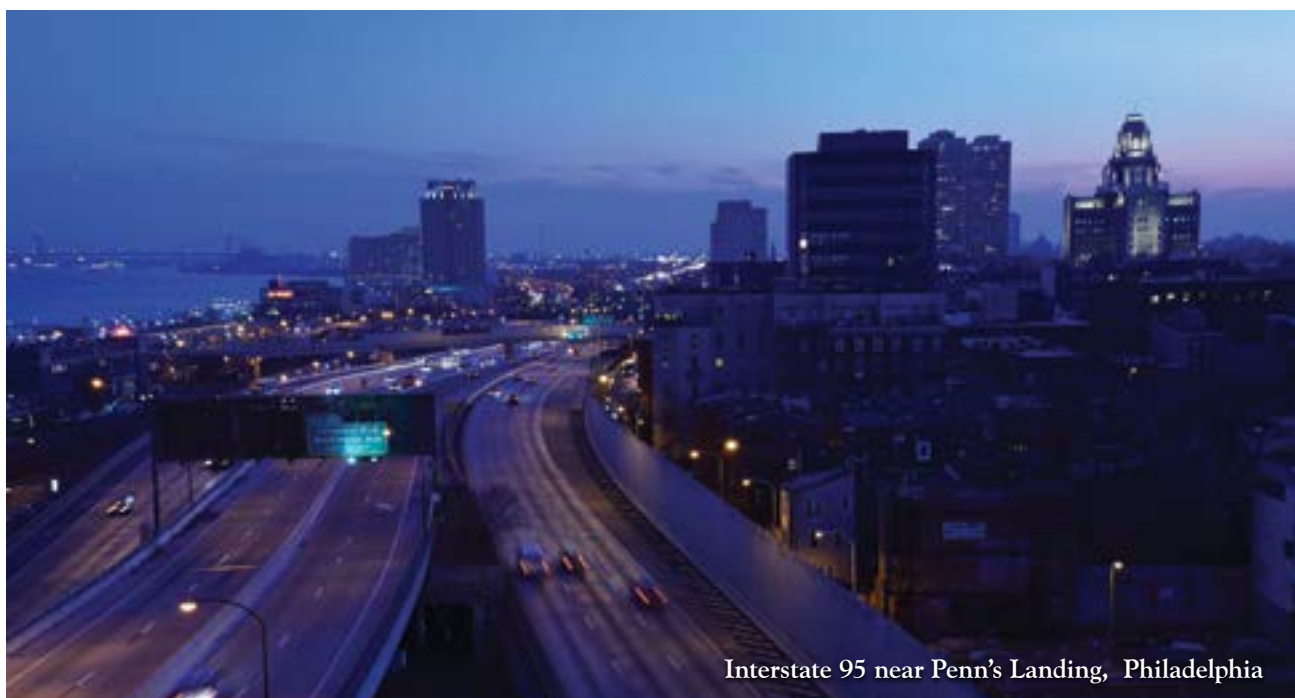




Fourth Quarter 2014
Volume 97, Issue 4

BUSINESS REVIEW



Interstate 95 near Penn's Landing, Philadelphia

PHOTO BY MAKOTO NAKAJIMA

New Ideas in the Air: Cities and Economic Growth

Rising Disability Rolls: Causes, Effects, and Possible Cures

A Closer Look at the German Labor Market 'Miracle'

Research Rap

INSIDE

ISSN: 0007-7011

The ***Business Review*** is published four times a year by the Research Department of the Federal Reserve Bank of Philadelphia. The views expressed by the authors are not necessarily those of the Federal Reserve. We welcome your comments at PHIL.BRComments@phil.frb.org.

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New Ideas in the Air: Cities and Economic Growth

BY GERALD A. CARLINO

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ost countries make sustained economic growth a principal policy objective. While many factors contribute to growth, economists believe that educating workers plays a critical role. Individuals invest in education because of the expected benefits to themselves or their children, such as higher earnings. But such private investment can increase the productivity of others as well. For example, the collaborative effort of many educated workers in a common enterprise may lead to invention and innovation that sustains the growth of the enterprise. Some economists believe there is an important link between national economic growth and the concentration of more highly educated people in cities.¹ These economists argue that the knowledge spillovers associated with increased education can actually serve as an engine of growth for local and national economies. They also argue that the concentration of people in cities enhances these spillovers by creating an environment in which ideas flow quickly amid face-to-face contact.

As far back as 1890, Sir Alfred Marshall described cities as having ideas “in the air.” In Marshall’s view, knowledge spillovers are the unintended transmission of knowledge that occurs among individuals and organizations, as opposed to the conscious sharing and exchange of knowledge. For example, as pointed out by AnnaLee Saxenian, although there

is intense competition in California’s Silicon Valley, a remarkable degree of knowledge spillover occurs.

In the first half of the 20th century, American cities contributed to economic efficiency and growth when the U.S. economy was based on the production of goods. Today’s cities, despite their well-known drawbacks such as congestion, contribute to the efficient production of knowledge in the new innovation-based economy.

KNOWLEDGE SPILLOVERS AND GROWTH

Economic growth has many facets, but a key one is that the value of real output per hour worked in the U.S.

has increased dramatically over the years: In 2012, the value of output per hour worked was more than four times the value of output per hour in 1950. This increase in worker productivity is the hallmark of growth. What are the main reasons for the increase in worker productivity? The two key causes are increases in the amount of capital per worker and technological progress. Capital goods are nonfinancial assets such as factories, office buildings, and machinery used to produce goods and services. The capital stock refers to the total amount of physical capital available to an economy at a given point in time. Technological progress can take the form of either product innovation or process innovation. For example, the moving assembly line and interchangeable parts used by Henry Ford in 1913 to produce autos is an example of process innovation. Groupon is a more recent example of process innovation that has changed the way merchants attract customers and how customers find merchants. The Swiffer is an example of product innovation. Unlike traditional dust mops that must be laundered, Swiffer refills are discarded.

In an influential paper, the economist Robert Solow computed that 51 percent of U.S. output growth from 1909 to 1949 can be attributed to technological progress, while growth in the capital stock accounted for only 11 percent of the increase in growth. Despite the fact that technological progress is measured as a residual, Solow’s work made it abundantly clear that the growth in real income per worker is far too large to be accounted for by growth in the capital stock. In the absence of technological progress, the economy settles into a steady state in which out-

¹ Unless otherwise indicated, city and metropolitan area are being used to designate a metropolitan statistical area (MSA), which is a geographic area delineated by the U.S. Office of Management and Budget that combines a densely populated nucleus with adjacent communities that have a high degree of economic integration with the nucleus.



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put per worker and capital per worker remain constant through time; that is, the standard of living does not change. However, improvements due to, say, a new production technology can lead to a new, higher steady state. In Solow's model, the rate of long-run growth of the economy is determined by the rate of technological progress, which is taken as given, providing no explanation for productivity improvements. Since the rate of productivity growth is the most important determinant of long-run growth, treating such an important factor as given leaves many unanswered questions.²

Beginning in the mid-1980s, economists, most notably Paul Romer and Robert Lucas, expanded on Solow's framework to include explanations for productivity growth, referred to as the *new growth theory*. One version of the new growth theory focused on human capital — the knowledge and skills of people — as the engine of growth. As people enhance their human capital, they not only become better workers, they also contribute to economic growth by developing new goods and new ways to produce existing goods. Education is one way individuals add to their human capital. But as individuals accumulate knowledge, they also contribute to the productivity of many other individuals with whom they have contact either directly or indirectly. Thus, the accumulation of knowledge

by one person has a positive effect on the productivity of others.

Interestingly, the new theory of growth helped to establish a link between cities and innovation. Knowledge flows are much more easily transmitted among individuals located in a common area, such as a city. This is especially true for “tacit” knowledge, which is highly contextual and hard to codify. The best way to transmit tacit knowledge is through frequent face-to-face contact. Importantly, cities not only facilitate the transmission of knowledge among people and firms; cities also promote the continuous creation of new ideas, which is an important ingredient in the growth process. In this view, growth can be sustained by the continuing development and improvement of the human capital that generates knowledge spillovers. Although the channels through which knowledge spillovers are transmitted are not well understood, the dense concentration of people and firms in cities creates an environment in which new ideas travel quickly.

WHAT'S THE EVIDENCE?

Since knowledge spillovers are invisible, they cannot be directly measured. The challenge is to come up with a way to measure them indirectly. There are two main empirical approaches to identifying spillovers in regions: through their effects on wages and on patent citations.

Studies based on wages. Lucas suggests that the level of productivity in a location depends on the *average* level of human capital in that location. Education is an important aspect of human capital, and many studies use some measure of educational attainment as a proxy for the human capital stock of cities. Accordingly, a productivity spillover occurs when the body of educated workers in a city makes other workers in that city more productive. The share of the adult population age

25 and older with a college education differs dramatically across cities (see Table 1). The college-educated share in 2010 runs from a high of almost 28 percent in the Raleigh, NC, metro area to a low of about 9 percent in the Visalia, CA, metro area — a threefold differential. In his 2012 book, Enrico Moretti shows that there is an even bigger differential across cities (by a factor of 5) in the college-educated share among *workers*. If a higher college-educated share (the proxy for knowledge spillovers) makes workers more productive, this increased productivity will be reflected in higher wages. Thus, the vast majority of studies attempt to measure the additional earnings that similar workers — in terms of age, education, occupation, industry, and experience — receive as the share of college graduates in their city increases.³ Importantly, these studies find that each additional year of average education increases a region's expected wages by 1 percent to 5 percent.⁴

Antonio Ciccone and Giovanni Peri point out that an increase in the share of highly skilled workers in a city

³ See the studies by Rauch; Acemoglu and Angrist; Ciccone and Peri; Moretti, 2004a; and Rosenthal and Strange.

⁴ Using 1980 census data, Rauch estimates that each additional year of average education in a city increases expected wages 3 to 5 percent. But do the most skilled individuals gravitate to cities that offer higher wages? Or do high average wages in cities improve worker productivity, leading to higher wages? Recent studies attempting to control for reverse causality find that a one-year increase in average schooling is associated with about a 1 to 2 percent increase in average wages. In addition, rents must be higher in more productive cities; otherwise, workers could increase their welfare and firms would increase profits by moving to these cities. That is, increases in productivity will show up as some combination of higher wages and higher rents. Few studies have looked for evidence of knowledge spillovers in urban land markets, as land rent data are not generally available. One exception is a study by Jesse Shapiro, which finds that a 10 percent increase in the share of college-educated workers in metropolitan areas led to a 2.4 percent increase in wages and a 1.2 percent increase in rents from 1940 to 1990.

² Since 1950, real U.S. GDP has grown at an average annual rate of 3.2 percent. Applying the Solow approach and using the rule of thumb that capital receives about one-third of national output and labor two-thirds, growth in the stock of capital (net of depreciation) would account for only 0.34 percentage point of real GDP growth. Another 1.18 percentage points could be attributed to growth in the labor input and 1.7 percentage points to technological progress. Put differently, growth in the capital stock accounts for only about 11 percent of the output growth since 1950 and growth in labor explains 37 percent, while over 50 percent is accounted for by technological change (the Solow residual).

could increase the wages of less-skilled workers in that city for reasons other than knowledge spillovers. Highly skilled and less-skilled workers can complement one another in production, in the sense that an increase in one type of worker can increase the productivity of the other type of worker.

Thus, an increase in the share of highly skilled workers in a geographic area will increase the productivity of less-skilled workers in that area, just as having more or better machines to work with increases worker productivity. Given this increase in overall productivity, firms can offer higher wages to less-

skilled workers. The question is, how much of the increase in the wages of less-skilled workers as a result of having more highly skilled workers in the city is due to knowledge spillovers and how much is due to complementarities? Holding the labor force skill mix constant over the period 1970-90, Ciccone and Peri find no evidence of a return to a one-year increase in average schooling once they account for complementarities between highly educated and less-educated workers. An interesting study by Moretti reports that being around a lot of highly skilled workers can be especially beneficial for less-skilled workers. He finds that a 1 percent increase in a city's share of college graduates increases the wages of college graduates by only about 0.5 percent but increases the wages of high school dropouts by almost 2 percent, while raising the wages of high school graduates by roughly 4.5 percent.

Studies based on patents. Although wage studies are useful for estimating the magnitude of knowledge spillovers, they treat differences in average educational attainment from one city to another as static conditions, telling us little about the forces driving economic growth.⁵ Because the accumulation of knowledge is needed for economic growth, studies that look at research and development and patent-

⁵ A primary advantage of large cities is that they facilitate learning, thus leading individual workers to develop their human capital over time (a dynamic effect). Glaeser and Maré (2001) find that the effect on workers' wages is small when first they arrive in a new city (static effect) but that wages tend to grow over time as workers accumulate human capital (dynamic effect). Several studies confirm that wages grow faster in larger cities (Baum-Snow and Pavan, 2013; De la Roca and Puga, 2012; Wang, 2014). Using a sample of Spanish workers during 2004-09, De la Roca and Puga (2012) find that one-half of the premium is static — that is, workers receive it upon arriving in a city — while the other half accumulates over time as part of the dynamic benefits of learning. Wang (2014) finds that college-educated workers who spend their early years in large cities tend to have faster wage growth.

TABLE 1

College Share Differs Widely Among Metro Areas

Rank	Top 10	Percent*
1	Raleigh-Cary, NC	27.8
2	San Francisco-Oakland, CA	26.5
3	Madison, WI	26.0
4	Austin-Round Rock-San Marcos, TX	25.7
5	San Jose-Sunnyvale-Santa Clara, CA	25.6
6	Minneapolis-St. Paul-Bloomington, MN-WI	25.4
7	Ann Arbor, MI	25.4
8	Provo-Orem, UT	25.2
9	Denver-Aurora-Broomfield, CO	25.0
10	Bridgeport-Stamford-Norwalk, CT	24.8
44	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	20.1
—	U.S. Average	17.8
Rank	Bottom 10	Percent*
148	Stockton, CA	12.1
149	Hickory-Lenoir-Morganton, NC	11.9
150	Charleston, WV	11.5
151	McAllen-Edinburg-Mission, TX	11.3
152	Beaumont-Port Arthur, TX	10.9
153	Ocala, FL	10.8
154	Modesto, CA	10.6
155	Brownsville-Harlingen, TX	10.3
156	Bakersfield-Delano, CA	9.9
157	Visalia-Porterville, CA	8.9

* Share of the population with college degrees in metro areas with at least 200,000 residents age 25 and older.

Source: American Community Survey, U.S. Census Bureau.

ing activity can be more informative about the role of knowledge spillovers in growth. In my research with Satyajit Chatterjee and Robert Hunt, we find that the share of the population with a college degree is by far the most important factor in explaining patenting activity in cities in the 1990s. We find that a 10 percent increase in the college share is associated with an 8.6 percent increase in patents per capita during the 1990s.

Firms undertake R&D to realize productivity gains through innovations. Since R&D is an input into the production of patents, patent citations provide a measure of knowledge spillovers. Patent citations trace knowledge flows in that a citation in a patent application to earlier patents indicates that inventors knew about and used information contained in earlier patents. Adam Jaffe, Manuel Trajtenberg, and Rebecca Henderson point out that inventors are likely to be more aware of patents awarded to inventors who are geographically close to them. If knowledge spillovers are localized within a given metropolitan area, then citations to patents within a given metropolitan area should come disproportionately from other inventors who are located within that metropolitan area. Since every patent lists the names, hometowns, and zip codes of the inventors named in the patent, one inventor's proximity to another is easily determined.

However, Jaffe and his coauthors are concerned that a citation to nearby inventors may be due to reasons other than knowledge spillovers. The concern is that technologically related activity may be clustered geographically for reasons unrelated to knowledge spillovers. For example, the semiconductor industry could have concentrated in Silicon Valley because that location was a source of venture capital. So, for each citation, Jaffe and his coauthors choose a control citation

that is technologically similar to the original citation and was made around the same time. Jaffe and his coauthors find a significant "home bias." That is, patent citations (excluding self-citations) are two to six times more likely than control patents to come from the same metropolitan area.⁶

Their finding provides strong evidence for knowledge spillovers among inventors. Indeed, the magnitude of the spillover may be understated. Metropolitan areas may not be the most appropriate geographic area of measurement, as their boundaries are determined by worker commuting distances rather than by the concentration of inventors and therefore are not well suited for capturing the knowledge spillovers among individuals engaged in innovative activity. There is mounting evidence that the transmission of knowledge rapidly deteriorates the farther one gets from the source of that knowledge. For example, Mohammad Arzaghi and Vernon Henderson look at the location pattern of firms in the advertising industry in Manhattan. They show that for an ad agency, knowledge spillovers and the benefits of networking with nearby agencies are extensive, but the benefits dissipate quickly with distance from other ad agencies and are gone after roughly one-half mile. Since knowledge

⁶ See my article with Jake K. Carr for details on the technique used by Jaffe and his coauthors. Peter Thompson and Melanie Fox-Kean report that Jaffe and his coauthors' findings are sensitive to the way the control patents are selected. By using much broader technology classifications to select the control patents, Thompson and Fox-Kean find no evidence supporting localization of knowledge spillovers at either the state or metropolitan area level. Since knowledge spillovers tend to be highly localized within a metropolitan area, states and metro areas are not the appropriate geographies for studying them. Yasusada Murata and his coauthors instead use a distance-based approach and find substantial evidence supporting the localization of patent citations even when very broad technological classifications are used to select the control patents.

spillovers appear to be highly localized, nearby inventors and firms can introduce innovations faster than rival inventors located elsewhere can. There is historical evidence on the highly localized nature of knowledge spillovers, too. In 17th century England, people gathered in coffeehouses to share ideas, with different coffeehouses attracting specialized clienteles. The London Stock Exchange began life in 1698 in a coffeehouse where merchants met. Another coffeehouse where shippers and traders met became recognized as the place to obtain marine insurance and gave rise to Lloyd's.⁷

In my research with Jake Carr, Robert Hunt, and Tony Smith, we describe how the geographic concentration of R&D labs can be used to determine more appropriate geographic boundaries in which knowledge spillovers are most likely to occur. For example, we found a cluster of R&D labs centered on Cambridge, MA, and a cluster in Silicon Valley, among others. Similar to Jaffe and his coauthors, we find evidence of a significant home bias in patent citations (excluding self-citations) in most of the clusters we identified. We find that patent citations are over 12 times more likely to come from the San Jose, CA, cluster and more than eight times more likely to come from the Cambridge cluster as from their respective control patents chosen to match the geographic concentration of technologically related activities. This finding provides not only evidence of localized knowledge spillovers in patent citations but also much stronger evidence than reported in prior studies.⁸

Patents have well-known problems as indicators of inventive activity in

⁷ Tom Standage, "Social Networking in the 1600s," *New York Times*, June 23, 2013.

⁸ See my article with Jake K. Carr for details on the clustering of R&D labs.

that not all inventions are patented. Firms can choose other ways to protect their profits from inventions such as maintaining trade secrets and being first to bring a new product to market. Another concern is that the patent examiners themselves routinely add citations to patent applications. Citations added by examiners are unlikely to reflect knowledge flows. Jeff Lin avoids this potential problem by looking for evidence of knowledge spillovers in patent interferences, which are administrative proceedings to determine which applicant is entitled to the patent when multiple applications are submitted for the same invention. The basic idea is that inventors involved in an interference are likely to share certain knowledge, so patent interferences may offer evidence of knowledge spillovers among inventors. If localized knowledge spillovers are important, we should see that inventors in close geographic proximity should be disproportionately involved in interferences. Lin finds that patent interferences are more likely to be observed between inventors located close to one another as opposed to those located farther apart — evidence that common knowledge inputs among independent inventors are highly localized.

In another study, Lin looked at which cities are the most creative, in that they generate “new work,” measured by jobs that did not exist a decade earlier. The idea, which dates from Jane Jacobs, is that having a higher percentage of educated workers in a city leads to greater creativity and to the invention of new ways of working. Lin finds that 5 percent to 8 percent of U.S. workers are engaged in new work, but that the percentage is higher in cities with a higher-than-average density of college graduates and a more diverse set of industries.

Other studies. Some studies have looked for evidence of knowledge spillovers by considering how differences

in education across cities translate into differences in firms’ productivity across cities. The idea is that firms situated in cities with high human capital will be able to produce more output using the same level of inputs compared with similar firms located in cities with low human capital. Moretti (2004b) looks at the growth in the productivity of manufacturing plants during the 1980s and finds that, on average, human capital spillovers account for a meager 0.1 percent increase in output per year, or about \$10,000 per year.

Looking at population growth and the growth in income in cities from 1960 to 1990, Ed Glaeser, José Scheinkman, and Andrei Shleifer find that cities with high median years of schooling for persons age 25 and older grew faster. A one-year increase

tributed via the usual media sources. Perhaps people can share tacit knowledge through professional or social networks. But, as Vernon Henderson has asked, how do these networks form, how are members accepted, and how do spatial patterns form? Glaeser suggests a mechanism for learning in cities when young people move to big cities to learn from experienced workers. Think of a recent M.B.A. who moves to Wall Street to learn from experienced brokers and traders.

Alternatively, geographic proximity may facilitate the exchange of knowledge through contractual and market-based channels. One way knowledge could spread is when skilled workers move from one firm to another, especially within the same city. This type of knowledge transfer

How do these networks form, how are members accepted, and how do spatial patterns form?

in median years of schooling in 1960 increased subsequent income growth by almost 3 percent. Similarly, Jesse Shapiro finds that from 1940 to 1990, a 10 percent increase in a metropolitan area’s share of college-educated residents (from, say, 20 percent to 22 percent) raised employment growth by approximately 2 percent.

In sum, the bulk of the evidence supports the existence of localized knowledge spillovers. But knowledge flows are invisible, so we do not observe exactly how knowledge flows among individuals. A central limitation of these studies is that none explore the ways in which knowledge is transmitted among individuals living in close geographic proximity. So far, we have stressed the role of nonmarket-based geographic ties in spreading knowledge, especially tacit knowledge that cannot be easily codified and dis-

tributed via the usual media sources. Perhaps people can share tacit knowledge through professional or social networks. But, as Vernon Henderson has asked, how do these networks form, how are members accepted, and how do spatial patterns form? Glaeser suggests a mechanism for learning in cities when young people move to big cities to learn from experienced workers. Think of a recent M.B.A. who moves to Wall Street to learn from experienced brokers and traders.

Alternatively, geographic proximity may facilitate the exchange of knowledge through contractual and market-based channels. One way knowledge could spread is when skilled workers move from one firm to another, especially within the same city. This type of knowledge transfer

is not a spillover to the extent that these workers are compensated for the knowledge they bring to their new firms. But there is reason to believe that such sharing of ideas through mobility is limited, as most employers include nondisclosure and noncompete clauses in employment contracts to protect proprietary knowledge from leaking to another firm. Additionally, Ariel Pakes and Shmuel Nitzan show that stock options give employees a strong incentive to remain with their current employers. The courts in most states deem noncompete clauses to be legally binding contracts provided they contain reasonable limitations on the geographic area and time period in which an employee may not compete. California is an important exception; its courts have generally been reluctant to enforce noncompete clauses, which have been held to violate freedom

of competition and unduly restrict people's ability to seek work wherever they choose. Even so, Bruce Fallick, Charles Fleischman, and James Rebitzer find that, outside of the computer industry in Silicon Valley, job-hopping rates for college-educated males are no higher than in other states.

CONCLUSION

What, if anything, should local policymakers do to stimulate local innovative activity? The answer depends, in part, on who benefits from that local innovative activity. A metropolitan area might be highly inventive, but if the benefits of this inventive climate — that is, the successful commercialization of its

inventions — occur largely in other regions, local policymakers might have too little incentive to support local inventive activity by offering tax breaks or other financial incentives to attract R&D labs and innovative startups. That wider benefit that comes from innovation suggests a role for federal support to foster local innovation. But this begs the questions: What type of support would have the most impact? And who should decide how and where support should be provided? Although it is difficult to make policy recommendations grounded in the evidence, we can offer broad suggestions. The most significant levers that policymakers at any level of government should consider are

ones that influence the development of human capital. The concentration of individuals with high human capital in cities leads to knowledge spillovers among these individuals, which in turn leads to new ideas and economic growth. My research with Chatterjee and Hunt shows that education is by far the most important variable in explaining the overall rate of inventive activity in cities. Glaeser and his coauthors suggest that local policymakers need to focus on lifestyle enhancements such as good schools, public parks, low crime, and clean streets, because they are important in attracting and retaining highly educated workers. 

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Rising Disability Rolls: Causes, Effects, and Possible Cures

BY BURCU EYIGUNGOR

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ocial Security disability insurance began in 1956 as a means of insuring a portion of the earned income of U.S. workers over age 50 against the risk of disability. In 1960, when coverage was extended to all workers, less than half a million workers were collecting benefits, and by 2012 this number had increased to 8.8 million people — an increase from 0.3 percent to 3.6 percent of the population. Over this period, there have been a number of changes: Initially, the law insured only against permanent disabilities, but in 1965 the definition of disability was expanded to cover impairments expected to last at least one year. In 1973, beneficiaries disabled for two years became eligible for health insurance through Medicare. Of particular interest from the standpoint of this article is that in the past three decades, disability rolls have been growing fast, costing the system more in benefit payouts as well as in forgone tax revenue as more working-age Americans leave gainful employment.

I will examine trends in disability insurance recipient numbers, which have been growing for all age groups, and the possible reasons behind the increase. As I will show, although disability insurance provides much-needed aid to those who can no longer work, how the program is administered can affect people's decisions to remain employed or to leave or rejoin the labor force. I investigate these effects by summarizing a number of studies that assess the impact of the availability of disability insurance on labor force participation rates. Finally, I will look at reforms that have been undertaken to encourage more D.I. recipients to re-

turn to the labor market and whether these reforms have been effective.

COSTLY TRENDS

I will focus on men and their usage of the disability insurance program, as women's usage has been affected by their low labor force participation in earlier decades, which affects their eligibility. Figure 1 shows the behavior over time of the ratio of disabled male workers receiving D.I. benefits relative to the 25- to 64-year-old male population.¹ In 1967, the ratio of disabled workers was 2.1 percent, and in 2012 the ratio had become 5.8 percent. The increase did not proceed smoothly dur-

ing this period. The rapid, unexpected increase in D.I. enrollment after the program's inception in 1957 led to a funding crisis by the end of the 1970s. In response, in 1980, new federal legislation increased the number of reviews of beneficiaries to determine continued eligibility and also made it more difficult for applicants to qualify for benefits. These actions led to a decline in enrollment but also generated a public backlash. Congress responded with legislation in 1984 that relaxed the eligibility criteria to include hard-to-verify ailments such as depression and back pain. Since 1989, the ratio of D.I. recipients has risen steadily.

Providing disability insurance is costly along two dimensions for the Social Security Administration budget. The obvious cost is the direct outlay of benefits. The second is the forgone taxes that would have been collected if these individuals were instead working. For that reason, the ratio of disability insurance recipients relative to the total number of working people is the right measure to evaluate the cost and sustainability of this program. Figure 1 also presents the ratio of disabled male workers relative to employed men age 25 to 64. This ratio went up from 3.6 percent in 1989 to 7.4 percent in 2012.

When the ratio of beneficiaries relative to working people is high, the tax rates to fund the program will have to be higher, too, and higher taxes themselves create a disincentive to



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¹ Because the number of D.I. benefit recipients below age 25 is very small, I calculated the proportion relative to 25- to 64-year-old males.

work. (See *Snapshot: U.S. Social Security Disability Insurance* on page 11.)

Two questions that arise are whether D.I. benefits affect all age groups in a similar way and whether the increase in the ratios that we have

seen might be explained by demographic shifts in the population. Figure 2 shows how the ratio of disabled workers has evolved for different age groups. Not surprisingly, we see that older age groups utilize D.I. benefits

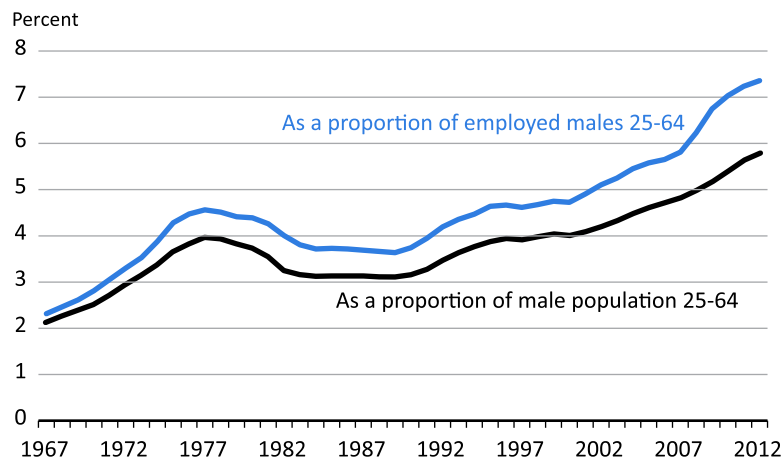
in much higher proportions. Only 1.8 percent of 30 to 39 year olds were on disability in 2011, while that number was 16.8 percent for 60 to 64 year olds. It is also true that the ratio has gone up for all age groups since 2000. Figure 3 shows the percentage point increase in the ratio of recipients for different age groups since 2000. The percentage point increase has been strongest for older age groups: For 55 to 59 year olds, the ratio has gone up 1.8 percentage points since 2000. By holding the ratio of beneficiaries in each age group at its level in 2000, we can look at how the ratio of beneficiaries among 30 to 64 year olds would have evolved if only demographic changes are taken into account. Figure 4 shows that the share of beneficiaries would have gone up 0.8 percentage point if there had been no increase in utilization rates within age groups, while in reality this ratio has gone up by 1.9 percentage points. This evidence shows that the increase in D.I. rolls is coming not only from the aging of the population. Indeed, more of the increase is coming from higher utilization rates occurring within the same age groups.

The upward trend in D.I. utilization rates is all the more puzzling given the longstanding trend in the labor market away from physically demanding work.² Absent other factors, this shift should have reduced the incidence of disabling medical conditions and lowered the relative size of the disability insurance program.³ In the next section, I will look at the possible causes cited for the increase in D.I. rolls.

² Steuerle, Spiro, and Johnson find that from 1950 to 1996, the share of U.S. workers in physically demanding jobs — defined as requiring the frequent lifting or carrying of objects weighing more than 25 pounds — declined from about 20 percent to about 8 percent. Johnson, Mermin, and Resseger find that from 1971 to 2006, the share of U.S. jobs involving any general physical demands declined from about 57 percent to 46 percent.

FIGURE 1

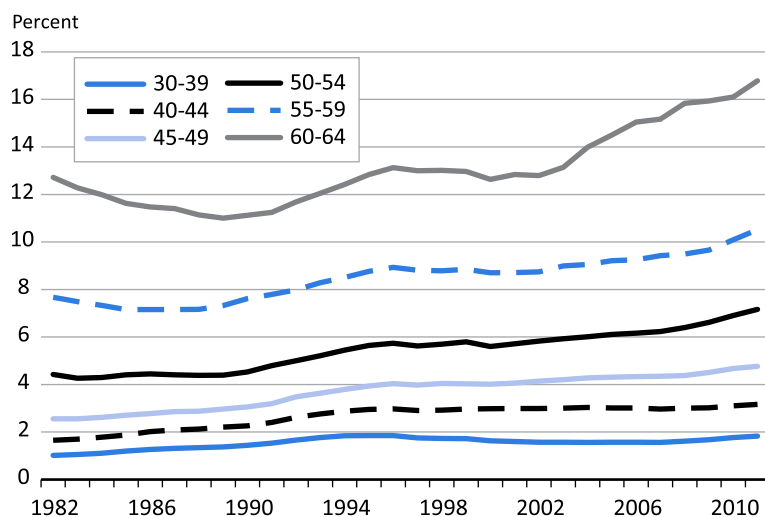
Rolls Rising as a Proportion of Work Force



Source: Social Security Administration via Haver Analytics.

FIGURE 2

Older Workers More Likely to Go on Disability Proportion of male workers on disability by age group.



Source: Social Security Administration via Haver Analytics.

POSSIBLE REASONS FOR THE INCREASE

As I have mentioned, one widely cited reason behind the increase in the rolls is that Congress liberalized the screening process, which has put more weight on hard-to-verify ailments such as backaches, headaches, and depression. In addition, because these conditions often appear in young people as well and tend not to be fatal, D.I. recipients with such diagnoses tend to collect benefits for relatively long periods. As a result, the ratio of beneficiaries who leave the disability rolls has decreased in the past few decades. Figure 5 shows that the exit rate has gone down from 20 percent in 1960 to 8 percent in 2011.⁴

Another commonly cited reason, documented in depth by David Autor and Mark Duggan, is the increase in the replacement rate — the ratio of D.I. benefits relative to the market wage — for low-wage workers. As I will explain in depth below, this increase is not a result of a change in the rules for disability insurance, but rather a result of greater income inequality in the U.S. combined with how D.I. benefits are determined.

To qualify, an applicant must have worked in at least five of the previous 10 years at jobs covered by Social Security, cannot be engaged in a substantial gainful activity (equivalent in 2012 to earning \$1,010 or more a month for a nonblind person), and must be un-

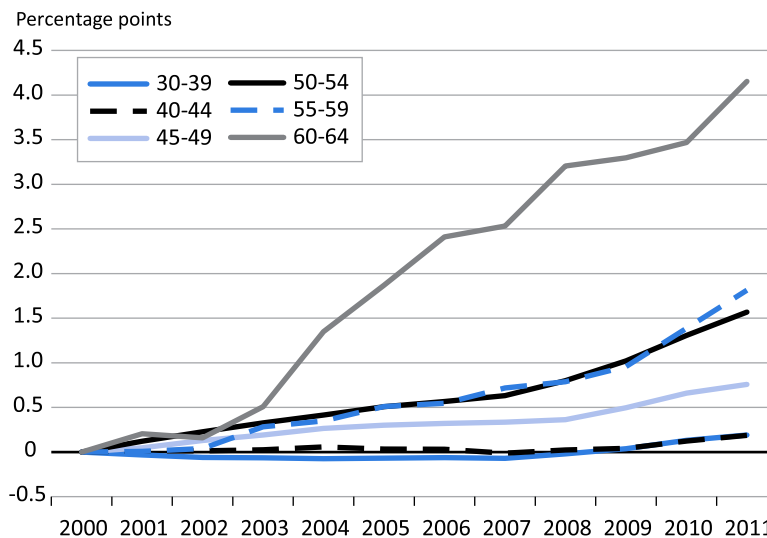
able to work due to a significant illness or impairment expected to last at least a year or to result in death within a year. Once a recipient hits retirement

age, disability benefits are automatically converted to retirement benefits.

To determine the dollar amount of D.I. benefits, a worker's average

FIGURE 3

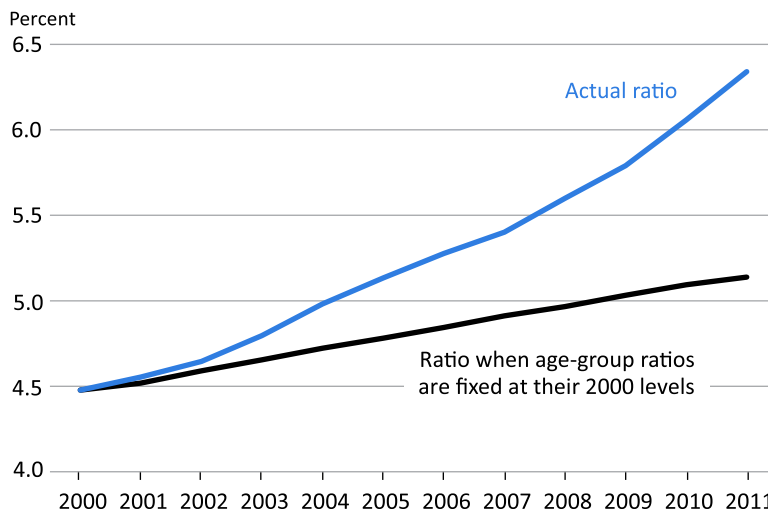
Increase Greatest for Older Workers Percentage point increase in the proportion of male workers on disability since 2000.



Source: Social Security Administration via Haver Analytics.

FIGURE 4

Increase in Rolls Not Only Due to Aging Population Proportion of male workers on disability age 30-64.



Source: Social Security Administration via Haver Analytics.

³ One might ask how much sedentary lifestyles are contributing to the increase in disability rolls. Autor and Duggan document that most of the increase in rolls has been due to mental disorders and musculoskeletal disorders (for example, back pain) and that the increase in rolls due to heart disease or endocrine system disorders (for example, diabetes) does not constitute a big portion of the total increase.

⁴ The exit rate measures the percentage of disability recipients whose enrollment ends in a particular year. Enrollment might end because the recipient dies, switches to Social Security retirement benefits, or no longer meets the medical criteria.

indexed monthly earnings (AIME) are calculated. For the average earnings, a worker's past wages are indexed up to the present using an "inflator" equal to the mean rate of wage growth in the economy. Once the average indexed earnings of the worker are calculated, benefits are determined according to a progressive replacement schedule. For example, in 2012, the replacement rate for the first \$767 of AIME was 90 percent, for the next \$3,857 it was 32 percent, and above that it was 15 percent. The brackets that determine replacement rates grow at the average rate of wage growth in the economy.

Increased wage inequality in the past few decades implies that low-wage workers' earnings increased more slowly than mean earnings, and so the brackets (which grow at the mean rate of wage growth) have grown faster than low-wage workers' earnings. This implies that a bigger portion of the AIME of a low-wage earner will be in the lower brackets, and the worker will have a higher overall replacement rate. In addition, the fact that the AIME is calculated by inflating past earnings at the mean rate of wage growth in the economy implies that, for a worker whose wages grow more slowly than the mean rate, the replacement rate relative to his current wage will be higher.

For example, consider the average earnings of a worker calculated over two years. The worker earned \$20,000 in each of the past two years. If in the last year mean wages grew 10 percent economywide, the inflated value of \$20,000 earned by the worker last year would be \$22,000 ($= \$20,000 + (\$20,000 \times 110\%)$) today, and the average earnings of the worker will be calculated as \$21,000 ($= (20,000 + 22,000) \times 0.5$). The replacement rate is calculated using average earnings of \$21,000, which will give a higher replacement rate relative to the current potential earnings of the worker, which is \$20,000.

Snapshot: U.S. Social Security Disability Insurance

Workers employed full time for at least five of the previous 10 years in a qualified job who have been unable to work for five months because of an illness or infirmity expected to last a year or more may be eligible to collect disability insurance benefits. Recipients receive a portion of their former earnings and are subject to periodic reevaluations.

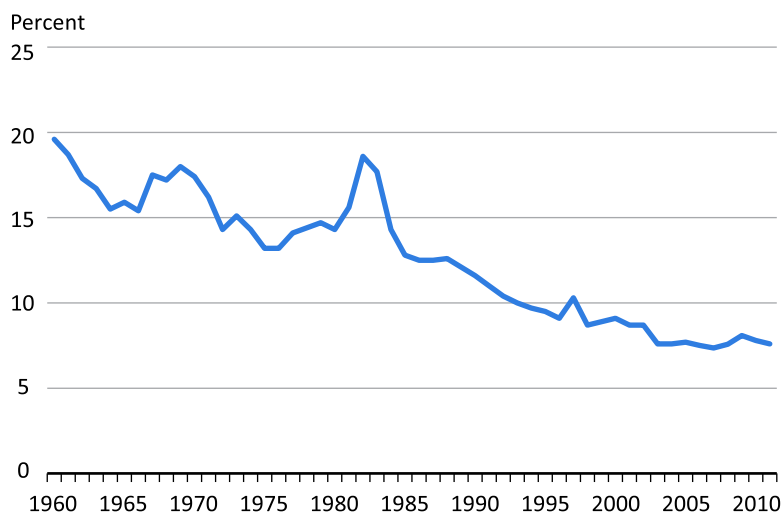
The program is funded through a portion of the Social Security taxes paid by covered employees and employers. The disability portion of the tax was equal to 0.5 percent of wages when the program was established in 1957 and is now 1.8 percent. Revenue goes into the Disability Insurance Trust Fund, controlled by the Social Security Administration. Funds not immediately paid out are invested in interest-bearing federal securities, as required by law. By 2016, the trust fund is projected to be able to pay only 80 percent of benefits.

Number of workers receiving benefits:	8.8 million
Average age of recipients:	53
Average monthly benefit:	\$1,130
Total 2012 disability payout:	\$137 billion

Sources: Congressional Budget Office, Social Security Administration. Data are 2012 estimates for male and female workers (excluding spouses and dependents) collecting disability benefits. www.ssa.gov/policy/docs/statcomps/supplement/2013/5d.html#table5.d4
www.ssa.gov/policy/docs/chartbooks/fast_facts/2013/fast_facts13.html

FIGURE 5

Fewer Recipients Dropping Off Rolls Ratio of disabled workers leaving rolls in a given year.



Source: Social Security Administration via Haver Analytics.

A third factor behind high replacement rates is that, since 1973, disability beneficiaries have been eligible for Medicare after being enrolled in the program for two years. Given that most low-wage workers have limited or no medical coverage through their employers, and also given the rising cost of health care, the value of Medicare benefits under the disability insurance program for these workers has been going up.

Autor and Duggan take all these factors into account and estimate male workers' replacement rates depending on their earnings percentiles, which are replicated here in Table 1. The replacement rate for male workers age 50 to 61 earning wages in the lowest 10th percentile has gone up from 68 percent in 1984 to 86 percent in 2002. For a worker in the same age group and in the 50th earnings percentile, this ratio has gone up from 34 percent to 46 percent. The increase in the replacement rate has been highest for low-wage workers, and it is approaching the full replacement rate for the 10th percentile worker. High replacement rates combined with lax eligibility criteria create disincentives to work; it is possible that this could lead some able workers to claim disability benefits.

MEASURING DISINCENTIVES TO WORK

In the same period that disability insurance rolls have been growing, the labor force participation rate for men has been going down. For example, in 1960, when D.I. benefits were extended to workers younger than 50, the proportion of disabled male workers relative to the male population age 25 to 64 was 0.9 percent. By 1977, this rate had risen 3 percentage points to 4 percent. Over the same period, the labor force participation rate for this group fell nearly 5 percentage points, from 95.2 percent to 90.4 percent. A cursory first look at the data seems to

imply a relationship between the labor force participation rate and the D.I. program, but let us examine this relationship in more detail.

Initial studies on the subject found that disability benefits had a large impact on labor force participation rates. Donald Parsons used regression analysis to come to that conclusion. He found that high replacement rates — the ratio of potential benefit levels to wages — predicted lower labor force participation rates. This effect was so strong that increasing replacement rates could explain the entire decline in the labor force participation rate for men from 1948 to 1976.⁵

These studies were later criticized because they did not take into account that, because of the progressivity of the disability insurance schedule, a high replacement rate for a worker would mean that the worker was getting low

wages, and low wages in themselves might drive the worker out of the labor force. In addition, less motivated (or possibly less healthy) workers tend to earn lower wages, and an unmotivated worker would be more inclined to leave the labor force even if disability insurance did not exist, while these regressions were attributing this to the disability insurance program.

In his seminal work, John Bound proposed a different way to estimate the impact of D.I. policies on people's decision to work. He looked at labor force participation among people who had applied for disability insurance and got rejected to get an upper bound of how many people whose claims were accepted would have worked if

⁵ Other studies that used similar regression analysis came to similar conclusions. See Parsons (1980b, 1982) and Frederic Slade (1984).

TABLE 1

Replacement Rates Rose the Most for Low-Wage Workers

Estimated D.I. wage replacement rates for men.

	Replacement rates		Including benefits, Medicare	
	1984	2002	1984	2002
Income percentile	Age 30-39			
10th	48.4%	59.4%	60.6%	85.7%
50th	36.2	41.9	35.4	44.4
90th	24.1	26.1	22.5	24.7
	Age 40-49			
10th	51.1	55.1	62.7	76.9
50th	33.5	43.3	32.7	44.4
90th	19.4	24.8	18.4	23.3
	Age 50-61			
10th	55.2	64.0	67.8	86.0
50th	34.7	45.9	34.1	46.4
90th	19.0	23.7	18.2	22.4

Source: Autor and Duggan's calculations from the Current Population Survey March Annual Demographic Supplement, 1964-2002.

they were not collecting D.I. benefits. He found that people who applied and got rejected were quite different from the general population. According to various estimates, no more than 33 percent of rejected applicants were working 18 months after having been denied benefits, while 3 percent of the beneficiaries were working, which implies that receiving benefits led to a reduction in the employment rate of applicants by at most 30 percentage points. The assumption here is that rejected applicants are healthier and more capable of work than those who were accepted. Thus, their labor force participation rate should provide an upper bound for what could be expected of beneficiaries.

Parsons points out that this approach might be underestimating the labor force participation disincentives of D.I. benefits.⁶ People who have been rejected usually apply again or appeal, risking letting their skills get rusty because they are unemployed during the application process. In addition, some people who intend to exit the labor force anyway might be filing false claims.

For example, take the case of a healthy person who applies for benefits fully intending to leave the labor force regardless and an unhealthy applicant who is nevertheless motivated to work. Presumably, the healthy person's claim is denied and the unhealthy person's is accepted. But would the unhealthy person work if he could not get disability benefits? The healthy person who applied for benefits had no intention of working but wanted to try his luck at getting benefits before leaving the labor force. By contrast, the truly disabled person is motivated to work and would possibly keep working if D.I. benefits did not exist. If we thought his labor force participation decision

absent disability insurance would be similar to that of the healthy person who was rejected for benefits, we would be underestimating D.I. beneficiaries' motivation to work. And if we assume that accepted applicants have no more inclination to work than rejected applicants, we would be underestimating the disincentive to work that D.I. benefits create for some people. Bound responds that workers whose D.I. claims

benefits. This choice might be due to increased income inequality, which has made not working more attractive.

Thus, while progress has been made in understanding the relationship between disability insurance and the declining labor force participation of men, how much of that decline is caused by disability insurance is still an open question that researchers are trying to answer.

Different reforms have been proposed to increase labor force participation without hurting the truly disabled.

are accepted are in general in much worse health than those who are rejected, and this effect should dominate the unobserved motivation element.⁷

Another question that arises is that, as discussed in the previous section, the disability insurance program has changed substantially in the decades since Bound's study, which was done in the 1970s. Given that the screening process is more liberal now, one would expect applicants to be healthier overall and to be more likely to participate in the labor force if their applications are rejected. Susan Chen and Wilbert van der Klaauw found that what Bound found to be true for the 1970s was still true for the 1990s. For males over age 45 applying for D.I. benefits, the labor force participation rate would have been only 23 to 40 percentage points higher were it not for the availability of the program. This finding is paradoxical if we believe that workers applying for D.I. benefits in the 1990s were generally healthier than applicants in the 1970s. Their finding seems to imply that more men were choosing to exit the labor force regardless of the availability of D.I.

ATTEMPTS AT REFORM

The aim of disability insurance is to insure workers' labor income against disabling medical conditions but at the same time not give those capable of holding a job a disincentive to work. Different reforms have been proposed to increase labor force participation without hurting the truly disabled. One solution is to shrink the size of the disability insurance program by making the screening process more stringent. The drawback is that more stringent screening would undoubtedly exclude more genuinely disabled people from receiving disability benefits or lead to more delays and therefore more suffering while the disabled are trying to get their benefits.

Most of the reforms that have been undertaken entail a form of financial incentive such that workers are allowed to keep a portion of their disability benefits even when they return to the labor force, usually for some finite amount of time. The U.S. program, known as the "\$1 for \$2 offset," reduced workers' benefits by \$1 for every \$2 they earned above a threshold of substantial gainful activity. In Britain, recipients who return to work are allowed to keep approximately 50 percent of their benefits for

⁶ See Parsons' comments in the *American Economic Review*.

⁷ See Bound's 1991 response in the *American Economic Review*.

up to 12 months. The aim of these programs is to increase the employment rate among disability insurance beneficiaries or even encourage some to exit the disability rolls permanently. The concern is that allowing people to keep some portion of their benefits even if they are employed might motivate more workers to apply for disability benefits in the first place, so the overall impact of these policies and which effect might dominate are empirical questions.

In 1999, the Social Security Administration was mandated by federal law to conduct a controlled trial to estimate the extent to which the “\$1 for \$2 offset” policy encouraged workers to apply for disability benefits and induced beneficiaries to rejoin the labor force. In the trial, some randomly selected workers would be able to benefit from the policy and the rest would not. But the trial was never implemented due to its costs.⁸ Luckily, a subsequent study in Norway highlights the effectiveness of such a policy in inducing workers to participate in the labor force again. In 2005, Norway implemented a similar policy in which workers collecting disability payments were able to keep the equivalent of 40 cents out of every dollar they earned over the substantial gainful activity threshold. To prevent this policy from inducing

⁸ Benitez-Silva, Buchinsky, and Rust summarize why the trial was never undertaken.

more workers to apply for benefits, the policy was applied only retroactively. That is, only workers who had gone on disability before 2004 were eligible. This exclusion provided a “natural experiment” that allowed economists Andreas Ravndal Kostøl and Magne Mogstad to compare the effect of the policy on the behavior of workers who went on D.I. just before and after this cutoff. These two groups of workers are presumably very similar to each other, other than their eligibility status.

They found that the labor force participation rate was 8 percent among eligible workers ages 18 to 49 but only 3 percent among ineligible workers in the same age group. Just as Bound had found for U.S. workers, they found that the labor force participation rate of Norwegians whose applications were rejected was 30 percent. In addition, they find that while younger groups (ages 18 to 49) are more responsive to this policy, older groups close to retirement (ages 50 to 61) have hardly responded to this policy at all. The strongest response was among males with high school educations and more labor market experience. Overall, the policy reduced the cost of Norway’s disability insurance program by decreasing spending on benefits for workers who participated in the labor force and increasing tax revenue by increasing the number of taxpaying workers. Obviously, this study does not answer the question of whether

applications for D.I. benefits would go up if the opportunity to work while collecting benefits were to also become available for new beneficiaries, as is the case in the U.S.

Autor and Duggan point out that one reason many people stay on the disability rolls is that, even if some people in ill health are able to work, the Medicare coverage that disability insurance provides is very valuable to them. The Affordable Care Act might decrease the value of disability insurance to these people, as they would get health-care coverage regardless of their labor force participation.

CONCLUSION

The proportion of U.S. workers in all age groups going on Social Security disability in the past three decades has been growing rapidly. Studies estimate that if there were no public disability insurance, the labor force participation rate of beneficiaries might be 30 percentage points higher. But eliminating disability insurance is not a realistic remedy. Certain financial incentives implemented to induce disability recipients to go back to work seem to increase their labor force participation rate by only about 5 percentage points, and these financial incentives might have the unintended effect of encouraging more workers to apply for benefits. 

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A Closer Look at the German Labor Market ‘Miracle’

BY SHIGERU FUJITA AND HERMANN GARTNER

Compared with the steep, persistent increase in unemployment that the Great Recession triggered in the United States, its effect on unemployment in Germany was surprisingly mild. While U.S. unemployment soared from 4.8 percent to 9.5 percent between the fourth quarter of 2007 and the fourth quarter of 2010, the German unemployment rate actually fell from 7.6 percent to 6.4 percent over the same period (Figure 1).¹ The marked contrast may make one wonder whether the magnitude of the recession itself was smaller in Germany. Actually, the severity of the recession as measured by the drop in output was greater in Germany than in the United States. German output, as measured by the peak-to-trough difference in real gross domestic product, declined roughly 10 percent, while U.S. output declined 7 percent (Figure 2). Germany's more severe downturn makes its labor market response to the Great Recession even more surprising. No wonder it is sometimes referred to as the “German labor market miracle.”

Some commentators have attributed the different responses of the U.S. and German labor markets to several German job protection programs that are absent in the U.S. — including the so-called short-time work policy that subsidizes firms that reduce workers' hours rather than lay them off.² However, it may be premature to suggest that similar job protections would

¹ According to the National Bureau of Economic Research, the Great Recession officially started in the U.S. in the final quarter of 2007 and ended in the second quarter of 2009. However, the U.S. unemployment rate remained elevated through 2010 and beyond.

² See, for instance, economist Paul Krugman's *New York Times* column of November 2009.

work well in the U.S. As we will show, the German labor market's response during the Great Recession differed not only from the U.S. response but also from Germany's own experience during prior recessions in which job protections were also in effect.

Then, what did spare Germany from a sharp rise in unemployment during the Great Recession? In this article, we argue that the most important reason is that there had already been an underlying upward trend in German employment, made possible by the Hartz labor market reforms of 2003-05, that masked the negative impact that the Great Recession had on employment.

To explore the differences between the labor market responses in the U.S. and Germany, we first need to understand how German and U.S. firms tend to adjust the size of their work forces to changes in the economic environment. As we will show, U.S. and German firms exhibit some similarities as well as differences. More important for our discussion, German firms' employment adjustment response during the Great Recession differed from their usual pattern during past recessions. We will discuss specific reasons why German firms retained more workers during the Great Recession than during prior recessions and show why it is misleading to attribute that reaction to job protection programs that had been in existence for a long time.

HOW U.S. FIRMS ADJUST THEIR WORK FORCES

To characterize how individual firms expand or contract their work forces, we draw on a useful methodology developed by Steven Davis and his coauthors showing the relationship between the rate at which a firm's work force grows or contracts on net (*job flows*) and the rate at which workers are hired or leave (*gross worker flows*).

These rates can differ from each other. For example, workers may leave a firm during a given quarter, but the firm may hire other workers to fill those positions. So there is no job flow even though there are still gross worker flows (separations and hires). The idea is that job flows capture firms' underlying motivation to increase or decrease the number of positions they have. When the job flow rate is positive, the firm is increasing the size of its work force



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on net, resulting in *job creation*. When the job flow rate is negative, the firm is shrinking the size of its work force on net, resulting in *job destruction*. Separations and hires, on the other hand, are gross measures of individual comings and goings, which can exceed job flows.

Figure 3 shows the relationship

between job flows (horizontal axis) and worker flows (vertical axis) for individual U.S. firms. Notice that a firm that is shrinking its work force by 20 percent (horizontal axis) has a hiring rate of roughly 10 percent (vertical axis). This relationship shows, perhaps surprisingly, that firms that are reduc-

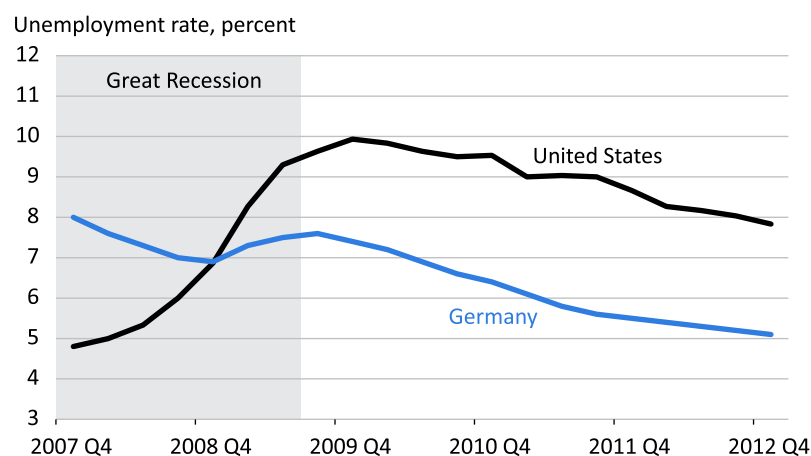
ing the number of positions on net are still doing some hiring.³ But the key takeaway from Figure 3 is that, as one would expect, when firms cut jobs, they do so by laying off workers, and they expand their work forces by hiring more workers.

Another important finding by Davis and his coauthors is that the relationship between job flows and gross worker flows stays roughly the same over business cycles. So regardless of whether the economy is in a recession or a boom, when a firm wants to reduce the number of jobs by, say, 20 percent, it tends to achieve that goal by laying off 30 percent of its workers while hiring 10 percent more workers.

Of course, in a recession, total employment across the economy drops. Why does it drop if the relationship between job flows and worker flows has not changed? It drops because many more firms are growing (landing them on the right side of Figure 3) in an expansion than in a recession, and many more firms are shrinking (placing them on the left side of Figure 3) during a recession.

FIGURE 1

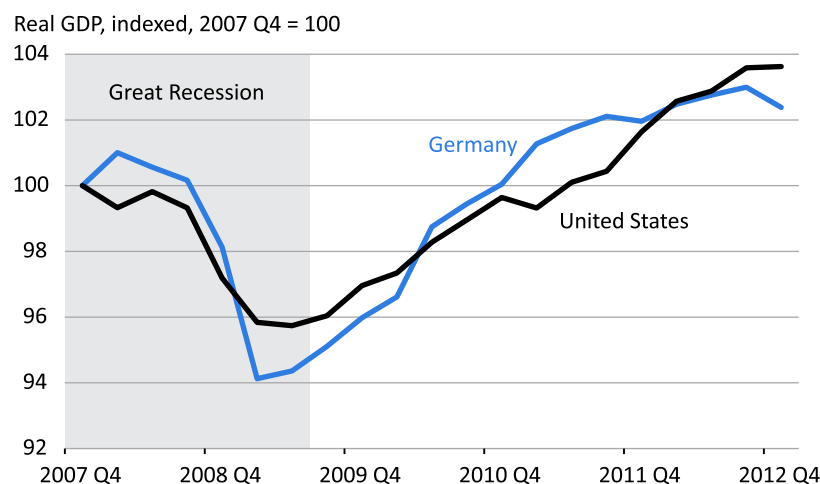
Milder Rise in German Unemployment...



Source: U.S. Bureau of Economic Analysis and Statistisches Bundesamt via Haver Analytics.

FIGURE 2

...Yet German Output Fell More Severely



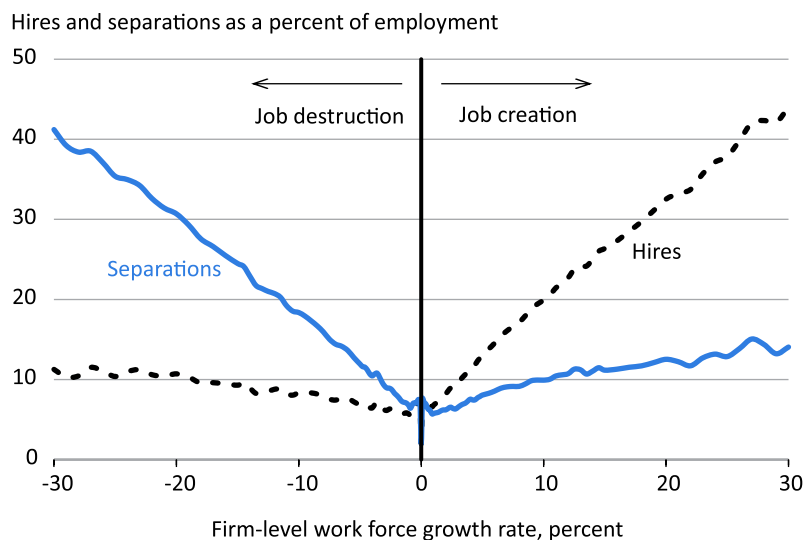
Source: U.S. Bureau of Economic Analysis and Statistisches Bundesamt via Haver Analytics.

HOW GERMAN FIRMS ADJUST THEIR WORK FORCES

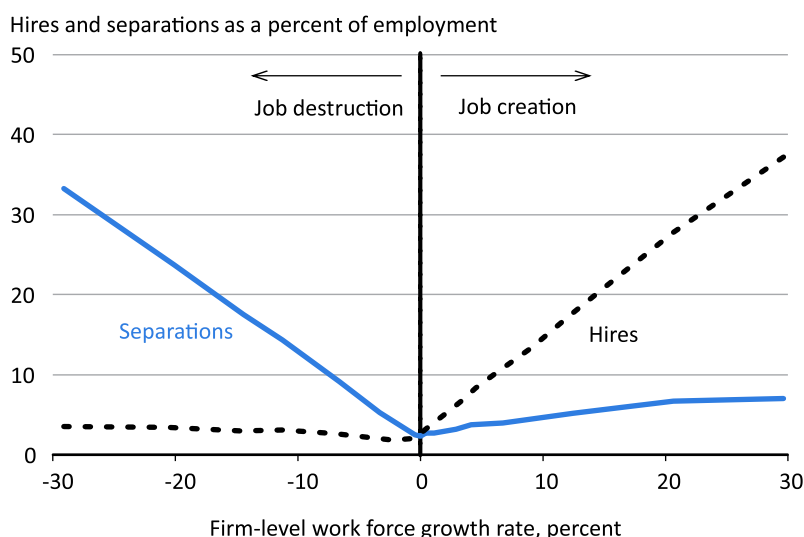
Now let us turn to how German firms adjust their work forces. We apply the same methodology developed by Davis and his coauthors to German employment data.⁴ Unlike the quarterly U.S. data used by Davis and his coauthors, the German survey collects information on job flows and worker

³ Why shrinking firms still hire is not very important for our main interest. However, one can easily imagine a scenario in which workers are voluntarily leaving a struggling firm, yet the firm still needs to replace at least essential personnel.

⁴ We draw on data from the IAB Establishment Panel, an annual nationwide employment survey of about 16,000 German firms of all sizes and sectors conducted via in-person interviews from the end of June until October.

FIGURE 3**Even as They Cut Payrolls, U.S. Firms Still Hire...****Relationship between U.S. job flows and worker flows, 2000 Q1-2009 Q3.**

Source: Adapted from Davis, Faberman, and Haltiwanger (2012).

FIGURE 4**...as Do German Firms, but to a Lesser Extent****Relationship between German job flows and worker flows, 2000-2010.**

Source: IAB German Establishment Panel.

flows that occurred in the first six months of the year, so we have to be careful in comparing the German and U.S. results. Otherwise, the German survey is also nationally representative and collects similar information.

Figure 4 pools all the surveys between 2000 and 2010 to give an overall picture of job flows and worker flows. A comparison between Figures 3 and 4 demonstrates two things. The first is the similarity of the relationship between job flows and worker flows in the two countries. That is, more job cuts are achieved by more separations, more expansions are achieved by more hiring, and worker flows exceed job flows, just as in the U.S.

The second is that in Germany, worker flow rates exceed job flow rates by a smaller margin than in the U.S. Remember that in the U.S., even when a firm is reducing its work force by 20 percent on net, the firm is still hiring 10 percent more workers while shedding 30 percent of its work force. In Germany, the hiring rate of a firm that is cutting its work force by 20 percent is less than 5 percent. This smaller “excess” worker flow rate in Germany makes sense, given that the cost of laying off workers is considered higher in Germany: When German firms want to achieve a net employment reduction of 20 percent, they have a stronger incentive to do so with fewer excess separations.⁵

To link the firm-level pattern in Figure 4 with overall employment, we need to also look at what percentage of firms are expanding or contracting their work forces and at what rates under different economic conditions. Here we also see a significant difference between the two countries. Table 1 gives the percentages of firms in five

⁵ Interested readers can also look at a study by Lutz Bellmann and his coauthors, who conduct an analysis similar to ours and reach the same conclusion.

TABLE 1**Smaller Work Force Fluctuations at German Firms****U.S. and German firm-level work force growth distributions.***

Percent of firms whose work forces:	U.S.	Germany
Contracted >10%	12.6%	4.5%
Contracted ≤10%	28.0	27.5
Had no net change	15.5	35.9
Expanded ≤10%	30.7	24.7
Expanded >10%	13.2	7.4

Sources: U.S. Bureau of Labor Statistics Business Employment Dynamics as tabulated in Davis et al. (2012); German IAB Establishment Panel.

*U.S. data are quarterly; German data are six-month rates. All data are from 2006.

growth categories: (1) no change, (2) expansion of 10 percent or less, (3) contraction of 10 percent or less, (4) expansion of more than 10 percent, and (5) contraction of more than 10 percent.⁶ Note that the U.S. data are collected each quarter, so these growth rates were calculated over three-month intervals, while the German data are collected each year, asking firms about the first six months of each year, and thus the growth rates were calculated over six-month intervals. As we will see, it is important to keep this difference in mind in interpreting the numbers in the table.

A much larger fraction (about 36 percent) of German firms made no net change in the size of their work forces over the six-month period than did U.S. firms (about 16 percent) over the three-month period. Note that it is plausible to assume that the longer the interval for the growth rate calculation, the less likely it is that

employment stays constant. Thus, if the intervals were the same, the difference in the percentage of German versus U.S. firms with no change in work force size would likely be even larger. Another notable observation is that U.S. firms were more likely to make drastic changes. More than 25 percent of U.S. firms were either expanding or shrinking their work forces by more than 10 percent over a quarterly period versus only 12 percent of German firms. Again, the differences could be even larger if the growth rates were measured over the same interval. Thus, in terms of work force growth and worker flows, many more German firms appear to have made no net change in their work forces, and many more U.S. firms appear to have made more extreme changes in payrolls.

A high percentage of “inactive” firms that keep their work force size unchanged is usually considered an indication of a rigid labor market. For example, an important paper by Hugo Hopenhayn and Richard Rogerson shows that stronger job protections such as Germany offers increase the percentage of firms that are inac-

tive. Furthermore, Germany’s larger percentage of inactive firms means that its overall job flows are lower than in the U.S., which many studies have empirically verified. However, it is important to keep in mind that low turnover does not rule out the possibility that job creation declines and job destruction increases in recessions and that the opposite is true during economic expansions.

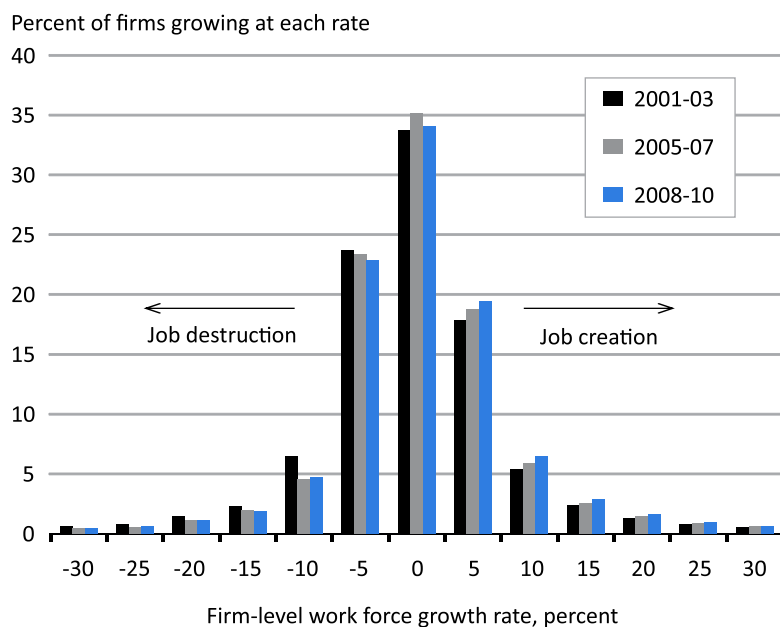
EFFECTS OF ECONOMIC UPS AND DOWNS

Next, let’s turn to how German firms have responded to changes during various business cycles. In Figure 5, we split our 2000-10 survey sample into three periods: a recession and slow recovery in 2001-03, an economic expansion in 2005-07, and the Great Recession and immediate aftermath in 2008-10.⁷ Let’s compare the first two periods to set the benchmark for evaluating the labor market reaction to the Great Recession. The black bars in Figure 5 represent the work force growth distribution during the period encompassing the recession and sluggish employment recovery in the early 2000s. The gray bars are for the economic expansion of 2005-07. Figure 6 confirms that overall employment contracted in Germany during the recessionary period in the early 2000s, while during the subsequent expansion, overall employment grew relatively strongly.

In Figure 5, one can see that the black bars are always higher than the gray bars for firms that are shrinking their work forces (the negative side of Figure 5). That is, more firms are shrinking in the downturn (2001-03) than in the expansion (2005-07). Simi-

⁶ This table looks at 2006 because it is the only year for which we have data from both countries. But this cross-sectional pattern should hold for other phases of business cycles as well.

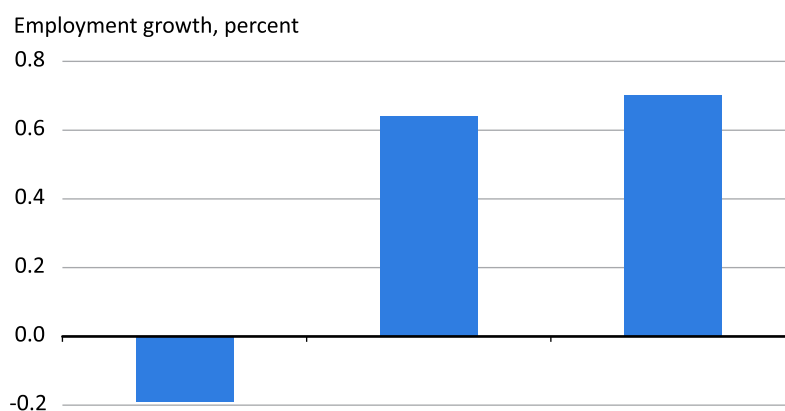
⁷ The recession in the early 2000s officially started in late 2001 and ended after six months in 2002. However, given that labor market sluggishness lasted much longer, we pool the data for the three years from 2001 through 2003.

FIGURE 5**German Firms' Work Force Growth Distribution**

Source: IAB Establishment Panel.

FIGURE 6**German Employment Actually Grew Faster in the Great Recession**

Aggregate work force growth rates.



Source: Calculated from the IAB Establishment Panel.

Note: Growth rate over the first six months of each year, averaged over each three-year period.

larly, the gray bars are always higher than the black bars for firms that are expanding their work forces (the positive side of Figure 5). More firms are expanding in mid-decade than during the recession and slow recovery. These results illustrate how economy-wide employment growth fluctuates because of shifts in the share of firms that are shrinking their work forces versus those that are expanding.

Although our discussion above focuses on only two episodes (2001-03 versus 2005-07), the literature suggests that the pattern we discussed holds for previous business cycles in Germany.⁸ As mentioned above, in Germany, job turnover is slow, reflecting its stronger job protections. But the pace of job creation and destruction does change over the business cycle. The change in the pace of job flows occurs through the shifts in the share of firms expanding versus shrinking their work forces. The work force adjustment pattern at German firms is similar to that of U.S. firms in this respect.

Let's now take a closer look at how German firms behaved during the Great Recession. When we look at the blue bars in Figure 5, which give the work force growth distribution for the Great Recession, it is quite surprising that the blue bars in the job creation region are always higher not only than the black bars representing the recessionary period in the early 2000s but also compared with the gray bars representing the expansion in 2005-07. Also interestingly, the percentage of German firms destroying jobs during the Great Recession was always lower than during 2001-03. Even compared with the economic expansion, the percentage of firms destroying jobs tended

⁸ See, for example, the article by Gartner, Merkl, and Rothe, who look at the rates of worker transition into unemployment in Germany and show that both the rate of layoffs and the rate at which people find jobs are similar to the corresponding U.S. rates.

to be lower during the Great Recession. (The exception is the percentage of firms cutting their work forces by 5 percent to 10 percent.) Figure 6 confirms that overall employment in Germany not only grew during the Great Recession but actually grew slightly faster than it had during the previous economic expansion.

WHAT EXPLAINS THIS 'MIRACLE'?

An often-cited reason for this "German labor market miracle" is the existence of programs that promote labor "hoarding."⁹ One is the short-time work program. When employees' hours are reduced, the participating firm pays wages only for those reduced hours, while the government pays the workers a "short-time allowance" that offsets 60 percent to 67 percent of the forgone earnings.¹⁰ Moreover, the firm's social insurance contributions on behalf of employees in the program are lowered. In general, a firm can use this program for at most six months. At the beginning of 2009, though, when the slowdown of the economy became apparent, the German government encouraged the use of the program by expanding the maximum eligibility period first to 18 months and then to 24 months and by further reducing the social security contribution rate. The usual eligibility requirements were also relaxed.

An important thing to remember here is that these special rules had also been applied in past recessions and thus were not so special after all.¹¹ True, the share of workers in the program increased sharply in 2009, and

⁹ See, for example, the article by Graef and Schneider.

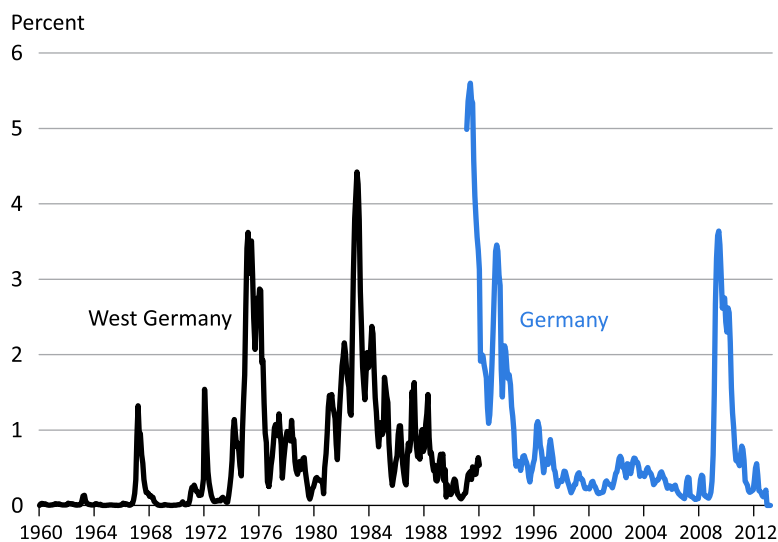
¹⁰ Workers receive the allowance from their employers, who are then reimbursed by their local employment agency.

¹¹ See the article by Jens Boysen-Hogrefe and Dominik Groll for more details.

FIGURE 7

2009 Spike in Job-Saving Programs Was Typical of Recessions

Share of German workers in short-time work programs.



Source: Federal Employment Agency of Germany.

thus it certainly helped reduce the impact of the Great Recession on German employment (Figure 7). But a more important observation is that even at its peak during the Great Recession, participation in the program was not extraordinary compared with the levels observed in past recessions. Moreover, in previous recessions, the German labor market had responded in a similar manner to the U.S. labor market.

Another German program that some have credited with staving off high unemployment is the working-time account, which allows employers to increase working hours beyond the standard workweek without immediately paying overtime. Instead, those excess hours are recorded in the working-time account as a surplus. When employers face the need to cut employees' hours in the future, they can do so without reducing workers' take-home pay by tapping the surplus account. German firms overall came into the recession with surpluses in

these accounts. Thus, qualitatively speaking, this program certainly reduced the need for layoffs. However, less than half of German workers had such an account, and most working-time accounts need to be paid out within a relatively short period — usually within a year or less.¹² According to Michael Burda and Jennifer Hunt, the working-time account program reduced hours per worker by 0.5 percent in 2008-09, accounting for 17 percent of the total decline in hours per worker in that period.

WHY WAS THE GREAT RECESSION DIFFERENT?

The evidence above clearly casts doubt on the argument that Germany's stronger job protections were responsible for its labor market's muted response to the Great Recession. The question, then, is why German firms

¹² See the article by Peter Ellguth, Hans-Dieter Gerner, and Ines Zapf.

responded differently — not only from U.S. firms but also from their own past behavior. Let us first point out that there had been a strong upward trend in German employment leading up to the Great Recession. In Figure 8, one can see that the overall employment level had been generally stagnant from 1991 until just before 2005. However, since then, employment has grown steadily. The Great Recession barely affected this trend. We saw in Figure 5 that the share of firms expanding their work forces during 2008-10 was higher than during 2005-07, while Figure 8 illustrates how the longer-term trend has drifted upward starting a bit before 2005.

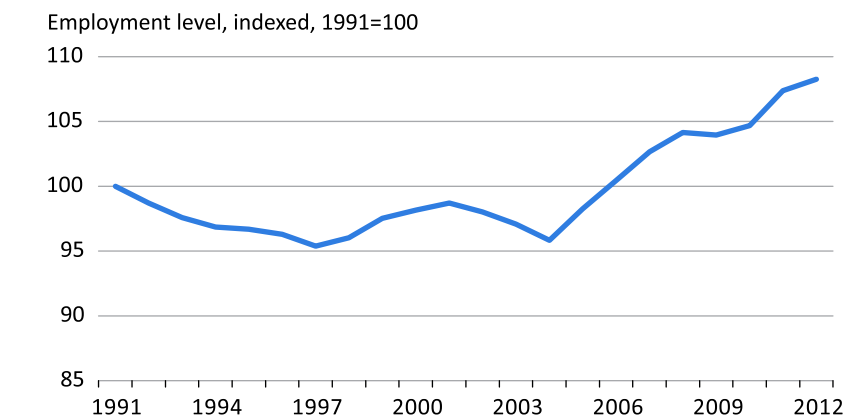
This underlying upward trend since the mid-2000s masked the negative impact of the Great Recession in Germany. We argue that the underlying upward trend was made possible by labor market policies called the Hartz reforms, implemented in 2003-05. The literature has emphasized the role that the reforms played in the moderation of labor costs. (See the adjoining discussion, *Germany's Hartz Labor Market Reforms*.)

The most important part of the reforms was the reduction in unemployment benefits. With less generous benefits, workers will tend to accept job offers they would have tended to reject when collecting unemployment benefits was more financially advantageous. This means that firms can hire workers at lower wages, thereby stimulating job creation. Moreover, job protections and the regulation of temporary employment agencies and fixed-term labor contracts were also significantly relaxed, making the labor market more flexible.

While there is no study directly quantifying the impact of the reforms on firm-level employment decisions, some researchers have shed some light on this issue by examining the changes in overall wages, employment, and out-

FIGURE 8

Jobs Rose Steadily Well Before Great Recession **German employment trend, 1991-2012.**



Source: EU Labor Force Survey.

Germany's Hartz Labor Market Reforms

Persistently high unemployment in Germany since the 1990s led German society to recognize the urgent need to reform its labor market. To stimulate job creation by reducing labor costs, a series of labor market policies called the Hartz reforms were put into place between 2003 and 2005. The Hartz reforms are regarded as one of the most important social reforms in modern Germany.

The most important change was in the unemployment benefit system. Before the reforms, when workers became jobless, they were eligible to receive benefits equal to 60 percent to 67 percent of their previous wages for 12 to 32 months, depending on their age. When these benefits ended, unemployed workers were eligible to receive 53 percent to 57 percent of their previous wages for an unlimited period. Starting in 2005, the entitlement period was reduced to 12 months (or 18 months for those over age 54), after which recipients could receive only subsistence payments that depended on their other assets or income sources. Moreover, unemployed workers who refused reasonable job offers faced greater and more frequent sanctions such as cuts in benefits.

To further lower labor costs and spur job creation, the size of firms whose employees are covered by unemployment insurance was raised from five to 10 workers. Also, regulation of temporary contract workers was relaxed. Furthermore, starting in 2004, the German Federal Employment Agency and the local employment agencies were reorganized with a stronger focus on returning the unemployed to work and by, for example, outsourcing job placement services to the private sector.

The Hartz reforms leave untouched the system of wage negotiations, in which labor unions play an important role. However, it is conceivable that the Hartz reforms, together with the generally declining trends of union membership and the number of workers covered by collective bargaining contracts, have played an important role in wage moderation.

put before and after the reforms. For example, some studies show that the wage moderation prior to the Great Recession had played an important role in stabilizing the employment response during the recession years.¹³ An econometric study by Jens Boysen-Hogrefe and Dominik Groll finds that the actual employment response in the Great Recession was too small, relative to what is implied by the past relationship between output and employment, and that once wage growth is incorporated into the analysis, their model explains the “miraculous” employment response fairly well. In other words, in the boom leading up to the Great Recession, wage growth was much more muted than during previous booms, and thus this wage moderation was an important factor in creating the upward trend in employment.

The literature points out another factor that contributed to the muted employment response in the Great Recession: The recession in Germany was brought about by a different shock than that which triggered the recession in the U.S.¹⁴ The U.S. economy

suffered a decline in domestic demand as the plunge in home values reduced households’ net wealth, whereas Germany had experienced no housing bubble. Instead, the decline in German output was driven by a short-term plunge in world trade. Whether a recession is expected to be short or long-lasting is an important factor in firms’ hiring and firing decisions. If a firm expects a downturn to last only a short period, it may well choose not to cut its work force, even though it faces lower demand, especially if laying off and hiring workers is costly, as it is in Germany. Consistent with this possibility, Burda and Hunt point out anecdotal evidence that, especially by 2009, German firms were reluctant to lay off their workers because of the difficulty in finding suitable replacements.

CONCLUSION

Job protection programs in Germany cannot be the main cause of the “German labor market miracle” for a simple reason: These programs have existed for a long time in Germany, while the muted response of German employment during the Great Recession was at odds not just with the U.S. labor market response but with its own history.

The literature has suggested sev-

eral plausible reasons why the German labor market response was different this time. First, the Great Recession was perceived in Germany to a short-lived, albeit sharp, shock that was external to the German economy. Second, labor market reforms in 2003-05 provided the basis for a strong underlying trend of expanding employment, masking the negative impact from the Great Recession. There is no doubt that government policies, such as the short-time work program and working-time accounts, helped German firms weather the storm in 2008-09. But it may well be that those programs were effective only because the labor market reforms had already been put into effect prior to the Great Recession and because the decline in demand was brought about by a short-term shock.

The analysis in this article suggests that it is misleading, or at least premature, to say that similar job protection policies would work well in the U.S. Indeed, it is well established in the economics literature that stronger job protections can dampen overall employment and productivity in the long run.¹⁵ 

¹³ See Hermann Gartner and Sabine Klinger (2012), and Gartner and Christian Merkl (2011).

¹⁴ See, for example, the paper by Burda and Hunt.

¹⁵ See Hopenhayn and Rogerson, 1993.

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Should Defaults Be Forgotten? Evidence from Variation in Removal of Negative Consumer Credit Information

Practically all industrialized economies restrict the length of time that credit bureaus can retain borrowers' negative credit information. There is, however, a large variation in the permitted retention times across countries. By exploiting a quasi-experimental variation in this retention time, the authors investigate what happens when negative information is deleted earlier from credit files. The authors find that the loss of information led banks to tighten their lending standards significantly as the expected retention time was diminished from on average three-and-a-half to three years exactly. Simultaneously, they find that borrowers who experience this shorter retention time default more frequently. Since borrowers nevertheless obtain more net access to credit and total defaults do not increase overall, the authors cannot rule out that this reduction in retention time is optimal.

Working Paper 14-21. Marieke Bos, SOFI, Stockholm University, Federal Reserve Bank of Philadelphia Visiting Scholar; Leonard Nakamura, Federal Reserve Bank of Philadelphia. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-21.pdf.

Fiscal Policy: Ex Ante and Ex Post

The surge in fiscal deficits since 2008 has put a renewed focus on our understanding of fiscal policy. The interaction of fiscal and monetary policy during this period has also

been the subject of much discussion and analysis. This paper gives new insight into past fiscal policy and its influence on monetary policy by examining the U.S. Federal Reserve Board staff's Greenbook forecasts of fiscal policy. The authors create a real-time database of the Greenbook forecasts of fiscal policy, examine the forecast performance in terms of bias and efficiency, and explore the implications for the interaction of fiscal policy and monetary policy. The authors also attempt to provide advice for fiscal policy by showing how policymakers learn over time about the trajectory of the U.S. federal government's fiscal balance as well as the changing roles of structural and cyclical factors.

Working Paper 14-22. Dean Croushore, University of Richmond, Federal Reserve Bank of Philadelphia Visiting Scholar; Simon van Norden, HEC Montréal, CIRANO, CIREQ, and Federal Reserve Bank of Philadelphia Visiting Scholar. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-22.pdf.

The Impact of the Home Valuation Code of Conduct on Appraisal and Mortgage Outcomes

During the housing crisis, it came to be recognized that inflated home mortgage appraisals were widespread during the subprime boom. The New York State Attorney General's office investigated this issue with respect to one particular lender and Fannie Mae and Freddie Mac. The investigation resulted in an agreement between the Attorney General's office, the government-sponsored enterprises (GSEs), and the Federal Housing Finance Agency (the GSEs' federal regu-

lator) in 2008, in which the GSEs agreed to adopt the Home Valuation Code of Conduct (HVCC). Using unique data sets that contain both approved and nonapproved 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 reduced the probability of inflated valuations and induced a significant increase in low appraisals. The HVCC also made it more difficult to obtain mortgages in the aftermath of the financial crisis.

Working Paper 14-23. Lei Ding, Federal Reserve Bank of Philadelphia; Leonard Nakamura, Federal Reserve Bank of Philadelphia. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-23.pdf.

Liquidity, Trends, and the Great Recession

The authors study the impact that the liquidity crunch in 2008-2009 had on the U.S. economy's growth trend. To this end, the authors propose a model featuring endogenous productivity a la Romer and a liquidity friction a la Kiyotaki-Moore. A key finding in the authors' study is that liquidity declined around the Lehman Brothers' demise, which led to the severe contraction in the economy. This liquidity shock was a tail event. Improving conditions in financial markets were crucial in the subsequent recovery. Had conditions remained at their worst level in 2008, output would have been 20 percent below its actual level in 2011. The authors show that a subsidy to entrepreneurs would have gone a long way toward averting the crisis.

Working Paper 14-24. Pablo A. Guerron-Quintana, Federal Reserve Bank of Philadelphia; Ryo Jinnai, Texas A&M University. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-24.pdf.

Credit Access After Consumer Bankruptcy Filing: New Evidence

This paper uses a unique data set to shed new light on credit availability to consumer bankruptcy filers. In particular, the authors' data allow them to distinguish between Chapter 7 and Chapter 13 bankruptcy filings, to observe changes in credit demand and credit supply explicitly, and to differentiate existing and new credit accounts. The paper has four main findings. First, despite speedy recovery in their risk scores after bankruptcy filing, most filers have much reduced access to credit in terms of credit limits, and the impact seems to be long lasting (well beyond the discharge date). Second, the reduction in credit access stems mainly from the supply side as consumer inquiries recover significantly after the filing, while credit limits remain low. Third, new lenders do not treat Chapter 13 filers more favorably than Chapter 7 filers. In fact, Chapter 13 filers are much less likely to receive new credit cards than Chapter 7 filers even after controlling

for borrower characteristics and local economic environment. Finally, the authors find that Chapter 13 filers overall end up with a slightly larger credit limit amount than Chapter 7 filers (both after the filing and after discharge) because they are able to maintain more of their old credit from before bankruptcy filing. The authors' results cast doubt on the effectiveness of the current bankruptcy system in providing relief to bankruptcy filers and especially its recent push to get debtors into Chapter 13.

Working Paper 14-25. Supersedes Working Paper 13-24. Julapa Jagtiani, Federal Reserve Bank of Philadelphia; Wenli Li, Federal Reserve Bank of Philadelphia. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-25.pdf.

Agglomeration and Innovation

This paper reviews academic research on the connections between agglomeration and innovation. The authors first describe the conceptual distinctions between invention and innovation. They then discuss how these factors are frequently measured in the data and note some resulting empirical regularities. Innovative activity tends to be more concentrated than industrial activity, and the authors discuss important findings from the literature about why this is so. The authors highlight the traits of cities (e.g., size, industrial diversity) that theoretical and empirical work link to innovation, and they discuss factors that help sustain these features (e.g., the localization of entrepreneurial finance).

Working Paper 14-26. Gerald Carlino, Federal Reserve Bank of Philadelphia; William R. Kerr, Harvard University, Bank of Finland, NBER. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-26.pdf.

Reverse Mortgage Loans: A Quantitative Analysis

Reverse mortgage loans (RMLs) allow older homeowners to borrow against housing wealth without moving. Despite growth in this market, only 2.1% of eligible homeowners had RMLs in 2011. In this paper, the authors analyze reverse mortgages in a calibrated life-cycle model of retirement. The average welfare gain from RMLs is \$885 per homeowner. The authors' model implies that low-income, low-wealth, and poor-health households benefit the most, consistent with empirical evidence. Bequest motives, nursing-home-move risk, house price risk, and loan costs all contribute to the low take-up. The Great Recession may lead to increased RML demand, by up to 30% for the lowest-income and oldest households.

Working Paper 14-27. Supersedes Working Paper 13-27. Makoto Nakajima, Federal Reserve Bank of Philadelphia; Irina A. Telyukova, University of California–San Diego. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-27.pdf.

Identity Theft as a Teachable Moment

This paper examines how instances of identity theft that are sufficiently severe to induce consumers to place an extended fraud alert in their credit reports affect their risk scores, delinquencies, and other credit bureau variables on impact and thereafter. We show that for many consumers these effects are relatively small and transitory. However, for a significant number of consumers, especially those with lower risk scores prior to the event, there are more persistent and generally positive effects on credit bureau variables, including risk scores. We argue that these positive changes for subprime consumers are consistent with the effect of increased salience of credit file information to the consumer at the time of the identity theft.

Working Paper 14-28. Julia Cheney, Federal Reserve Bank of Philadelphia; Robert Hunt, Federal Reserve Bank of Philadelphia; Vyacheslav Mikhed, Federal Reserve Bank of Philadelphia; Dubravka Ritter, Federal Reserve Bank of Philadelphia; Michael Vogan, Federal Reserve Bank of Philadelphia. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-28.pdf.

Analyzing Data Revisions with a Dynamic Stochastic General Equilibrium Model

The authors use a structural dynamic stochastic general equilibrium model to investigate how initial data releases of key macroeconomic aggregates are related to final revised versions and how identified aggregate shocks influence data revisions. The analysis sheds light on how well preliminary data approximate final data and on how policymakers might condition their view of the preliminary data when formulating policy actions. The results suggest that monetary policy shocks and multifactor productivity shocks lead to predictable revisions to the initial release data on output growth and inflation.

Working Paper 14-29. Dean Croushore, University of Richmond; Keith Sill, Federal Reserve Bank of Philadelphia. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-29.pdf.

Microeconomic Uncertainty, International Trade, and Aggregate Fluctuations

The extent and direction of causation between micro volatility and business cycles are debated. The authors examine, empirically and theoretically, the source and effects of fluctuations in the dispersion of producer-level sales and production over the business cycle. On the theoretical side, the authors study the effect of exogenous first- and second-moment shocks to producer-level productivity in a two-country DSGE model with heterogeneous producers and an endogenous dynamic export participation decision.

First-moment shocks cause endogenous fluctuations in producer-level dispersion by reallocating production internationally, while second-moment shocks lead to increases in trade relative to GDP in recessions. Empirically, using detailed product-level data in the motor vehicle industry and industry-level data of U.S. manufacturers, the authors find evidence that international reallocation is indeed important for understanding cross-industry variation in cyclical patterns of measured dispersion.

Working Paper 14-30. George Alessandria, University of Rochester, Federal Reserve Bank of Philadelphia, NBER; Horag Choi, Monash University; Joseph P. Kaboski, University of Notre Dame and NBER; Virgiliu Midrigan, New York University and NBER. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-30.pdf.

Credit, Bankruptcy, and Aggregate Fluctuations

The authors ask two questions related to how access to credit affects the nature of business cycles. First, does the standard theory of unsecured credit account for the high volatility and procyclicality of credit and the high volatility and countercyclicality of bankruptcy filings found in U.S. data? Yes, it does, but only if we explicitly model recessions as displaying countercyclical earnings risk (i.e., rather than having all households fare slightly worse than normal during recessions, we ensure that more households than normal fare very poorly). Second, does access to credit smooth aggregate consumption or aggregate hours worked, and if so, does it matter with respect to the nature of business cycles? No, it does not; in fact, consumption is 20 percent more volatile when credit is available. The interest rate premia increase in recessions because of higher bankruptcy risk discouraging households from using credit. This finding contradicts the intuition that access to credit helps households to smooth their consumption.

Working Paper 14-31. Makoto Nakajima, Federal Reserve Bank of Philadelphia; José-Victor Ríos-Rull, University of Minnesota, Federal Reserve Bank of Minneapolis. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-31.pdf.

The Supply and Demand of Skilled Workers in Cities and the Role of Industry Composition

The share of high-skilled workers in U.S. cities is positively correlated with city size, and this correlation strengthened between 1980 and 2010. Furthermore, during the same time period, the U.S. economy experienced a significant structural transformation with regard to industrial composition, most notably in the decline of manufacturing and the rise of high-skilled service industries. To decompose and investigate these trends, this paper develops and estimates

a spatial equilibrium model with heterogeneous firms and workers that allows for both industry-specific and skill-specific technology changes across cities. The estimates imply that both supply and demand of high-skilled labor have increased over time in big cities. In addition, demand for skilled labor in large cities has increased somewhat within all industries. However, this aggregate increase in skill demand in cities is highly concentrated in a few industries. The finance, insurance, and real estate sectors alone account for 35 percent of the net change over time.

Working Paper 14-32. Jeffrey C. Brinkman, Federal Reserve Bank of Philadelphia. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-32.pdf.

An Anatomy of U.S. Personal Bankruptcy Under Chapter 13

The authors build a structural model of Chapter 13 bankruptcy that captures salient features of personal bankruptcy under Chapter 13. The authors estimate their model using a novel data set they construct from bankruptcy court dockets recorded in Delaware between 2001 and 2002. The authors' estimation results highlight the importance of debtor's choice of repayment plan length on Chapter 13 outcomes under the restrictions imposed by the bankruptcy law. The authors use the estimated model to conduct policy experiments to evaluate the impact of more stringent provisions of Chapter 13 that impose additional restrictions on the length of repayment plans. The authors find that these provisions would not materially affect creditor recovery rates and would not necessarily make discharge more likely for debtors with income above the state median income.

Working Paper 14-33. Supersedes Working Paper 07-31. Hülya Eraslan, Rice University; Gizem Kozar, Johns Hopkins University; Wenli Li, Federal Reserve Bank of Philadelphia; Pierre-Daniel Sartre, Federal Reserve Bank of Richmond. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-33.pdf.

Sourcing Substitution and Related Price Index Biases

The authors define a class of bias problems that arise when purchasers shift their expenditures among sellers charging different prices for units of precisely defined and interchangeable product items that are nevertheless regarded as different for the purposes of price measurement. For business-to-business transactions, these shifts can cause sourcing substitution bias in the Producer Price Index (PPI) and the Import Price Index (MPI), as well as potentially in the proposed new true Input Price Index (IPI). Similarly, when consumers shift their expenditures for the same products temporally to take advantage of promotional sales or among retailers charging different per unit prices, this can cause a promotions bias problem in the Consumer Price Index (CPI) or a CPI outlet substitution bias. The authors recommend alternatives to conventional price indexes that make use of unit values over precisely defined and interchangeable product items. They argue that our proposed ideal target indexes could greatly reduce these biases and make use of increasingly available electronic scanner data on prices and quantities. The authors also address the challenges national statistics agencies must surmount to produce price index measures more like the specified target ones.

Working Paper 14-34. Alice O. Nakamura, University of Alberta; W. Erwin Diewert, University of British Columbia, University of New South Wales; John S. Greenlees, Bureau of Labor Statistics (Retired); Leonard I. Nakamura, Federal Reserve Bank of Philadelphia; Marshall B. Reinsdorf, U.S. Bureau of Economic Analysis. www.philadelphiafed.org/research-and-data/publications/working-papers/2014/wp14-34.pdf.

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"The Fed's Formative Years," www.federalreservehistory.org/Events/DetailView/16. "100 Years of Tradition and Transition," Federal Reserve Bank of Philadelphia 2013 Annual Report, www.philadelphiafed.org/publications/annual-report/2013/100-years.cfm.



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