analysis offers several introductory level guides to NIPA, easily accessible at www.bea.gov.

[3] Depreciation and taxes have their own set of measurement issues, but they can safely be ignored: See the accompanying discussion, *Other Measurement Challenges*, for a brief description of additional issues. See also Paul Gomme and Peter Rupert (2004) for a complete description of all labor share measurement issues.

[4] It actually includes some other small components such as income from nonprofit institutions.

[5] The BLS methodology is far from perfect: Some occupations may be more common among payroll workers than among self-employed workers, for example, which could lead to misleading results.

[6] The headline labor share, also called the top-line labor share, includes all industries. See www.bls.gov/lpc/lpcmethods.htm for details on the construction of the headline measure.

[7] The labor share also displays some weak cyclicality, increasing during economic downturns. The focus of this article, though, is squarely on the long-run trends of the labor share.

[8] In addition, we consider only nonfinancial corporations. Financial sector income is notoriously volatile and presents some measurement problems of its own — namely, that stock options and similar payments are often used as labor compensation.

[9] Data reported as a share of total value added. The shifts in the share of employment are of similar magnitude. Over the same period, the farming sector also shrank substantially.

[10] Data from Michael Elsby, Bart Hobijn, and Aysegul Sahin (2013). Labor shares are given by the share of payroll compensation over total value added.

[11] The increase in the labor share in services is related to William Baumol's "cost disease of services," dating back to the 1960s, that argues that productivity growth is inherently more difficult to achieve in services. See Baumol (2012) for an updated view.

[12] This calculation ignores the decomposition of proprietor's income, discussed earlier. For the manufacturing sector, though, proprietor's income is unlikely to be large.

[13] The "wage" rate actually includes benefits and bonuses, which have become an increasing fraction of total labor compensation.

[14] Following Susan Fleck, John Glaser, and Shawn Sprague (2011), Figure 4 deflates output by the implicit price index of manufacturing output and wage rates by the consumer price index.

[15] Some may argue that "yet" is itself not very honest, for economists always have several hypotheses and no definitive answer for any question that is posed to them.

[16] To be fair, the 1990s do fit quite well with the theory, as labor productivity did accelerate over the period. However, most of the fall in the labor share happened in the 2000s. There is also an issue of labor composition: See the discussion on page 6 of the relationship between technology and the wage gap separating skilled and unskilled workers.

[17] See Margaret Jacobson and Filippo Occhino (2012) for an accessible study of the effect of the labor share on inequality.

[18] See Thomas Piketty and Emmanuel Saez (2003) and Facundo Alvaredo, Anthony Atkinson, Piketty, and Saez (2013).

[19] There is a long line of work on skill-biased technological change as well as capital-skill complementarity. Lawrence Katz and Kevin Murphy (1992) and Per Krusell and his coauthors (2000) are the seminal references, but both articles are quite technical. See Keith Sill's 2002 *Business Review* article for a more accessible discussion.

[20] The original observation was attributed to Wassily Leontief. See Daniel Trefler (1993) for an evaluation of the factor content of trade using more recent data. However, a number of studies have challenged his conclusion; see, for example, John Romalis (2004).

[21] See Avraham Ebenstein and his coauthors (2013) for an example. For a summary of previous work, see Stephen Golub (1998).

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Big Cities and the Highly Educated: What's the Connection?

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Large American cities have disproportionately large shares of highly educated workers, a growing trend in recent decades.[1] What's the draw? Money for one thing, naturally. Not only do big-city firms generally pay higher wages; there is also evidence that the differential is greater for those with more education. These higher wages raise interesting questions: Why do firms in big cities find it profitable to pay more? That is, what makes a well-educated city worker more valuable than a comparably educated worker in a small town? And it's not just about money: Evidence suggests that amenities are increasingly important factors in where people choose to live, and big cities appear to provide greater amenities for higher-income workers than small cities do. But which is the bigger draw — higher wages or better amenities? As this article will show, cities may have a stake in the answer.

This article will focus on two channels through which relative advantages can arise for highly skilled or educated workers in big cities.[2] First, there may be gains in productivity in the sense that people with similar skill levels doing the same job produce more in big cities relative to smaller ones. Additionally, direct relative advantages for college-educated individuals in cities arise through what are known as *skill-biased technological advantages*. Put another way, while cities generally improve productivity for all workers, the production advantages of large cities may benefit different skill groups to different degrees. Furthermore, certain industries may be more productive than others in large cities, and these industries may be more likely to employ highly skilled workers. Disentangling these effects is not simple. Second, big cities may offer some advantages through consumption amenities. These consumption amenities may be innate, such as good weather or natural beauty, or may arise from access to a greater variety of goods and services available only in large urban areas.

Finally, note that characteristics of cities that improve production or consumption need not be mutually exclusive. Access to the ocean, for example, may improve the quality of life but is also important for industries that export goods. Likewise, transportation infrastructure improves both the efficiency of businesses as well as mobility and access for residents.

It is important for policymakers to understand why highly educated people concentrate in cities. A wide range of policies — including the provision of infrastructure, public services, and tax policy — can affect where different groups of people live and work. Given the evidence that different skill groups may not benefit equally from locating in big cities, these policies could have unintended consequences for both economic efficiency and equality.

WHAT DRAWS EDUCATED WORKERS TO BIG CITIES?

Production advantages. It has long been established that productivity increases in large cities. This increased productivity is often attributed to *agglomeration externalities* — that is, efficiency gains stemming from the concentration of workers, customers, suppliers, and even competing firms — which can arise for various reasons. A *Business Review* article by Gerald Carlino in 2011 details many of the key production advantages cities provide. However, there is still the question of why these agglomeration benefits might accrue to highly educated workers more than others.

One reason that high-skilled workers might locate in large cities is that a disproportionate share of innovation takes place in large cities. Gerald Carlino, Jake Carr, Robert Hunt, and Tony Smith show that research labs are more spatially

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concentrated than other measures of economic activity. Furthermore, using patent citation data, they are able to link innovative activity from lab to lab to provide evidence that knowledge spillovers depend on geographic concentration and therefore lead to increased production. Given that research and development often involves highly educated individuals, this is one potential reason for the increased productivity of educated workers in large cities.

The primary way to measure productivity among cities is to measure how much similar individuals are paid in different cities. In general, we would expect that if firms are willing to pay similar workers different wages in different cities, this provides evidence of productivity differences among cities. First, however, let us consider where workers with different levels of education tend to locate, a process that economists call *sorting*. In Figure 1, notice that in both 1980 and 2010, the share of college-educated workers increases with city size. In addition, this correlation has strengthened over the last 30 years, as evidenced by the steeper slope for 2010. These sorting patterns imply that highly skilled workers are better off in big cities. If we consider the relative wages earned by workers in different cities, then evidence suggests that a good part of the advantage for highly skilled workers comes through productivity.

Figure 2 shows wages paid to low- and high-skilled workers by city size. Note that workers with and without college degrees tend to earn higher wages in larger cities, as evidenced by the positive slope for both groups. However, wages of college graduates grow faster with city size
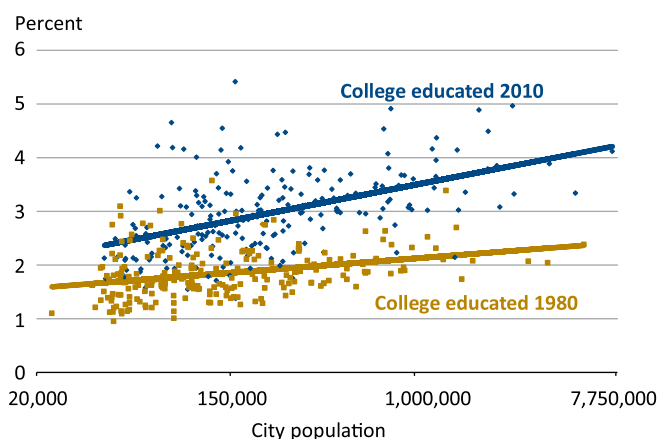
FIGURE 2

Big-City Wage Premium Greater for College Educated
Annual average wages of workers with different education levels by city size.
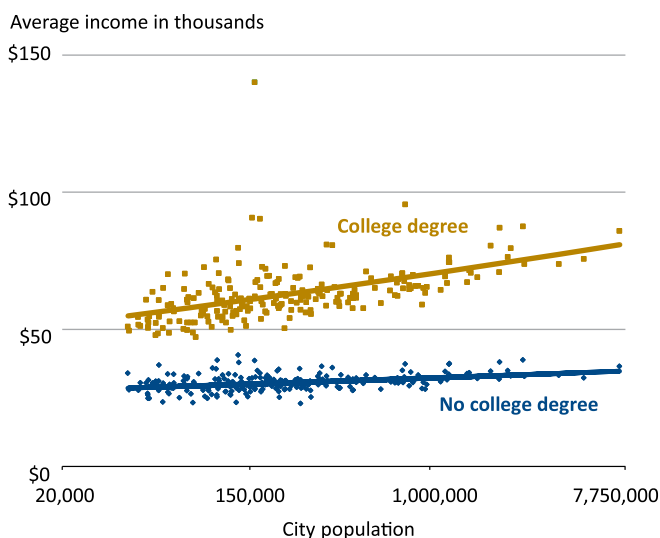
Source: IPUMS-USA, University of Minnesota, www.ipums.org.
Note: 2010 data on a log scale with least-squared fitted lines.

compared with wages of workers without college degrees. Research by Marigee Bacolod, Bernardo Blum, and William Strange supports this notion by showing that workers with different skill sets receive different wage premiums across cities of different sizes. Other researchers have shed light on why highly educated workers might have higher productivity in cities. For example, Jeffrey Lin shows that highly educated workers are more able to adapt to new technologies and therefore might thrive in cities, where new technologies are more available.

While some research has focused on skill-specific productivity returns to city size, there is also significant research that suggests that economic agglomeration and the production advantages of cities are related to specific industries. If certain industries employ larger shares of highly skilled workers, and if these industries are also more likely to be located in larger cities than small ones, then this could explain the sorting patterns of different education groups. For example, research by Nathaniel Baum-Snow and Ronni Pavan also shows that there is a skill premium in larger cities, given that the larger the city, the greater the degree of wage inequality. However, they note that while much of the inequality arises from skill-specific productivity differences, industry composition also plays a role.

It is quite clear that the production advantages of cities vary significantly across industries. Vernon Henderson

FIGURE 1

Well-Educated Workers Increasingly Choosing Big Cities
Percentage of college-educated workers by city size, 1980 versus 2010.

Source: IPUMS-USA, University of Minnesota, www.ipums.org.
Note: Log scale along with least-squared fitted lines.

and Ronald L. Moomaw, in separate papers, showed that agglomeration externalities are stronger for high-tech and high-skilled manufacturing industries, respectively. These results would predict that industry composition would change with city size. Figure 3, which plots the percentage of employment in durable goods manufacturing and the finance industry for each city, confirms that this is indeed the case. In larger cities, the percentage of employment in the finance industry grows significantly, while the percentage of employment in durables manufacturing actually declines with city size.

In addition, certain industries hire mostly highly skilled workers, while other industries use less-skilled labor. Table 1 shows the percentage of workers with different education levels by industry. There is clearly wide variation in the education composition of the work force across industries. Also, note that the finance industry, which is heavily concentrated in large cities, has a relatively educated labor force, while durable goods manufacturing employs fewer college graduates. It is possible that the differences in skill composition across cities may be due to differences in industry composition instead of to productivity differences directly related to skill levels. The importance of these separate effects is still an open question, but initial research suggests that both are important. The role of industry linkages is particularly relevant given that the U.S. economy has experienced a major structural transformation over recent decades, moving away from goods

manufacturing toward more service-oriented industries.

The role of big-city amenities. As mentioned above, production is only part of the story when it comes to where firms and workers decide to locate and where educated workers tend to be concentrated. Amenities also vary among locations, and some of these amenities may be more important for the well educated than for the less well educated. The amenities that cities provide can come from various sources but generally fall into two categories. City amenities may be natural, such good weather, beaches, or mountains. Or city amenities might arise *endogenously*, in the sense that as cities get larger, their scale allows for access to a larger variety of goods and services. For example, large cities provide residents with a greater quantity and variety of restaurants, stores, or public services such as transit, parks, and cultural institutions.

The way economists determine the amenity value of a city is to measure the willingness of people to pay for those amenities. This boils down to comparing incomes in a given location with its cost of living, most importantly housing prices. If two people with similar education levels and occupations get the same salary in different locations, but one location has a very high cost of living, this is evidence that it has a high level of amenities. Using this method, David Albouy finds that there is a slightly positive correlation between city size and amenity value. In addition, Edward Glaeser, Jed Kolko, and Albert Saiz argue that consumption amenities are becoming increasingly important for attracting firms and skilled workers to a city by showing that high-amenity cities have grown faster over recent decades.

However, the question then arises: How are big-city amenities valued by people in different income groups? In separate papers, Sanghoon Lee and Jessie Handbury have suggested that higher-income people place a higher amenity value on the greater variety and quality of products available in big cities versus small cities. The intuition is that as people's income rises, they will demand more variety and better quality in the products they buy. Because the market is larger, big cities can supply a larger variety of goods, which attracts more high-income workers — in economic terms, these workers therefore self-sort according to income or skill levels.

GENERAL EQUILIBRIUM: PUTTING IT ALL TOGETHER

Up to this point, we have discussed the roles of production and consumption in cities separately and in isolation. However, it is important to consider the location decisions of all businesses and workers together. That requires ac-

FIGURE 3
Industry Composition Changes Along with City Size
Percent of total employment in manufacturing and finance by city size.
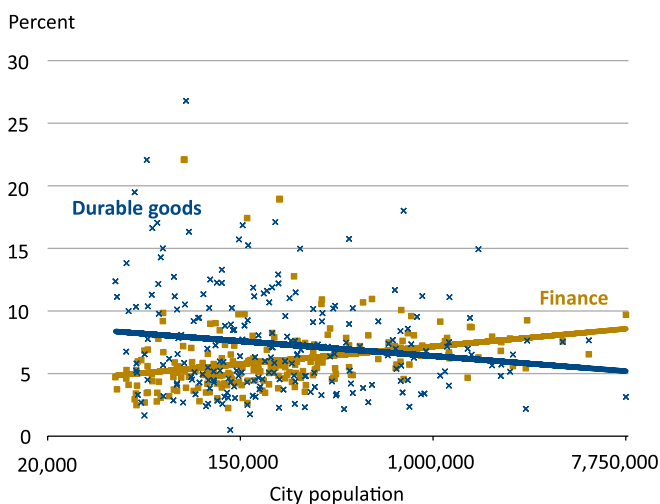
Source: IPUMS-USA, University of Minnesota, www.ipums.org.
Note: 2010 data on a log scale with least-squares fitted line.

Workers' Education Levels Vary Widely Among Industries
Industry work force education levels, highest to lowest, 2010.

	Less than high school diploma	High school diploma	Some college	College degree	Graduate degree
Professional services	1.6%	14.1%	19.2%	41.1%	24.0%
Education	2.4	15.5	17.2	28.7	36.2
Legal services	0.9	15.9	21.2	17.1	44.9
Finance, insurance and real estate	2.3	24.0	27.0	34.7	12.0
Public administration	1.7	23.7	31.0	27.2	16.4
Communications	1.8	24.0	31.4	32.0	10.8
Social services	6.5	26.5	26.1	25.0	15.7
Health care	3.7	24.1	32.9	21.5	17.8
Business and repair services	10.1	32.0	24.0	24.9	9.0
Nondurable goods	12.3	36.2	20.3	21.9	9.3
Durable goods	9.0	36.9	22.9	21.0	10.2
Wholesale durable goods	7.1	36.2	26.9	23.9	5.9
Wholesale nondurable goods	11.3	35.5	23.7	23.6	6.0
Utilities and sanitary services	6.6	38.0	27.4	19.8	8.2
Entertainment and recreation	10.8	32.4	30.5	21.6	4.7
Transportation	7.7	44.3	29.3	15.3	3.3
Personal services	15.8	40.5	26.3	14.0	3.3
Agriculture, forestry, and fisheries	33.4	32.9	17.1	11.1	5.5
Retail trade	13.9	41.1	28.9	13.4	2.7
Construction	20.0	45.1	21.6	10.8	2.5

Source: IPUMS-USA, University of Minnesota, www.ipums.org.

nomics that was provided by Jennifer Roback: On average, people and firms are indifferent about location because all of the differences between productivity and amenity values in different locations are already capitalized into wages and prices, at least in the long run. This is a powerful idea, but the implications become less clear when preferences for amenities might differ among workers in a way that is correlated with their productivity. Further complications arise when one considers that both productivity and amenities are endogenous in the sense that they depend on the educational composition of the work force or the size of the city.

Only recently have researchers begun to study the importance of heterogeneous workers and firms for amenities and production across cities in a way that considers the economy as a whole. In economics, when we consider all the agents and markets in an economy as a whole, this is referred to as general equilibrium analysis. Results derived from *general equilibrium* studies often provide very different insights than studies that consider only one aspect of the economy in isolation.

counting for supply and demand in labor markets, as well as housing and land markets, in all cities simultaneously.

To understand how these location decisions might work, consider a hypothetical situation in which your employer offers you two choices. You can move to Philadelphia or San Diego. In addition, your employer offers a salary that is 5 percent higher in Philadelphia. This suggests that employers believe that productivity might be higher in Philadelphia; otherwise they would not offer a higher salary. Nonetheless, you have visited San Diego and, in your opinion, Southern California's lifestyle and weather are worth a 5 percent salary cut. Then you look at houses in San Diego and realize that prices are at least twice as high as they are in Philadelphia. The obvious reason is that everyone else thinks San Diego is nicer, too, and so house prices have been driven up to match the value of the amenities that the city provides, a dynamic that economists refer to as the *capitalization* of amenities into house prices. With this, you decide that you might as well just flip a coin.

This example illustrates the key insight in urban eco-

One example is work by Rebecca Diamond, who estimates production and amenity values by considering the importance of spillovers due to concentrations of highly skilled workers. Diamond measures how the supply of and demand for workers with different education levels change with respect to city characteristics, taking into account house prices and wages. She finds that productivity changes in cities have been the primary source of the concentration of highly skilled individuals but that amenities have also adjusted to reinforce this effect. Put another way, increases in productivity in cities that have high concentrations of educated workers lead to increases in wage inequality between high- and low-skilled workers. Moreover, the inequality is actually even greater, given that highly skilled workers benefit more from the amenities these cities offer than low-skilled workers do.

Using similar methods, my own research also shows that production advantages are the primary reason that highly educated workers gravitate to large cities, while ame-

nity advantages also increase more with city size for college graduates than for other workers.

To quantify the primacy of productivity advantages relative to amenity advantages, consider how the supply of and demand for different types of workers change as city population increases. First, for every 1 percent increase in city population, the supply of college-educated workers, which is driven by consumption amenities, increases 1.07 percent, while the supply of workers with only high school diplomas increases only 0.95 percent. (These results hold house prices and wages constant.) Next, the demand for college-educated workers, which is driven by productivity, increases 1.14 percent for every 1 percent increase in total population, while the demand for workers with high school educations increases only 0.88 percent. Notice that the gap in demand between skill groups is twice as wide as the gap in supply. In other words, as city size increases, both supply and demand increase more for highly skilled workers than they do for less-skilled workers. However, the gap in demand widens faster, which leads to increased inequality in large cities when wages and house prices adjust to meet this supply and demand.

Furthermore, while it is true that the demand for highly skilled workers in all industries is higher in large cities, a disproportionate share of this demand comes from just a few industries. Finance, real estate, and insurance alone accounted for 35 percent of the change in demand for college-educated workers in cities between 1980 and 2010 despite representing less than 10 percent of total employment in the U.S. This disparity suggests that industry characteristics play an important role in attracting educated workers to large cities.

CONCLUSION

Overall, research suggests that cities exist to provide both production and consumption advantages for people. Economists have long known about the production advantages of cities, but recent evidence suggests that cities are increasingly being valued for consumption amenities arising from easier access to a larger variety of goods and services. Furthermore, the consumption and production roles of cities are different for people with different skill levels, and these roles have been changing over time. This means that how skills or education vary from city to city is an important consideration for policymakers who are trying to provide the right public goods and services or for firms that are deciding where to locate and want to remain competitive in the labor market. For example, public investment in parks or museums may make cities more attractive to firms in certain industries that want to attract educated workers despite having no direct effect on production. In other words, people may accept lower wages to live in a location that has more consumption amenities, and this will, in turn, make locations more attractive to firms.

Clearly, there is more work to be done in order to understand the relative importance of cities for consumption and production. Although we have made progress measuring and documenting some of these patterns, we are still learning about the underlying mechanisms that lead to amenity and productivity advantages in cities. ■

NOTES

[1] For the purposes of this article, *city* refers to geographically separated labor markets. In the U.S., they are usually defined by metropolitan statistical area (MSA).

[2] In this article, *skilled* and *educated* will be used interchangeably. While their meaning is obviously not precisely the same, education is easier to measure and therefore often used as a proxy for skill level.

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BANKING TRENDS

How Our Region Differs

BY JAMES DISALVO AND RYAN JOHNSTON

The banking industry has undergone a sea change in the last 30 years. Regulatory changes and technological advances have led to dramatic increases in the size and market share of large banks, while banks have shifted their activities notably away from commercial lending toward real estate lending. While these broad trends are true of banks in the Third District served by the Federal Reserve Bank of Philadelphia, our regional banking market also differs in some interesting ways. Our small regional banks are larger and concentrate much more heavily on residential real estate lending and less on commercial lending than small banks in other regions around the nation do. Our region's banking markets are also significantly more *integrated* — that is, they face much more competition from banks headquartered outside the market — than markets elsewhere. Why do banks in our region differ in these ways? What regional market forces are bankers here responding to? Before we narrow down the possibilities, it will help to understand the extent of these regional differences and how much the wider banking world has changed.

SOME SIMILAR CHANGES FOR LARGE AND SMALL BANKS...

Bank balance sheets reflect major changes in banks' role in the financial system over the last three decades. First, their loan portfolios have shifted dramatically toward real estate lending. Real estate loans as a percent of total loans have nearly doubled at large banks, and they have increased substantially at small banks as well. The explosion of real estate lending in the last three decades is also reflected in

banks' securities holdings, which have shifted from Treasury securities to mortgage-backed securities at both large and small banks.[1] This shift is primarily due to the growth of securitization — the packaging of numerous loans into a single security — as the dominant process for financing home loans.[2] Banks hold mortgage-backed securities sold by other banks, as do other financial institutions.

At the same time, the percentage of commercial and consumer loans has decreased.[3] The decline in commercial loans is partly due to the growth of nonbank alternatives to bank finance such as the junk bond market and, more recently, the increasing share of large bank loans that are ultimately held by nonbank intermediaries such as mutual funds and hedge funds.[4]

Finally, all banks are carrying more capital, as shown by their equity-to-assets ratios. This increase has been driven mainly by tighter regulations as new laws and international agreements such as the Basel Accords have expanded capital requirements for banks.[5]

...BUT SIGNIFICANT DIFFERENCES REMAIN

Large banks have captured an increasing share of banking markets.[6] Since 1984, the market share of the top 10 banks has increased from just over 17 percent to 55.2 percent.[7] This increased concentration has been even more pronounced in our region.[8] In the tristate area, the market share of the top 10 firms increased from 2.7 percent

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to nearly 70 percent. At the same time, small banks' share of deposits has shrunk from over half in both the nation and the region to 18.5 percent in the nation and 10.5 percent in the tristate area (Figure 1).

Small banks do substantially more real estate lending as a percent of total loans than large banks do, with a much higher percentage devoted to commercial real estate.[9] Small banks also have a much lower percentage of their total loans in commercial and industrial loans, although the decline in commercial lending over the last 30 years has been particularly dramatic at large banks. Interestingly, small banks' share of small business loans has remained at roughly 40 percent, even as their share of assets has declined from almost half to just above 20 percent of assets (Figure 2).

Small banks have long been found to have a comparative advantage in lending to small businesses because they maintain relationships that rely on soft information about firms and their business environment that is difficult to measure, such as knowing how effectively a business owner responds to problems based on a long history of doing business with the firm.[10] Considering the predominance of commercial real estate loans in community bank loan portfolios, small community banks' detailed knowledge of local real estate markets may now be a more important source of comparative advantage in financing commercial real estate.
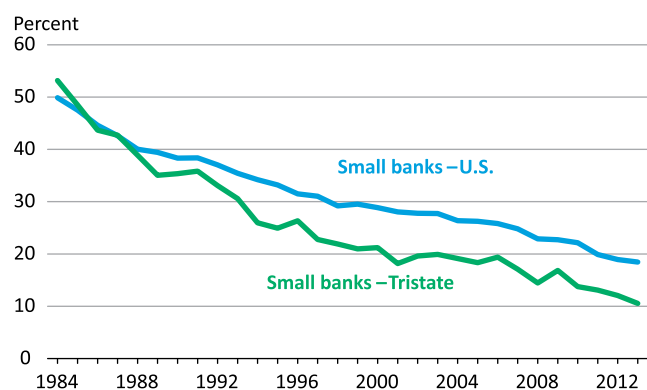
Sources: Federal Financial Institutions Examination Council Call Reports (U.S.), Federal Deposit Insurance Corporation Summary of Deposits (tristate).
Notes: The *tristate* area consists of Pennsylvania, New Jersey, and Delaware. *Small tristate banks* are defined as those based in the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. *Small U.S. banks* are defined as those based outside the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries.

FIGURE 2
…But Are Still Important Small Business Lenders
Share of small business loans, 1993–2013.
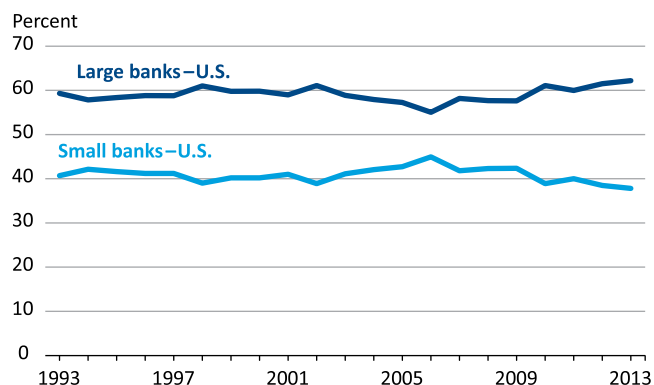
Source: Federal Financial Institutions Examination Council Call Reports, Schedule RC-C Part II, reported annually in the second quarter.
Notes: *Large U.S. banks* are defined as banking organizations such as bank holding companies that are ranked in the top 100 in banking assets in that year, including assets of only their commercial bank subsidiaries. Large banks typically operate in multiple regions. *Small U.S. banks* are defined as those based outside the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries.

Small banks' funding mix is also different from that of large banks. Although small banks continue to rely more heavily on deposits than large banks do, small banks' share of the most stable deposits, known as core deposits, has declined dramatically, particularly from 2004 to 2013 (Table 1).[11] With a lower percentage of core deposits, banks are forced to seek out less stable and therefore more expensive sources of funds. Thus, the relative decline in core deposits has undermined their competitive advantage.

HOW OUR SMALL BANKS DIFFER

There are two striking differences between small banks in our region and those in the rest of the nation. First, our regional banks are much larger. The average tristate area community bank was nearly three times as large as the average in the rest of the country in 1984, and it is still almost twice as large today (Table 2).

More surprising, small banks in our region have consistently dedicated an unusually large share of their loan portfolios to residential real estate lending — over 18 percentage points more than other small banks from 1984 to 1993, over 22 percentage points more from 1994 to 2003, and over 13 percentage points more from 2004 to 2013 (Table 1).

A Dramatic Shift Toward Real Estate Lending

	Large Banks			Small Banks — U.S.			Small Banks — Tristate		
	1984–1993	1994–2003	2004–2013	1984–1993	1994–2003	2004–2013	1984–1993	1994–2003	2004–2013
Portfolio									
Loans/Assets	62.72	64.29	65.61	51.86	60.03	65.18	58.26	61.60	67.12
Securities/Assets	16.22	20.85	18.92	29.52	26.04	19.38	26.63	27.81	20.11
Percent of Loans									
Real Estate	34.96	50.02	64.63	43.62	57.63	70.98	60.72	76.26	82.94
Residential	12.80	25.82	25.70	13.68	25.88	24.06	32.28	47.07	37.50
Commercial	17.19	20.80	34.27	18.12	26.69	40.86	16.73	25.50	41.50
Commercial & Industrial	31.57	23.52	19.32	16.62	14.27	12.76	13.18	9.91	10.06
Consumer	17.60	12.61	5.53	17.65	11.84	5.41	18.99	8.69	2.20
Credit Cards	3.44	0.93	0.02	0	0	0	0.11	0.17	0
Consumer Loans/Assets*	12.42	11.94	6.93	11.13	7.30	2.99	10.27	7.97	4.31
Credit Cards/Assets*	4.20	4.93	2.69	1.19	1.48	0.37	0.37	0.43	0.14
Percent of Securities									
Mortgage-backed	10.17	35.13	53.22	2.38	6.77	18.43	1.31	14.86	31.82
Treasuries	29.76	7.10	0.28	14.30	6.41	0	16.81	5.65	0
Deposits/Liabilities	78.84	75.89	81.33	98.61	98.13	96.16	98.23	96.08	93.58
Core Deposits/Liabilities	63.71	62.68	59.73	88.87	84.46	75.51	90.77	86.04	75.56
Earnings									
ROAA	0.85	1.23	0.95	0.95	1.11	0.89	1.10	1.10	0.76
Net Interest Margin	3.53	3.63	3.11	4.02	4.02	3.58	3.92	3.82	3.27
Capital									
Total Equity/Total Assets	6.01	8.03	10.16	8.37	9.45	9.89	8.28	9.32	9.35
Deposits/Total Assets	74.22	69.81	72.21	89.69	87.10	85.28	89.12	85.12	83.21

Source: Fourth quarter Federal Financial Institutions Examination Council Call Reports.
Notes: Numbers are the median* percentages for each 10-year period for all commercial banks, including their banking subsidiaries, except (1) bankers' banks, (2) banks less than five years old, (3) nonbank institutions that either make commercial loans or accept demand deposits but do not do both, (4) monoline credit card banks, defined as having a state credit card bank charter or having more than 50 percent of their loans as credit card loans, (5) wholesale banks, defined as having less than 5 percent of their deposits in time deposits of less than $100,000, money market deposit accounts, other savings deposits, and demand deposits, (6) cash management banks that require a special charter, and (7) depository trust companies.
Large U.S. banks are defined as banking organizations such as bank holding companies that are ranked in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. Large banks typically operate in multiple regions. *Small U.S. banks* are defined as those based outside the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. *Small tristate banks* are defined as those based in the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. The *tristate area* consists of Pennsylvania, New Jersey, and Delaware. *U.S.* excludes tristate banks.

HOW CAN THESE DIFFERENCES BE EXPLAINED?

While we do not have a complete answer, we can narrow down the possibilities and pose some tentative hypotheses. As to size, one factor may be that Delaware and New Jersey were early adopters of liberal intrastate branching and merger laws, which allowed banks to grow outside their home communities.[12] Population density in our region may also play a role. The region is more urbanized than the na-

tion as a whole, and there is some evidence that small banks in urban areas tend to be larger.[13]

Regarding their greater focus on mortgage lending, we can rule out three hypotheses: First, tristate small banks do not securitize a smaller share of their home mortgages than small banks elsewhere do, so the high percentage of mortgages held in their portfolios does not appear to be the result of selling fewer mortgages into the mortgage-backed securities market. Indeed, small banks in the region securi-

Community Banks Twice as Large Here

	Large Banks				Small Banks – U.S.				Small Banks – Tristate			
	1984	1993	2003	2013	1984	1993	2003	2013	1984	1993	2003	2013
Number of Organizations	100	100	100	100	10,835	7,902	6,066	5,029	392	283	212	171
Number of Banks	1,251	997	409	188	12,660	9,490	7,030	5,433	427	337	226	175
Number of Branches	17,873	30,559	38,566	51,469	32,899	27,766	30,684	33,205	3,198	2,347	2,009	1,657
Average Organization Size	15,248.2	26,397.5	59,104.7	114,860.1	81.7	115.9	222.2	366.5	216.1	312.6	455.0	665.4
Average Bank Size	1,218.9	2,647.7	14,451.0	61,095.8	69.9	96.5	191.7	339.3	198.4	262.5	426.8	650.2

Sources: Federal Financial Institutions Examination Call Reports and Federal Deposit Insurance Corporation Summary of Deposits.
Notes: Average bank and organization size are in millions of dollars. A *banking organization* is defined as the sum of all of the bank subsidiaries of a bank holding company. *Large U.S. banks* are defined as banking organizations such as bank holding companies that are in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. Large banks typically operate in multiple regions. *Small U.S. banks* are defined as those based outside the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. *Small tristate banks* are defined as those based in the tristate area that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. The *tristate area* consists of Pennsylvania, New Jersey, and Delaware. *U.S.* excludes tristate banks.

tize more of their home mortgages. Second, the larger size of our community banks is not a factor. When we rank our community banks by size, the smaller ones make even more mortgages than the larger ones do (Figure 3). Third, residential real estate activity as a share of total economic activity is no greater in the region than in the nation. For all banks operating in the region, including both large and small banks, residential real estate lending as a share of total deposits is lower here than in the rest of the nation (Figure 4).[14]

Two distinctive features of our region's banking markets suggest that the explanation may lie in the competitive structure of the market. In 1990, nonbanks — which, despite the name, include savings banks, savings and loans, and mortgage banks — held approximately 20 percentage points less of the residential real estate market in our region than they did in the rest of the nation, with this portion of

FIGURE 3
Higher Percentage of RRE Loans in Tristate Portfolios
Residential real estate loans as a share of total loans.
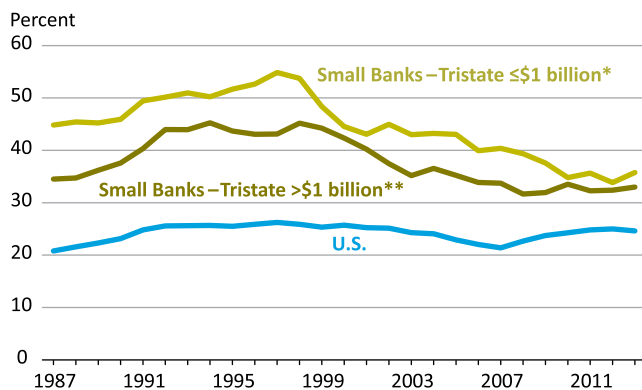
Source: Federal Financial Institutions Examination Council Call Reports.
Notes: The *tristate* area consists of Pennsylvania, New Jersey, and Delaware. *U.S.* excludes tristate banks.
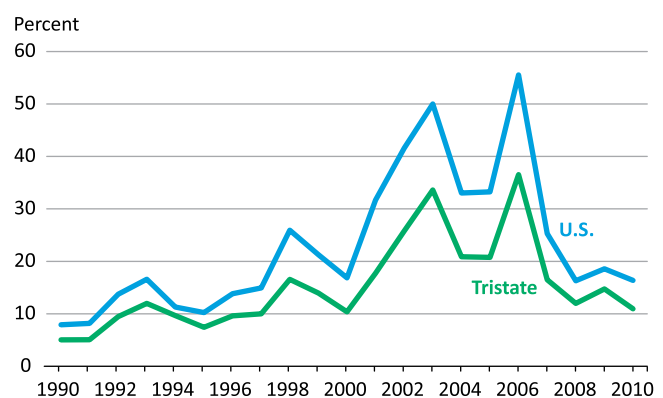*Those with $1 billion or less in assets, including assets of only their commercial bank subsidiaries.
**Those with more than $1 billion in assets, including assets of only their commercial bank subsidiaries.

FIGURE 4
Residential Lending Is Lower in the Tristate Region
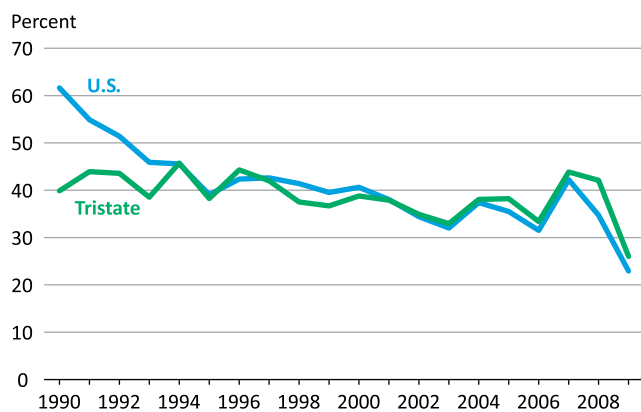Total HMDA loans as a share of total deposits.

Sources: Home Mortgage Disclosure Act data, Federal Deposit Insurance Corporation Summary of Deposits.
Notes: The *tristate* area consists of Pennsylvania, New Jersey, and Delaware. *U.S.* excludes tristate banks.

FIGURE 5

Until Mid-1990s, Nonbanks Had Smaller Share of Tristate RRE
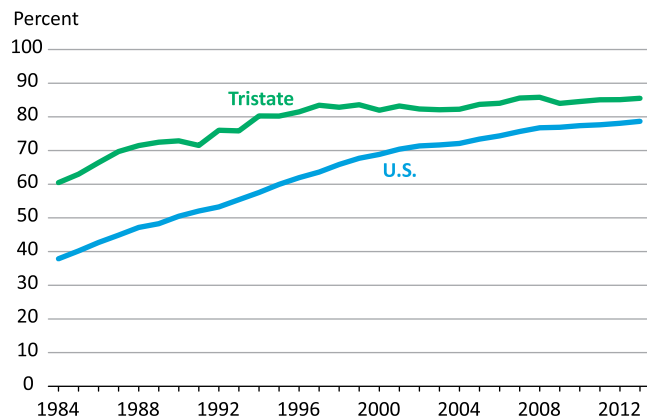Nonbanks' share of HMDA loans.

Percent

Source: Home Mortgage Disclosure Act data.
Notes: The *tristate* area consists of Pennsylvania, New Jersey, and Delaware. *U.S.* excludes *tristate banks*. *Nonbanks* are defined as credit unions, independent mortgage associations, thrift banks, and their subsidiaries.

FIGURE 6

Banking Markets Are More Integrated in the Tristate Area
Market share of deposits held by out-of-market competitors.

Percent

Source: Federal Deposit Insurance Corporation Summary of Deposits.
Notes: The *tristate* area consists of Pennsylvania, New Jersey, and Delaware. *U.S.* excludes tristate banks.

the market shared roughly equally by large and small banks (Figure 5). Although the precise factors behind nonbanks' relatively small share at the beginning of our sample period remain unclear, we take away from these data the conclusion that our small regional banks were specialists in residential real estate lending at a time when these markets were more local and less competitive than they became in the 1990s and 2000s.

Another distinctive feature of the competitive landscape is the extent to which banking markets in our region are integrated and thus the extent to which banks face a wide range of competitors. One measure of integration is the extent to which banks in a local market face competition from banks headquartered outside that market, so called *out-of-market banks*. For example, a bank in the Philadelphia market may face direct competition from a small bank headquartered in Harrisburg or from Bank of America, headquartered in North Carolina. Over the entire sample period, from 1984 to 2013, out-of-market banks had an average market share of about 79 percent in the tristate area market, compared with 63 percent for the rest of the nation (Figure 6).[15] Contributing factors include the presence of several fairly populous metropolitan areas clustered within the tristate region and the early adoption of intrastate branching.[16] The relatively low net interest margins for tristate small banks compared with small banks elsewhere are consistent with this explanation. Thus, there is evidence to suggest that tristate area banks specialize in residential real estate lending at least partly because of the stiffer competition they face in their home markets. ∎

NOTES

[1] *Large banks* are defined as banking organizations such as bank holding companies that are ranked in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. Large banks typically operate in multiple regions of the country. *Small banks* — sometimes referred to as *community* banks — are defined as those that are not in the top 100 in banking assets in a given year, including assets of only their commercial bank subsidiaries. We refer to small bank holding companies and banks that are headquartered in Pennsylvania, New Jersey, or Delaware as *tristate* banks.

[2] See Ronel Elul's *Business Review* article for an account of the economics of securitization. Probably most important from the banking industry's standpoint, the deregulation of deposit rates in 1980 and the inflation-driven increases in interest rates in the 1970s and early 1980s increased the *interest rate risk* of holding long-term, fixed-rate assets (mortgages) funded with short-term liabilities (mainly deposits). When interest rates rise, banks' cost of funds rise, while mortgage rates do not, depressing profits. These same factors led to the savings and loan crisis and the continued decline of the S&L industry since the 1990s.

[3] Oscar Jorda, Moritz Schularick, and Alan Taylor found that this is part of a longer-term trend beginning at the end of World War II with expanded bank lending, particularly in mortgages, and much higher household debt.

[4] While the declining share of commercial loans is partly due to the rapid growth in real estate loans, commercial bank loans have declined as a share of business debt finance. Mitchell Berlin's *Business Review* article discusses the relative roles of banks and other intermediaries in the provision of business financing. Vitaly Bord and Joao Santos's article discusses the role of nonbank intermediaries in the syndicated loan market.

[5] Ronel Elul's *Business Review* article on bank capital discusses evolving capital regulation.

[6] Since our primary focus is on community banks, we do not discuss large banks' capital market activities. Although our definition of a small regional bank includes some comparatively large banks — approximately $6.7 billion in assets in 2013 — our account would not change if we used a narrower definition such as banks with less than $1 billion in assets.

[7] Robert DeYoung, William Hunter, and Gregory Udell discuss the role of technological advances and regulatory changes in the relative growth of large banks. Joseph Hughes and Loretta Mester provide empirical evidence for pervasive scale economies in the banking industry.

[8] The Philadelphia Fed oversees the Third District, which includes eastern Pennsylvania, southern New Jersey, and Delaware. However, when we speak of the *tristate area* or the *region*, we include all of Pennsylvania and New Jersey, since banking markets extend well beyond the Third District. See James DiSalvo's recent analysis of Third District banking markets.

[9] Residential real estate lending consists of mortgages on so-called 1–4 family properties — detached single-family homes plus attached homes of two to four units — secured by first or junior liens plus home equity lines of credit. Commercial real estate lending consists of construction loans and loans secured by multifamily (five or more units) properties and by nonfarm, nonresidential properties.

[10] By contrast, large banks have a comparative advantage in making loans based on *hard* information, notably credit scores, which treat small businesses essentially the same as credit card customers. See DeYoung, Hunter, and Udell's discussion of these two lending technologies. However, Allen Berger, William Goulding, and Tara Rice provide evidence that small firms may increasingly gravitate toward the speed and convenience of the hard information lending model.

[11] Core deposits are basically insured deposits minus *brokered* and foreign deposits. The FDIC insurance limit was raised from $100,000 to $250,000 in 2008. Brokered deposits are generally short-term deposits obtained through a third party from a depositor with no other relationship with the bank.

[12] Philip Strahan documents the deregulation of intrastate branching restrictions. Delaware permitted intrastate branching before 1970 (one of 12 early adopters), New Jersey did so in 1977 (earlier than 44 other states), and Pennsylvania followed in 1982 (earlier than 28 other states). Consistent with the view that removing intrastate branching restrictions was important, community bank size in Pennsylvania lagged that of both New Jersey and Delaware until the late 1990s. Community banks in other relatively urbanized states that were early adopters such as California and Maryland are roughly as large as those in our region.

[13] William Bassett and Thomas Brady document this relationship for the first half of our sample period.

[14] We can calculate these numbers for mortgage lending — but unfortunately not for other types of lending — because HMDA data provide the geographic location of all mortgages. The loan numbers are seconded by measures of real economic activity; that is, real estate activities are not a larger share of total gross state product in our tristate area than elsewhere.

[15] A market is defined as either a county or as a metropolitan or micropolitan statistical area (2013 definition). An out-of-market firm is any banking organization not headquartered in the market.

[16] The greater out-of-market competition in our region does not appear to stem from the combination of the proximity of large banks headquartered in New York City and the paucity of large banks headquartered in our region, the situation as of 2013. As Figure 6 shows, the difference between the tristate region and the rest of the nation was greatest at the beginning of our sample period, when banking across state lines was not permitted. As large banks increasingly entered markets in other regions throughout our sample period, banking markets became more integrated nationally, and the difference between our region and the rest of the nation narrowed significantly.

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RESEARCH RAP

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DEBT COLLECTION AGENCIES AND THE SUPPLY OF CONSUMER CREDIT

The activities of third-party debt collectors affect millions of borrowers. However, relatively little is known about their impact on consumer credit. To study this issue, the author investigates whether state debt collection laws affect the ability of third-party debt collectors to recover delinquent debts and if this, in turn, affects the amount of credit being provided. This paper constructs, from state statutes and session laws, a state-level index of debt collection restrictions and uses changes in this index over time to estimate the impact of debt collection laws on revolving credit. Stricter debt collection regulations appear to reduce the number of third-party debt collectors and to lower recovery rates on delinquent credit card loans. This, in turn, leads to fewer openings of credit cards.

Working Paper 15–23. Supersedes Working Paper 13–38/R. Viktar Fedaseyeu, Bocconi University, Federal Reserve Bank of Philadelphia Visiting Scholar.

FORECLOSURE DELAY AND CONSUMER CREDIT PERFORMANCE

The deep housing market recession from 2008 through 2010 was characterized by a steep rise in the number of foreclosures and lengthening foreclosure timelines. The average length of time from the onset of delinquency through the end of the foreclosure process also expanded significantly, averaging up to three years in some states. Most individuals undergoing foreclosure were experiencing serious financial stress. However, the extended foreclosure timelines enabled mortgage defaulters to live in their homes without making mortgage payments until the end of the foreclosure process, thus providing temporary income and liquidity benefits from lower housing costs. This paper investigates the impact of extended foreclosure timelines on borrower performance with credit card debt. The authors' results indicate that a longer period of nonpayment of mortgage expenses results in higher cure rates on delinquent credit cards and reduced credit card balances. Foreclosure process delays may have mitigated the impact of the economic downturn on credit card default.

Working Paper 15–24. Supersedes Working Paper 14–8. Paul S. Calem, Federal Reserve Bank of Philadelphia; Julapa Jagtiani, Federal Reserve Bank of Philadelphia; William W. Lang, Federal Reserve Bank of Philadelphia.

VALUING "FREE" MEDIA ACROSS COUNTRIES IN GDP

"Free" consumer entertainment and information from the Internet, largely supported by advertising revenues, has had a major impact on consumer behavior. Some economists believe that measured gross domestic product (GDP) growth since 2000 is too low because it excludes online entertainment. Similar large effects on consumers occurred with the arrival of free radio and television entertainment. The authors provide an experimental methodology that uses previously established GDP measurement procedures to value advertising-supported entertainment around the world.

Working Paper 15–25. Leonard Nakamura, Federal Reserve Bank of Philadelphia; Rachel Soloveichik, U.S. Bureau of Economic Analysis.

THE IMPACT OF STUDENT LOAN DEBT ON SMALL BUSINESS FORMATION

Small businesses are the backbone of the U.S. economy and account for approximately one-half of the private-sector economy and 99% of all businesses. To start a small business, individuals need access to capital. Given the importance of an entrepreneur's personal debt capacity in financing a startup business, student loan debt, which is difficult to discharge via bankruptcy, can have lasting effects and may have an impact on the ability of future small business owners to raise capital. This study examines the impact of

the growth in student debt on net small business formation. The authors find a significant and economically meaningful negative correlation between changes in student loan debt and net business formation for the smallest group of small businesses, those employing one to four employees. This is important since these small businesses depend heavily on personal debt to finance new business formation. Based on the authors' model, an increase of one standard deviation in student debt reduced the number of businesses with one to four employees by 14% on average between 2000 and 2010. The effect on larger firm formation decreased with firm size, which the authors interpret to mean that these firms have greater access to outside capital.

Working Paper 15–26. Brent W. Ambrose, Pennsylvania State University, Federal Reserve Bank of Philadelphia; Larry Cordell, Federal Reserve Bank of Philadelphia; Shuwei Ma, Federal Reserve Bank of Philadelphia.

INTERACTIONS BETWEEN JOB SEARCH AND HOUSING DECISIONS: A STRUCTURAL ESTIMATION

In this paper, the authors investigate to what extent shocks in housing and financial markets account for wage and employment variations in a frictional labor market. To explain these interactions, the authors use a model of job search with accumulation of wealth as liquid funds and residential real estate, in which house prices are randomly persistent. First, the authors show that reservation wages and unemployment are increasing in total wealth. And, second, they show that reservation wages and unemployment are also responsive to the composition of wealth. Specifically, when house prices are expected to rise, holding a larger share of wealth as residential real estate tends to increase reservation wages, which deteriorates employment transitions and increases unemployment. The authors estimate their model structurally using National Longitudinal Survey of Youth data from 1978 to 2005, and they find that more relaxed house financing conditions, in particular lower down payment requirements, decrease employment rates by 5 percentage points in the short run and by 2 percentage points in the long run. The authors also find that worse labor market conditions immediately increase homeownership rates by up to 5 percentage points, whereas in the long run homeownership decreases by 8 percentage points.

Working Paper 15–27. Sílvio Rendon, Federal Reserve Bank of Philadelphia; Núria Quella-Isla, Barnard College, Columbia University.

THE IMPACT OF THE HOME VALUATION CODE OF CONDUCT ON APPRAISAL AND MORTGAGE OUTCOMES

The accuracy of appraisals came into scrutiny during the housing crisis, and a set of policies and regulations was adopted to address the conflict-of-interest issues in the appraisal practices. In response to an investigation by the New York State Attorney General's office, the Home Valuation Code of Conduct (HVCC) was agreed to by Fannie Mae, Freddie Mac, and the Federal Housing Finance Agency. Using unique data sets that contain both approved and non-approved mortgage applications, this study provides an empirical examination of the impact of the HVCC on appraisal and mortgage outcomes. The results suggest that the HVCC has led to a reduction in the probability of inflated valuations, although valuations remained inflated on average, and induced a significant increase in the incidence of low appraisals. The well-intentioned HVCC rule made it more difficult to obtain mortgages to purchase homes during the housing price crash, possibly exacerbating the fall in prices.

Working Paper 15–28. Supersedes Working Paper 14–23. Lei Ding, Federal Reserve Bank of Philadelphia; Leonard Nakamura, Federal Reserve Bank of Philadelphia.

DECLINING LABOR TURNOVER AND TURBULENCE

The purpose of this paper is to identify possible sources of the secular decline in the job separation rate over the past four decades. The author uses a simple labor matching model with two types of workers, experienced and inexperienced, where the former type faces a risk of skill loss during unemployment. When the skill loss occurs, the worker is required to restart his career and thus suffers a drop in his wage. The author shows that a higher risk of skill loss results in a lower separation rate. The key mechanism is that the experienced workers accept lower wages in exchange for keeping their jobs.

Working Paper 15–29. Supersedes Working Paper 11–44\R. Shigeru Fujita, Federal Reserve Bank of Philadelphia.

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