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BEHL WORKING PAPER SERIES

WP2013-04

The Rise of Services and the Lengthening of Economic Recovery

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May 2015
(Revised from December 16, 2013)

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BEHL Working Paper WP2013-04| May 2015
http://behl.berkeley.edu/wp/2013-04

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Keywords: services, deindustrialization, economic recovery, employment,
JEL classification: E24, E32, L80, N12

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The Rise of Services and the Lengthening of Economic Recovery

By MARTHA L. OLNEY AND AARON PACITTI[1]

Abstract: *We argue that the shift to a service-producing economy in the United States has had macroeconomic repercussions not previously considered, lengthening recovery from recessions. The effect operates through anticipations and export channels. Using a model that distinguishes between goods and services, and testing it with U.S. state-level employment data for post-1960 recessions, we find that increased production of services relative to goods lengthens trough-to-peak recoveries. We also find limited evidence that increased services lengthens and deepens peak-to-trough downturns. The rise in service production in the United States over the last half-century lengthens the recovery from recessions by about 75 percent.*

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Recovery from recessions in the United States takes longer today than in the past. This change has not happened because recessions are longer. Nor has it occurred because recessions are deeper than in the past. Instead we show that the lengthening of economic recoveries is due to what some have termed deindustrialization: the shift of production out of goods and into services.

Our argument focuses on what happens at the trough of a business cycle. Goods-

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producing businesses can increase production in *anticipation* of future demand, increasing their inventory holdings, spurring increased incomes and, through a multiplier effect, further increasing output and spending. This inventory cycle is a long-known characteristic of recessions and recoveries. Services, however, have no inventory cycle. Services can only be produced in response to actual—not anticipated—demand. The greater the share of services in the economy, the greater the share of businesses that must wait for demand to actually pick up before they can increase production. In the extreme, a wholly service-dependent economy will remain depressed with no source of increased incomes, spending, production, and employment.

An exports channel reinforces this anticipations channel. Consider the division between tradables and non-tradables. External demand can spur a recovery when an economy produces tradables. But recovery in an economy that produces mostly non-tradables depends primarily on increased internal demand. Most services, with the exceptions of tourism and finance, are not tradable. Therefore the rise of the service sector reduces the size of the tradable sector, reducing the role for external demand in spurring a recovery in output and employment, thus slowing recovery.

These two explanations support each other. Because services cannot be produced ahead of demand, there is no role for anticipations. And because most services cannot be exported, there is little role for external demand. The more services an economy produces, the longer it takes for a recovery to take hold. A service-based economy stalls out with no way to restart its engine.

Our argument is about behavior at the business cycle trough, not the peak. Neither the anticipations nor the exports channel would affect downturns. But, nevertheless, is there empirical evidence that there is a symmetrical effect in the downturn, that service-based

economies also have longer but more shallow recessions? Here the evidence is decidedly mixed. With a restricted sample and with only moderate statistical significance, we find that downturns are longer and not shallower but deeper in service-heavy economies.

We present a model that distinguishes between goods and services, and between foreign and domestic demand. We test our hypothesis using a panel of state-level employment data for the United States covering the 5 recessions between 1969 and 2001.[2] Our results confirm our hypothesis and are robust to alternative specifications: the higher is the share of services, the slower is the economic recovery. The *marginal* effect of the increased share of services in the U.S. economy over the last half-century lengthens recovery by about 75 percent.[3] In other words, a recovery that would have lasted 6 months in the 1950s will last over 10 months today. Recovery from the 2007-09 recession, which would have unfolded in just over 2 years in the 1950s, in fact lasted over 4 years.

I. Background and Literature

A. The Pace of Recovery

The four longest recoveries since 1948 also have been the four most recent recoveries—those that followed the recessions of 1981, 1990, 2001, and 2007.[4] The pace of recovery has been the focus of a great deal of research, particularly since the end of the Great Recession in 2009.

[2] We omit the cycle that began in 2007 from our empirical analysis because, although at the national level employment has recaptured its previous peak, the recovery is not yet complete for many states.

[3] We are not arguing that the most recent recession was deep and long and the recovery slow only because of rising service production. The recovery from the 2007 recession has been painfully long because the combination of the popping of the housing bubble and the ensuing financial crisis in 2008 created a deep recession. Our argument is a marginal one; that the rise of services since the 1950s made today's recovery about 75 percent longer than it would have been had the same downturn transpired in the 1950s.

[4] Where possible, we include the 2007-09 recession in our figures and tables for expository purposes. However, in our regression analysis, which is at the state level, we omit the cycle that began in 2007 because it is not yet complete for many states.

We are apparently the first to link the pace of recovery to the rise of services.

Recoveries are longer both absolutely and relative to the length of the downturn. In Table 1 we compare the number of months it takes nonfarm employment to recover to its previous business cycle peak—what we call the employment cycle—with the downturn length. The employment cycle is the sum of two parts: the employment downturn—the number of months from the previous employment peak to trough—and the employment recovery—the number of months from the trough until employment reaches its previous peak. Whether compared with the employment downturn or the NBER-dated recession length, since 1980 employment cycles and recoveries have lengthened relative to downturns.

< Table 1 here>

What might cause the lengthening of recoveries? One argument is that the past three recessions—1990, 2001, and 2007—have not been caused by contractionary monetary policy trying to reduce inflation, so recoveries can no longer start abruptly once the Fed begins to reduce interest rates (Hall 2007). Gali, Smets, and Wouters (2012) and Smets and Wouters (2007) argued that adverse demand shocks during recoveries since 1990—lower investment spending, and less expansionary fiscal and monetary policy—have slowed recoveries. Credit booms in an expansion can lead to more severe recessions and slower recoveries (Jorda, Schularick and Taylor 2013). Depressed credit conditions (Kannan 2012) can also lead to lead to permanent output losses (Cerra and Saxena 2008).

Other work focuses directly on the slow post-2009 recovery. Lazear and Spletzer (2012) argued that the issue is not *jobless* recoveries, but *slow* recoveries: the problem after 2009 "is not that the labor market is underperforming; it is that the [output] recovery has been very slow" (p. 33). The large decrease in aggregate demand has caused firms to reduce their recruiting intensity,

slowing employment growth (Davis, Faberman and Haltiwanger 2012). The rapid rise in household debt during the 2001-07 expansion is unwinding, leading to massive deleveraging, which depresses aggregate demand and increases unemployment (Mian and Sufi 2012). Geographic and industry mismatch is argued to have increased unemployment, or slowed its fall, by decreasing the job-finding rate (Sahin et al. 2012). The unprecedented rise in unemployment duration since 2007 can send negative signals to employers about the employability of long-term unemployed job seekers, leading to "duration dependence," or a positive feedback loop among the unemployed (Notowidigdo, Kroft, and Lange 2013). Policy changes, such as the extension of unemployment insurance benefit duration (Rothstein 2011), the rise of government transfers (Mulligan 2012), and uncertainty of policy direction (Baker, Bloom, and Davis 2012) are also argued to have negatively affected employment patterns during the current recovery.

But these explanations do not address more secular trends. Stock and Watson (2012) offered evidence that the recoveries in the 21st century will become increasingly slow because of slowing trend GDP growth, the slowdown in employment growth due to the plateauing of female labor force participation and the decline in male labor force participation, and real wage stagnation stemming from rising income inequality (Saez, Slemrod, and Giertz 2012) and skill mismatch (Goldin and Katz 2008). Basu and Foley (2013) found that employment has responded weakly to changes in output since the early 1980s, which has slowed recoveries, but argued that this change has been caused by measurement issues, such as overstating value-added in the service sector—especially the finance, insurance, and real estate sectors (FIRE)—because NIPA estimates of services output are imputed from income.

The above analyses use national data, which can obscure important variation between states. Blanchard and Katz (1992) for the 1947-1990 sample and Notowidigdo (2011) for the

1980-2000 sample found that firm relocation followed by labor relocation—outward migration of workers from contracting states and inward migration of workers to expanding states—is how states adjusted to shocks. For example, rapid employment growth in mining states since the late 1990s has led to firm creation and expansion, causing outflows of labor from depressed industrial states like Ohio and Michigan, and inflows of labor to states like North Dakota and Wyoming.

Using MSA-level data, Charles, Hurst, and Notowidigdo (2013) found that the decline of the manufacturing sector increased non-employment—unemployment plus workers dropping out of the labor force—between 2000 and 2011. About 40 percent of the rise in non-employment since 2000 was caused directly by the decline in manufacturing employment, but was offset by housing-bubble related increases in employment. The structural shift from goods production to service production has adversely affected employment patterns, but these authors do not specifically analyze the behavior of employment during recoveries.

The primary takeaway is that changing employment patterns and slow recoveries are the new norm, and multiple forces are acting to lengthen recovery time from downturns. We argue, however, that the existing literature overlooks an important secular trend that affects the pace of recovery: the rise of the service sector.

B. The Service Sector

An ever-increasing share of the economy over the past 60 years is services, as shown in Figure 1.[5] In 1950, just under 40 percent of expenditures for U.S. GDP were for services. By 2010, services constituted just under 65 percent of expenditures for GDP. Over the same period,

[5] The secular rise in services is equally evident in value-added as a share of total or private GDP, and in employment shares.

service-producing jobs rose from 48 to nearly 70 percent of employment.

<Figure 1 here>

The service sector is quite heterogeneous, encompassing a wide range of activities. Figure 2 shows employment in several sub-categories of services, expressed as a share of total employment.[6] Strong growth over the last half century is seen in health care, retail trade and restaurants, and "all other services."[7] In contrast to received wisdom, there is only moderate growth in employment in the finance, insurance, and real estate (FIRE) sector. Little change was evident in several categories not shown in the figure: legal services, education, accommodations, wholesale trade, and transportation.[8]

<Figure 2 here>

There are "bad" service jobs with low pay, no benefits, and job insecurity, and there are "good" service jobs with high pay, good benefits, and job security. To group service sub-sectors, we used wage and salary accruals per full-time equivalent (FTE) worker. "Median-pay jobs" are those that fell within 5 percent of the overall median wage per FTE worker in 1950 and in 2010. "High-pay service jobs" had wages more than 5 percent above the overall median and "low-pay service jobs" had wages more than 5 percent below the overall median. Goods-producing jobs, largely construction and manufacturing, are nearly all high-pay jobs.

[6] The breaks in 1998-2000 are necessitated by the change in classification strategies. The NAICS (North American Industry Classification System) replaced the SIC (Standard Industrial Classification) in the late 1990s. A great number of activities were shifted from one category to another, some even moving between services and manufacturing. Three years, 1998-2000, overlap the two systems. In some sub-sectors, it is relatively easy to closely match the SIC and NAICS categories. Figure 2 is restricted to the categories for which there was a reasonably close match between 2-digit SIC and NAICS.

[7] "All other services" excludes legal services, education, accommodations, wholesale trade, and transportation, as well as the categories shown in Figure 2: FIRE, health, retail trade and restaurants.

[8] Moretti (2012) focuses on "high tech" as illustrative of the rise of services. There is not just one category high tech in either the SIC or the NAICS systems. The BLS list of high tech industries comprised 27 manufacturing and 4 service industries under SIC codes, and 29 manufacturing and 10 service industries using NAICS codes (NSF 2004, p. 8-54).

Again in contrast to received wisdom, the rise of the service sector is not simply an increase in "bad" jobs. But as seen in Figure 3, nor is it a wash. Goods-producing jobs dropped precipitously over the last sixty years. Employment in high-pay service jobs—FIRE and legal—did not offset the drop in manufacturing and construction jobs but rose only slightly. Employment in low-pay service jobs—retail trade and restaurants, accommodations, educators—increased moderately. Employment in service jobs that pay within 5 percent of the overall median—transportation, health services, and all other services—nearly doubled as a share of total employment.

<Figure 3 here>

There are a number of hypotheses, most of which reinforce each other, explaining the secular increase in service production and employment. Jorgensen and Timmer (2011) documented the rise of service production and decline in goods production in the European Union, United States, and Japan for 1980-2005 and attribute the trends to the increased availability and use of skilled labor, and the "knowledge intensification of production" (p. 18). Older literature, especially Stigler (1956), Kuznets (1957), Baumol (1967), Fuchs (1968), and Maddison (1987) explain the rise of services similarly as a result of biased productivity growth rates and non-homothetic preferences, or higher income elasticities of demand for services. Rowthorn and Ramaswamy (1999) used an international panel data set for 1963-1994 to argue that the rise of services is due more to internal factors—faster productivity growth in manufacturing and rising incomes coupled with higher income elasticity of demand for services than for goods—than to external factors, such as import substitution from low-wage manufacturing countries. Buera and Kaboski (2012) explained the rise of services, particularly after 1980, as a result of rising productivity and the subsequent rise in the wage premium to

skilled workers, raising the opportunity cost of household production, leading to increased demand for services which substitute for home production.

The key point to be drawn about the rise of services is that it is a secular trend and is not itself determined by the business cycle. We argue, however, that the reverse is true: that the business cycle is affected by the rise of services.

II. Model

A simple model captures our thesis that the rise of services lengthens the recovery phase of the business cycle. The key insight comes from distinguishing between the production of goods and of services, and between domestic and foreign demand. Two features of services account for the lengthening of recoveries: services cannot be inventoried and opportunities for exporting services are limited.[9]

A standard relationship connects inventory (Inv), production (Q) and sales:

$$Inv_t = Inv_{t-1} + Q_t - Sales_t \tag{1}$$

where Inv_t is inventory holdings at the end of period *t*, and Q_t and $Sales_t$ are production and sales during period *t*. This standard form suggests inventory holdings are a residual (Blinder and Maccini 1991). In our model we start from the equivalent relationship

$$Q_t = Sales_t + \Delta Inv_t \tag{2}$$

Equation (2) suggests inventory change is deliberate.

Production and sales occur in two sectors: goods (g) and services (s). Sales are the sum of domestic (DS) and foreign (FS) sales. Thus equation (2) becomes

$$Q_t = Q_t^g + Q_t^s = \left(DS_t^g + FS_t^g + \Delta Inv_t^g\right) + \left(DS_t^s + FS_t^s + \Delta Inv_t^s\right) \tag{3}$$

When output is produced in anticipation of future demand, firms accumulate inventory.

[9] Jensen and Kletzer (2005) offer an empirical strategy for identifying which service sectors are potentially tradable.

Goods producers not only can, but indeed want to produce ahead of demand. Firms face a tradeoff between "stockouts"—when consumers confront empty shelves—and surplus inventory. Whereas surplus inventory can be carried over and sold once demand increases, stockouts reduce not only current sales but also future sales due to lower customer goodwill and loyalty (Kahn 1987, Wen 2005). Optimizing firms will accumulate inventory to avoid stockouts because the cost of a stockout is typically greater than the cost of surplus inventory.

Service producers, on the other hand, cannot produce ahead of demand. A restaurant cannot produce a meal weeks in advance; you have to be in the booth. A dentist cannot produce and inventory a teeth cleaning; you have to be in the dentist's chair. A service producer must wait until the customer is present—that is, until demand actually appears—in order to produce.

Because services cannot be inventoried, ΔInv_t^s is equal to 0. Rearranging slightly, total output is therefore equal to

$$Q_t = DS_t^g + DS_t^s + FS_t^g + FS_t^s + \Delta Inv_t^g \tag{4}$$

The level of production in period t depends on domestic and foreign sales of goods and of services, and changes in inventory holdings of goods.

Application of growth rules yields

$$g(Q_t) = \frac{DS_t^g}{Q_t} g\left(DS_t^g\right) + \frac{DS_t^s}{Q_t} g(DS_t^s) + \frac{FS_t^g}{Q_t} g\left(FS_t^g\right) + \frac{FS_t^s}{Q_t} g(FS_t^s) + \frac{\Delta Inv_t^g}{Q_t} g\left(\Delta Inv_t^g\right) \tag{5}$$

Growth in output $g(Q_t)$ reflects the combination of the growth rates of the five components of output and each component's share in total output. Recovery from a business cycle trough requires positive growth of output: $g(Q_t) > 0$. Not all five components of output grow at the same rate. Moderate growth in a large component—2 percent growth in a component that accounts for 50 percent of the economy—or quite rapid growth in a small component—50 percent growth in a component that accounts for just 2 percent of the economy—will produce

equal increases in $g(Q_t)$.

Four empirical observations for the United States are relevant. First, domestic sales of goods and of services are by far the two largest components of GDP, but their shares change dramatically over time. Second, the change in shares matters because the growth rates of those two sectors over the first year of recovery differ. Third, services require very few goods as inputs. Fourth, inventory change plays an outsize role in the early phase of recovery.

The shares of U.S. nominal GDP over the last 60 years are shown in Figure 4. Domestic sales of goods and of services exhibit opposite secular trends. Foreign sales of goods and of services more than doubled as shares of total output over time but remain less than 10 percent of total output. Inventory change is a negligible share of total output on average over time.

<Figure 4 here>

If the growth rates of domestic sales of goods and of services were approximately the same in the early phases of recovery, the change in their shares of total output would be immaterial. But the growth rates differ. Between 1954 and 1982, real domestic sales of goods typically grew at least twice as fast in the first year of recovery as did domestic sales of services: average one-year real growth following a trough is 6.8 percent for goods but only 3.2 percent for services. All else constant, the shift toward greater production of services therefore slows the growth rate of output in recovery.

If production of services required goods inputs, then recovery might not be slowed by the rise in services: a service producer anticipating increased demand would inventory goods inputs, spurring recovery. But production of services requires relatively few goods inputs as seen in Table 2, which uses input-output tables from the Bureau of Economic Analysis to provide estimates of the contributions to total output from primary inputs (agriculture and mining),

manufactured inputs (goods), services, and value added. Over 90 percent of the value of services represents either service inputs or value added by producers.[10] Preparing to produce services tomorrow is unlikely to spur a recovery today because less than 8 percent of inputs to services production are goods.

<Table 2 here>

Inventory change is a tiny share of total output, as seen in Figure 4, but its growth rate following a trough is so large that it can drive recovery. For each of the first four quarters of recovery, we calculated the share of total nominal GDP growth attributable to each of the five sources we highlight in our model: domestic sales of goods and of services, foreign sales of goods and of services, and changes in goods inventories.[11] Highlighting in Table 3 shows which source made the largest contribution to growth in nominal GDP. The recoveries before the 1970s relied on domestic sales of goods. Recoveries since 1982 have relied almost exclusively on domestic sales of services. Inventory change was the lead contributor to growth in at least one quarter in 4 of the first 5 recoveries, but did not take the lead role in 1975, 1982, or 1991.

<Table 3 here>

Table 3 also shows the contribution to output growth of each of the five sources over the entire first year of a recovery. The contributions reflect the combination of each source's share in total output and its growth rate. Inventory accumulation typically accounts for about 20 percent of post-trough growth. With the notable exception of post-2009, exports play a small role.

[10] As a side note, the rise of services inputs went hand-in-hand with the decline of value added in goods production in the 1980s and 1990s, a pattern consistent with the practice of contracting out. When goods producers hire an accounting firm rather than employ their own in-house accountants, services inputs rise and value added declines.

[11] Because we are looking at shares, the use of nominal GDP is not problematic. We use nominal rather than real GDP for two reasons. First, data on real values of exports of goods and services are not available before 1999. Second, use of the chain weighting method to calculate real values means we cannot compare across categories.

Services had provided about 40 percent of growth in the 1960s, 1970s, and 1980s, but was responsible for over 65 percent subsequently. The standout development is in goods production: whereas before 1990 domestic sales of goods accounted for 40 to 50 percent of output growth in the first year of a recovery, in recent business cycles, goods sales are dragging down rather than boosting recovery.

From Output to Employment

In our empirical work in Section 3 we analyze state-level data on total employment, not total output. We make this change due to data availability: output data are available at the state level only quarterly but employment data are available monthly for all states for all years since 1963. Output (Q) and employment (E) are related via labor productivity:

$$g(E) = g(Q) - g\left(\frac{Q}{E}\right) \tag{6}$$

While the downward trend in labor productivity growth from the 1960s to the 1980s is a well-known phenomenon, we are interested in only the recovery phase of the business cycle. The growth rate of labor productivity in the four quarters following a business cycle trough shows no trend.[12] Because the growth rate of labor productivity in the early phases of economic recovery is not systematically changing over time, changes in the growth rate of employment will reflect the same factors highlighted in the model above: the combination of the growth rates of the five components of output and each component's share in total output.

III. Empirical Analysis

We analyze a panel of state-level employment data for the 5 recessions from 1969 to 2001. We treat the 1980 and 1981-82 double-dip recession as one single business cycle because at the state

[12] The values range from 1.5 (1991) to 6.6 (1949), average 3.5 percent, and show no statistically significant time trend. We checked the full sample, omitted 1949, omitted 2009, and omitted pre-1960. In all cases the p-value on the coefficient on a time trend never fell below 0.26.

level there were not fifty double-dip recessions but fifty variously-timed single recessions (Basu and Foley 2013). Our analysis starts with the 1969 recession because complete state-level GDP data by sector begin in 1963. We omit the 2007-09 downturn because the recovery is not yet complete for many states. We find that states with large service sectors experience longer and slower economic recoveries.

We estimate the following equation by OLS

$$Y_{st} = \beta_0 + \beta_1 \frac{\sum_{i=0}^{2}\left(\frac{services}{GDP}\right)_{s,t-i}}{3} + \beta_2 depth_{st} + \beta_3 length_{st} + \alpha_s + \gamma_t + e_{st} \quad (7)$$

where Y_{st} is either the full employment cycle (peak-to-previous peak) or recovery length (trough-to-previous peak) measured in months for state *s* in recession *t*; $\left(\frac{services}{GDP}\right)_{s,t-i}$ is a state-specific variable averaged over the three years ending in the first year of recession; depth measures the percentage change in employment from peak to trough; length is the number of months from peak to trough, and α_s and γ_t capture state and recession fixed effects. Robust errors are clustered by state.

In alternative specifications we include the shares of GDP for all sectors, not just the services share. In those cases, we estimate the following equation by OLS:

$$Y_{st} = \beta_0 + \sum_{j=1}^{n-1} \beta_j \frac{\sum_{i=0}^{2}\left(\frac{sector_j}{GDP}\right)_{s,t-i}}{3} + \delta_2 depth_{st} + \delta_3 length_{st} + \alpha_s + \gamma_t + e_{st} \quad (8)$$

where *j* indexes *n-1* of the *n* sectors in the economy.

State-level analysis allows us to exploit the large heterogeneity in service production between states. Our approach follows the growing literature that uses regional variation within the United States to explain macroeconomic issues (e.g. Autor, Dorn, and Hanson 2013; Chodorow-Reich et al. 2012; Clemens and Miran 2012; Nakamura and Steinsson 2014; Wilson 2012). State fixed effects capture state-level characteristics and policies plus other unobserved

heterogeneity across states. Recession fixed effects capture recession-specific characteristics, including federal fiscal and monetary policies that affect all states more-or-less equally, as well as the 1980s adoption of just-in-time inventory techniques (McCarthy and Zakrajsek 2007).

A. Dependent Variables: Recovery Length and Employment Cycle Length

Our measures of cycle length are drawn from the Bureau of Labor Statistics "State and Metro Area Employment, Hours, & Earnings" establishment survey for seasonally adjusted nonfarm employment.[13] Downturn length—peak to trough, or P2T—is the number of months it takes nonfarm employment to reach the trough from the peak. Recovery length—trough to previous peak, or T2P—is the number of months it takes nonfarm employment to recover its previous cycle peak once employment has reached the trough. Employment cycle length—peak to previous peak, or P2P—is the sum of downturn length and recovery length, and is the number of months from the cycle peak until nonfarm employment recovers that previous peak.

Because state downturns do not necessarily follow exactly the NBER dates for the national economy—some start earlier, some start later—we allow state downturn dates to vary from the NBER-defined start of the recession. Peaks are defined as the months where employment is at a global maximum within 12 months, plus or minus, of the NBER start date.[14] In one case—Michigan, 2001 recession—employment never reaches a trough before the next recession begins. We omit this observation from all analyses. In 10 cases, a state never recovers its previous-peak level of employment before the next downturn begins; we set the recovery and

[13] The raw data for nonfarm employment by sector were provided to the authors by the Bureau of Labor Statistics. Seasonally-adjusted and non-seasonally-adjusted data by state for 1990-2012 were provided to us. The data provided for 1960-1989 were not seasonally adjusted. The seasonal adjustment process in Eviews—the Census X12 method—replicated the difference between the not-seasonally-adjusted and seasonally-adjusted data for 1990-2012 and was therefore used to seasonally adjust the 1960-1989 data.

[14] We experimented with several approaches to identifying peaks and troughs. Details are in the discussion of our robustness checks in section IV. The reported results use the global peak and global trough for each state recession. Our results are robust to the definitions of peak and trough.

employment cycle lengths to the number of months until the next recession began, using the NBER-defined recession start date.[15] In some specifications we omit those 10 states which never recover. For states that never enter a recession, we set their cycle and recovery lengths at 0.[16]

There is substantial variation in the lengths of the employment and recovery cycles by state and over time, with much cross-state variation within any one year and a dramatic re-ordering of states by cycle length from one recession to the next. In 2001 for states that entered a recession, the recovery length ranged from 2 to 87 months. Over time, business cycle lengths in some states such as Kentucky and Alabama have worsened relative to other states, while in other states such as Rhode Island and Washington, cycle lengths have improved relative to other states.

B. Independent Variables: Services, Depth, and Length

Our key variable of interest is the services share of the economy. We start from annual state GDP data disaggregated by value added by industry.[17] We compute the three-year average of the service sector's share of GDP, ending in the year the recession began, to smooth out fluctuations that may themselves be due to the business cycle. For example, the services shares used for the 1969 recession are each state's average for 1967-69. Summary statistics for the employment

[15] Because states begin their downturns in varying months, the maximum value could be different for each state even within one recession. The states that never recover are: for the 1969-70 recession, NY; for 1980-82, LA, OK, WV, and WY; and for 2001, IL, IN, MA, MS, and OH.

[16] The states that never enter a recession are: for the 1969-70 recession, AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN; for 1973-75, AK, ID, LA, NM, ND, OK, TX, UT, WA, and WY; for 1980-82, CO and FL; for 1990-91, ID, LA, MN, TX, UT, and WA; and for 2001, WY.

[17] The transition from SIC to NAICS coding after 1997 does not affect our analysis. The recessions proximate to the 1997 switch from SIC to NAICS are the 1990-1991 and 2001 recessions, neither of which overlaps 1997. Moreover our state analysis relies on the cross-section differences between states and not the changes over time within a state. For the SIC sample (1963-1997), the service sector includes: transportation and public utilities; wholesale trade; retail trade; finance, insurance, and real estate; and [all other] services. NAICS disaggregates "all other services." For the NAICS sample (1997-2010): the service sector includes: utilities; wholesale trade; retail trade; transportation and warehousing; information; finance and insurance; real estate and rental and leasing; professional, scientific, and technical services; management of companies and enterprises; administrative and waste management services; educational services; health care and social assistance; arts, entertainment, and recreation; accommodation and food services; and other services, except government.

cycle, recovery, and services share are presented in Table 4.[18]

<Table 4 here>

As with cycle length, there is substantial variation across time, between states, and in the ordering of most-to-least service-dependent states. Nevada had the highest share of services in 1967-69 at 72 percent and its share changed little over the next 40 years, rising to 75 percent by 2005-07. Delaware saw its service share nearly double from 42 percent to 77 percent due to the relocation of financial firms, while its goods share fell over the 40-year period from 45 percent to 12 percent.[19] By 2007, Alaska, Kentucky, and South Carolina no longer had the lowest shares of services; oil-rich states Wyoming, Alaska, and Louisiana did. And although Nevada still had a very high share of services, it was no longer the most service-dependent state; by 2007, New York and Delaware were.

State GDP data do not distinguish domestic from "foreign," or in this case interstate, sales of goods and services. But some services—especially tourism and finance—are tradable, allowing external demand to spark a recovery. Las Vegas may lose all its construction jobs, but if high-rolling Midwesterners still travel to its Strip, recovery might not be slowed. Hawaii may see its military bases shuttered, but if west coast residents still rent a beachfront condo, recovery might proceed apace. Similarly, states such as New York and Delaware, which have a high share of financial services in their output, are not necessarily dependent on internally generated demand because clients in, say, California might utilize their services for pension management,

[18]An alternative approach might be to use shares of employment but state employment data by sector are incomplete for many states and years. Private correspondences with Bureau of Labor Statistics' economists confirmed the BLS does not have these data. Although state Departments of Labor might have these data, they are unlikely to be consistent with BLS data. Output-based and employment-based measures of the service share follow similar, secularly-increasing trends over time.

[19] The specific values for Nevada are likely influenced by the switch from the SIC to NAICS classification schemes. The shift for Delaware, however, is clearly a trend, independent of the classification scheme.

and thus recovery in finance-heavy states might not be slowed.

In alternative specifications we therefore create proxies for tradable and non-tradable services. We cannot directly measure interstate and international tourism, so we use NAICS subsector 721 "accommodation" —hotels and motels, RV parks, rooming and boarding houses— as a proxy for tradable tourism services.[20] Hawaii and Nevada are heavily dependent upon tourism.

We use NAICS subsector 52 "finance and insurance" as our proxy for tradable financial services.[21] Some states have particularly large finance and insurance sectors that provide interstate or international services: New York and, for post-1990 recessions, also Connecticut, Delaware, and South Dakota.

Our proxy for non-tradable services is then the remainder: total services less accommodations and finance. In our most parsimonious specifications, we omit all other sectors and examine the effect on cycle length of changes in the shares of GDP attributable to either total services or our proxy for non-tradable services. The question is then: How does the rise of the (non-tradable) service sector affect the business cycle?

In alternative specifications, we break GDP into eight sectors: non-tradable services, tradable services (accommodations and, separately, finance), goods, farming, mining, construction, and government. In each case, we calculate 3-year averages of the shares of GDP, with the average ending in the first year of the recession. We offer two specifications that use all eight sectors: one omitting the goods sector, and one omitting non-tradable services. These "all sector" regressions allow us to see which margins truly matter to business cycle length.

[20] Under the SIC codes, this is major group 70, "hotels, rooming houses, camps, and other lodging places."

[21] Under the SIC codes, we used division H, "finance, insurance, and real estate" less major group 65, "real estate."

Clearly economic recoveries may be longer if recessions are deeper or longer, so we include control variables for downturn depth and length.[22] We measure the downturn's depth as the total percentage change in employment for the employment downturn, from cycle peak to trough. We expect states with very large drops in employment will experience longer recoveries simply because the state is climbing out of a deeper hole.

Finally, we expect the length of the downturn—the number of months from peak to trough—should also affect the recovery and the employment cycle, with longer recessions yielding longer recoveries. However, length of downturn is strongly correlated with depth and weakly correlated with services. For our counterfactual exercise, we are ultimately interested in the coefficient on services. Therefore we adjust our length variable so that the impact of services is not measured by some combination of the estimated coefficients. We regress downturn length on services share and depth, using OLS with recession and state fixed effects. We then calculate the residual—actual minus predicted length—which we think of as excess length. For each sample restriction, we generate a corresponding excess length variable using the same restrictions. If a downturn lasts just as long as would be predicted given its depth and the share of services in the economy, our length variable equals 0. Positive values of length depict recessions lasting longer than predicted. We expect a positive coefficient: unusually long downturns should be followed by long recoveries.

IV. Empirical Results

A. Employment Cycle, Downturn, and Recovery Lengths

Our most parsimonious results are in Table 5, where our hypothesis is confirmed: the larger the

[22] In earlier specifications we included the 5-year trend rate of employment growth and omitted state fixed effects. The estimated coefficients were robustly significant at the 1 percent level. Once we include state fixed effects, trend employment growth no longer adds any additional explanatory power to the regression. The estimated coefficient on trend employment growth was not statistically significant and omitting the variable did not change the other estimated coefficients.

share of a state's output that is services, the longer the employment cycle. We estimate the effect of an increase in total services, and separately the effect of an increase in non-tradable services. The shares of GDP run from 0 to 100 so the estimated coefficient shows the marginal effect of a 1 percentage point increase in that sector's share of GDP. All variables enter with the expected sign and are statistically significant. Our results are insensitive to sample restrictions: excluding states that never fully recover, states that never enter recession, or both.

<Table 5 here>

Table 5 highlights the importance of distinguishing between total services and non-tradable services. A one percentage point increase in total services as a share of GDP increases the full employment cycle by 0.8 to 1.0 months, an increase of 2 to 3 percent from the mean.[23] But some services are tradable and we would not expect a rise in their shares in an economy to necessarily lengthen the employment cycle. Focusing just on the effect of non-tradable services thus does a better job of capturing our thesis that more services lengthens economic recovery due to anticipations and export channels. Indeed the effect of non-tradable services is larger, more consistent across sample restrictions, and robustly significant at the 1 percent level. A one percentage point increase in non-tradable services as a share of GDP increases the full employment cycle by 1.3 to 1.4 months, an increase of about 4 percent from the mean.

In specifications that include only the services share—total or non-tradable services—we are unconcerned with the source of the change in the share; the omitted category is "all sectors other than (total or non-tradable) services." In the all-sector results in Table 6, we include seven of the economy's eight sectors. In all columns, the coefficient on goods or non-tradable services

[23] In alternative specifications not included here, we transformed the cycle and recovery length variables by norming them to first the 1969 and then separately the 2001 downturns. For each recession, the normed cycle or recovery length had a common mean. Doing so changes the raw size of the coefficient—effect measured in number of months—but has no effect on statistical significance nor the coefficient *relative to* dependent variable mean—effect measured in percentage change.

captures the effect of the tradeoff between those two sectors. A 1 percentage point swap toward non-tradable services away from goods production lengthens the employment cycle by 1.6 to 2.0 months depending upon the sample restriction, an increase of 5 to 6 percent from the mean.

<Table 6 here>

When we omit the goods sector (odd-numbered columns), we are asking how the decline in goods production affected cycle length. The first thing to note is that distinguishing between tradable and non-tradable services is the right thing to do; tradable services are similar to goods in their effect on cycle length. A swap between goods and accommodations production has no statistically significant effect on the employment cycle. Similarly, more finance and fewer goods has either very weak or no statistically significant effect on employment cycle.

Note that all the other sector's coefficients in the odd-numbered columns are positive and statistically significant. Decreasing goods production lengthens the employment cycle whether the sector absorbing the change is non-tradable services, farming, mining, construction, or government.

When we omit the non-tradable services sector (even-numbered columns), the coefficients on each of the other sectors tell us which margins account for the effect of non-tradable services seen in our more parsimonious results. Interpretation requires multiplying by negative 1: the coefficient shows the effect of *decreasing* non-tradable services and increasing the sector shown, even though the temporal pattern is just the opposite: *increasing* non-tradable services.

Again, distinguishing between non-tradable and tradable services is important. Not only does decreasing the goods share and increasing non-tradable services by one percentage point increase cycle length (1.6 to 2.0 months, a 5 to 6 percent increase from the mean), but a decrease

in tradable services and increase in non-tradable services also lengthens the employment cycle. The effect is particularly strong for finance but is also present for accommodations when we restrict the sample to states that entered and fully recovered from recession.

The full employment cycle is the sum of the downturn and the recovery lengths. Are our results driven not by recovery length, but by the length of the downturn? We explore this question by analyzing first the downturn length, and then the recovery length.

Services has a mixed and weak effect on the length of a downturn as seen in Table 7. Sample selection matters; more services lead to longer downturns only when we limit the sample to states that entered a downturn and fully recovered. In that restricted sample, a 1 percentage point difference in the total-services share raises downturn length by approximately 0.6 months, an increase of about 4 percent from the mean. Non-tradable services have a larger and more statistically significant effect: a 1 percentage point increase in non-tradable services as a share of GDP increases downturn length by 1 month, an increase of about 6 percent from the mean. Using the all-sector results in column (7) enables us to see which margins generate the effect of non-tradable services on downturn length. In the restricted sample, downturns are longer with a gain in non-tradable services relative to goods or to the tradable service, finance.

<Table 7 here>

If longer downturns were also shallower, the rise of services might not substantially alter the welfare loss in a downturn: long and shallow downturns could have the same cumulative employment loss as short and deep downturns. But as seen in Table 6 we find the opposite, albeit weakly. States with more services have deeper, not shallower, downturns. Sample selection again matters: the effect of services on depth is statistically significant only when we restrict the sample to the 208 states that experienced a downturn and fully recovered. And the result is

statistically significant only at the 10 percent level. A 1 percentage point increase in total services or in non-tradable services as a share of GDP deepens downturns by 0.12 percentage points, an increase of about 3 percent from the mean. The all-sector results in column (14) tell a similar story. More non-tradable services make downturns slightly deeper.

What about recoveries? We find supporting evidence that the increase of services lengthens the recovery phase. Using trough-to-peak recovery length as our dependent variable yields the results in Table 8. For consistency with our other results, we include the same four sample restrictions. The coefficient on services is positive in all samples. The recovery phase of the cycle is longer when there are more services in the economy.

Here again we see the importance of distinguishing between total services and non-tradable services. Indeed when we restrict the sample to states that entered recession, columns (5)-(8), the recovery length is not significantly impacted by changes in total services but is affected by changes in non-tradable services. A 1 percentage point increase in non-tradable services as a share of GDP increases the recovery length by 0.8 to 1.0 months, an increase of 4.5 to 5.5 percent from the mean.

<Table 8 here>

The all-sector results in Table 9 isolate which margins affect the recovery length. The tradeoff between non-tradable services and goods drives the increase in recovery length. Restricting attention to states that enter and fully recover from a recession (columns 7 and 8), we see that an increase in non-tradable services relative to goods increases recovery length by 1.0 months, an increase of 6 percent from the mean. Increasing non-tradable services relative to tradable services, farming, mining, or government has no statistically significant effect on recovery.

<Table 9 here>

B. Employment Growth from the Trough

Recoveries are longer in more service-dependent economies because employment grows more slowly from the trough. To demonstrate this, we calculated the growth rate in employment from the trough over 1-, 2-, 3-, and 4-quarter periods. We anticipate that service-dependent economies will bounce along the bottom, showing slower growth immediately after the trough as they await strong sustainable stimulus. Our independent variables are the same as before: seven of eight sectors shares of state GDP, the depth and (excess) length of the downturn. The results are in Table 10.

<Table 10 here>

Employment growth is slower in service-heavy economies than in goods-heavy or finance-heavy economies. We find that non-tradable services exert a negative and statistically significant effect on the growth rate of employment at the 1st, 2nd, and 3rd quarter following the trough. Depth, but not length, of the downturn affects the post-trough employment growth rate, mirroring results obtained by Wynne and Balke (1992) using national data.

The effect is not small. The average 1-quarter growth rate of employment following the trough was 0.84 percent. The services share has a range of more than 30 percentage points in any year. For every 10 percentage point increase in the share of non-tradable services relative to goods—the difference between Arkansas and Massachusetts in 2001, for instance—employment growth in the 1st quarter was more than 85 percent slower. A switch between non-tradable services and finance has a similar-sized effect. Over three quarters, a 10 percentage point increase in the share of non-tradable services relative to goods lowered the post-trough growth rate by nearly 45 percent, from 2.1 to 1.1 percent.

C. Counterfactual Analysis

Our results allow us to estimate the marginal impact of the last half-century's rise of services on the length of the most recent recovery. For the United States as a whole, the 2005-07 average for non-tradable services as a share of final output was 59 percent. Fifty years earlier, the three-year average as the nation's economy entered the 1957 downturn was 43 percent. We use the estimates from regressions that end with 2001 to forecast actual and counterfactual values for the 2007-09 downturn. The counterfactual value is estimated using the 1955-57 shares of non-tradable services and the 2007-09 values of the other control variables. The difference between the actual and counterfactual cycle length shows the marginal effect of the rise of non-tradable services over the last half century on the length of recovery.

The results are in Table 11. The rise of services is far from inconsequential. The full employment cycle (peak-to-peak) is 61 to 78 percent longer, and the recovery (trough-to-peak) is 70 to 87 percent longer than they would have been a half-century ago due just to the rise of the service sector.[24] The full employment cycle on a national basis for the 2007-09 recession lasted 75 months, more than 6 years. Without the last half-century's rise in services, the full cycle would have been complete in 42 to 47 months, less than 4 years. From the trough, it took 50 months for the U. S to recover all nonfarm jobs lost during the downturn. The recovery would have taken just 27 to 29 months if the economy still had 1957's share of non-tradable services. The marginal lengthening of the recovery by 70 to 87 percent would hold even if the 2007 recession had been relatively short and shallow since we are measuring the marginal effect of services.

[24] These results are our most conservative estimates, based on the 208-observation sample which excludes the states that never enter recession or never fully recover. Including all 249 observations or including the states that never fully recover or including the states that don't experience recession would make the marginal effect of the rise of non-tradable services on recovery length even larger.

<Table 11 here>

Although the 2007 employment cycle is not complete for all states, we use the partial cycle to further assess the validity of our hypothesis. Table 12 shows which states have recovered and which have not, broken down by high-, medium-, and low-service states. Of the 34 states that have recovered peak employment, only 8 (24 percent) are high-service states. Of the 16 states yet to recover, 50 percent are high-service states.

<Table 12 here>

D. Robustness Checks

In the results reported above, the peak month is the global maximum that occurred within 12 months (minus or plus) of the NBER-start date for the recession. The trough is the global minimum following the peak. But business cycles are rarely perfect parabolas with obvious peaks and troughs. Sometimes there are several local peaks before or after a global peak, and sometimes there are multiple local troughs before or after a global trough. We experimented with several variants of peak and trough definitions.

We introduced a rounding parameter that could itself vary in size. If the economy bounced along the top before turning down and all the bouncing fell within the rounding parameter, the month chosen as the peak was either the first or the last local maximum (two different specifications). We introduced a similar rounding parameter for the trough. If the economy bounced along the bottom before hitting a global minimum and all of the bouncing fell within the rounding parameter, the month chosen as the trough was the first local minimum. Our results are robust to these alternative specifications. Regardless of how we chose the peak and the trough, service-heavy states had longer and slower recoveries.

In our reported results, we also require that the recovery be sustained for at least three

months. The use of an alternative, weaker employment cycle measure that did not require that the return to previous peak be sustained did not alter our results.

V. Conclusion

A larger service sector will make recoveries from downturns slower and longer—a negative macroeconomic externality due to the shift from goods to service production. The marginal effect of rise in non-tradable services in the United States will cause recoveries to last about 75 percent longer than they would have a half century ago.

We offer two possible explanations for why more services lead to longer recoveries. Goods-producing businesses can produce in anticipation of increasing demand because retailers want to build up inventory to avoid stockouts once consumer demand reappears, but because services cannot be inventoried, service producers must wait until actual demand appears. And because most services are non-tradable, the rise of services makes economic recoveries increasingly dependent on internal demand.

Moretti (2012) argues the rise of services and especially the high tech sector is not harmful to long-run growth. He explicitly focuses on long-run growth rather than the business cycle. Our findings focus on the cyclical effect of the rise of the service sector, impacts not previously considered in the literature. More services, particularly more non-tradable services, slow the pace of recovery from recession, making business cycles longer.

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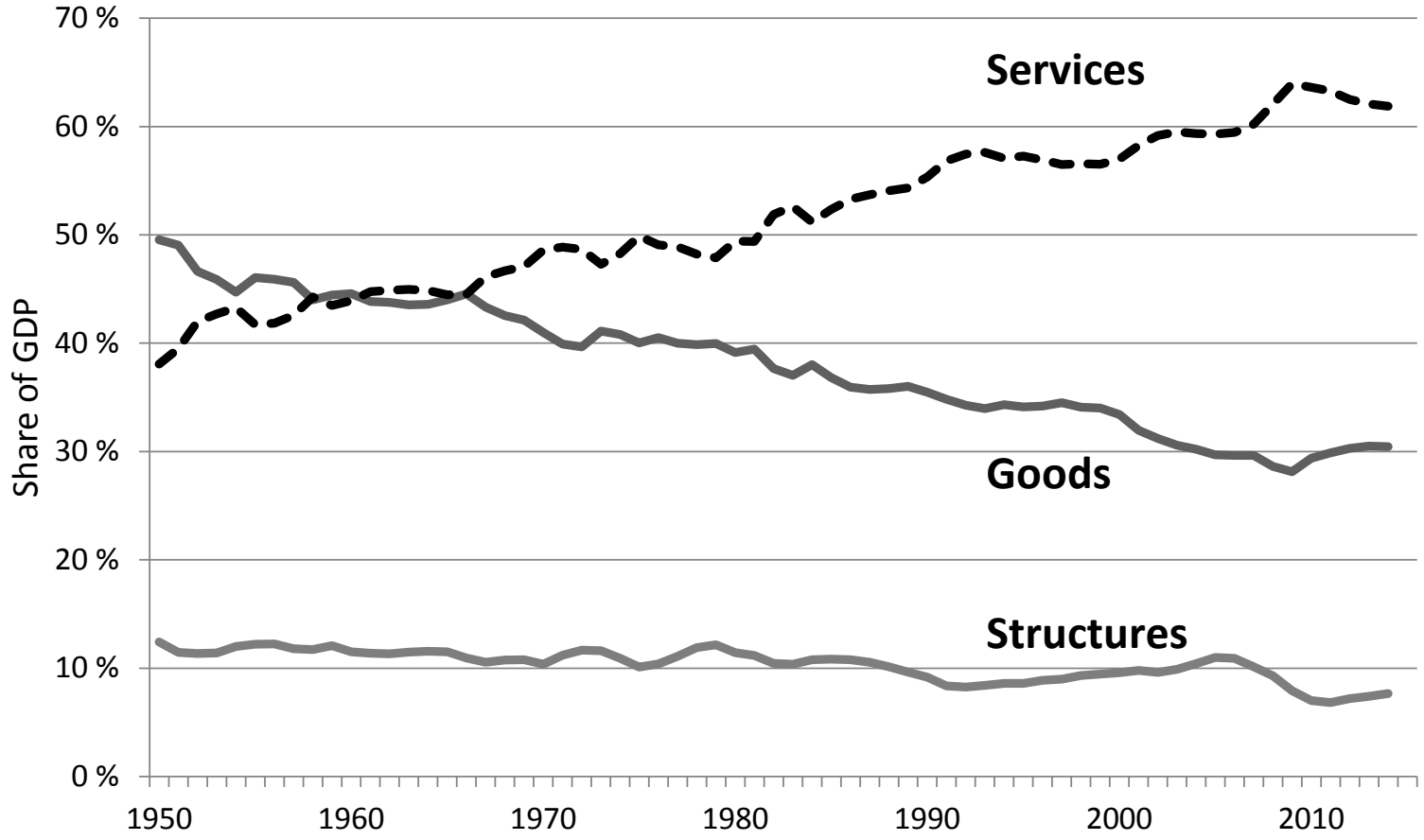
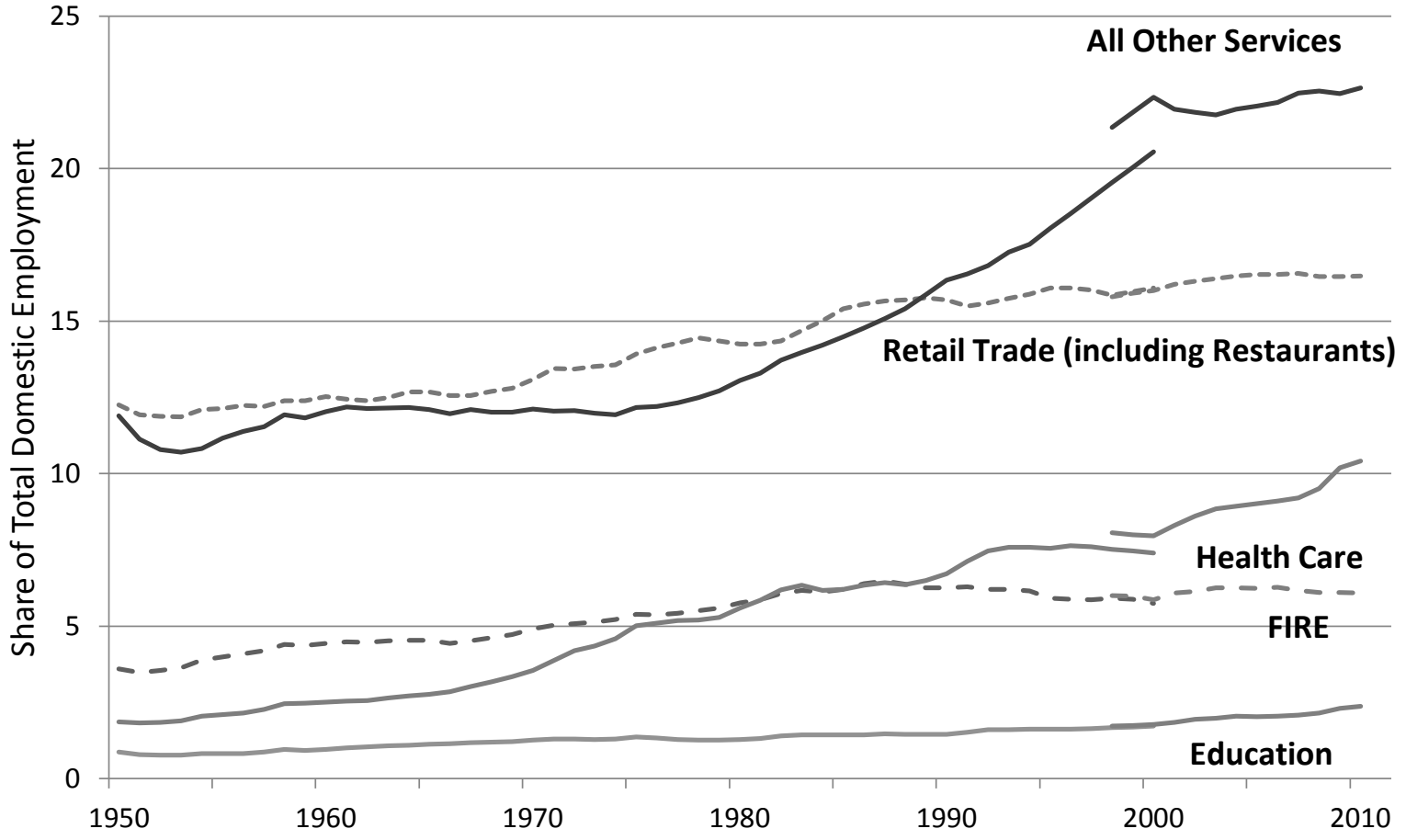
Figure 1. GDP (Expenditure): Goods, Services, and Structures, 1950-2014



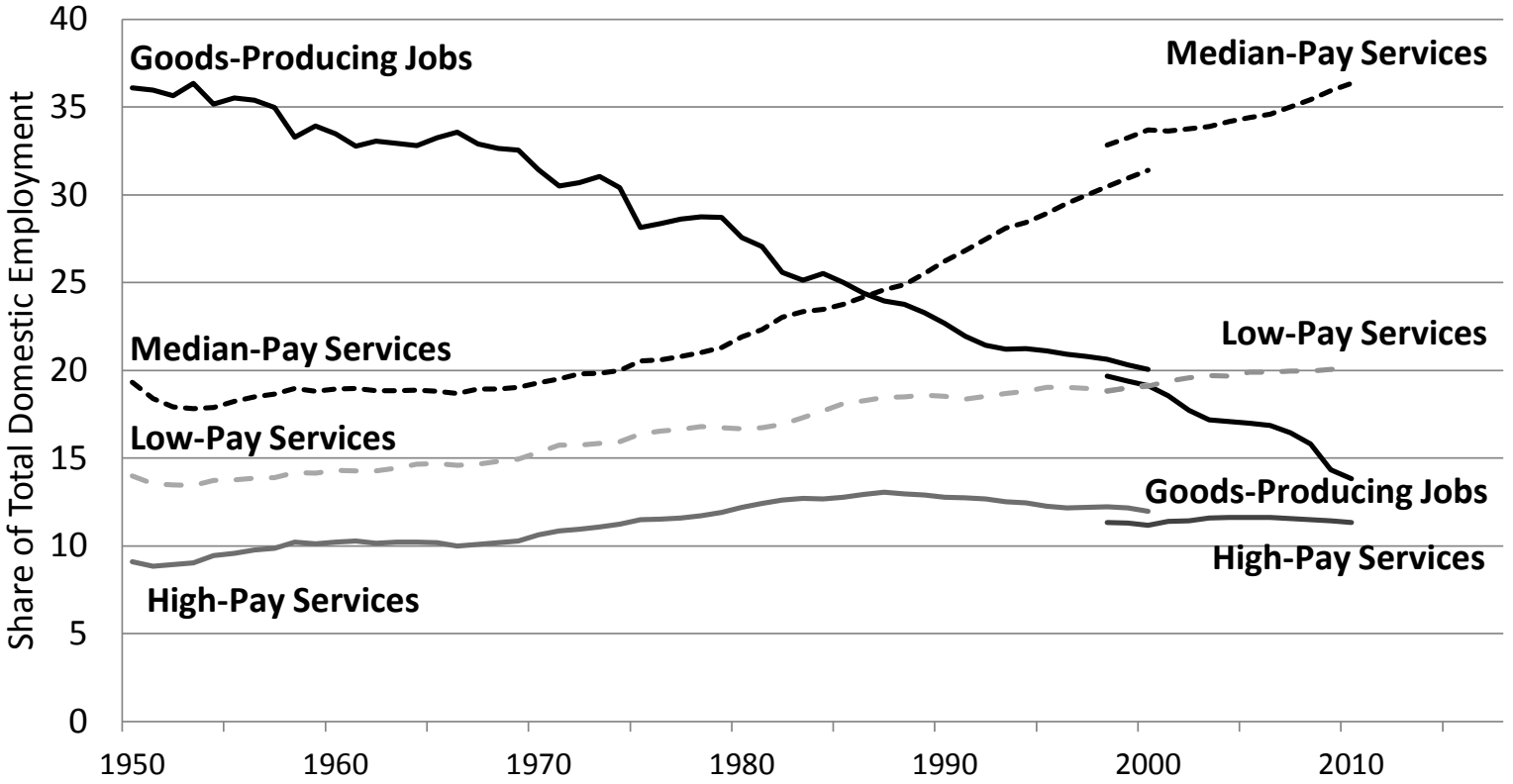
Source: Authors' calculations from Bureau of Economic Analysis, NIPA Table 1.2.5 Gross Domestic Product by Major Type of Product.

Figure 2. Employment Share by Service Industry, 1950-2010



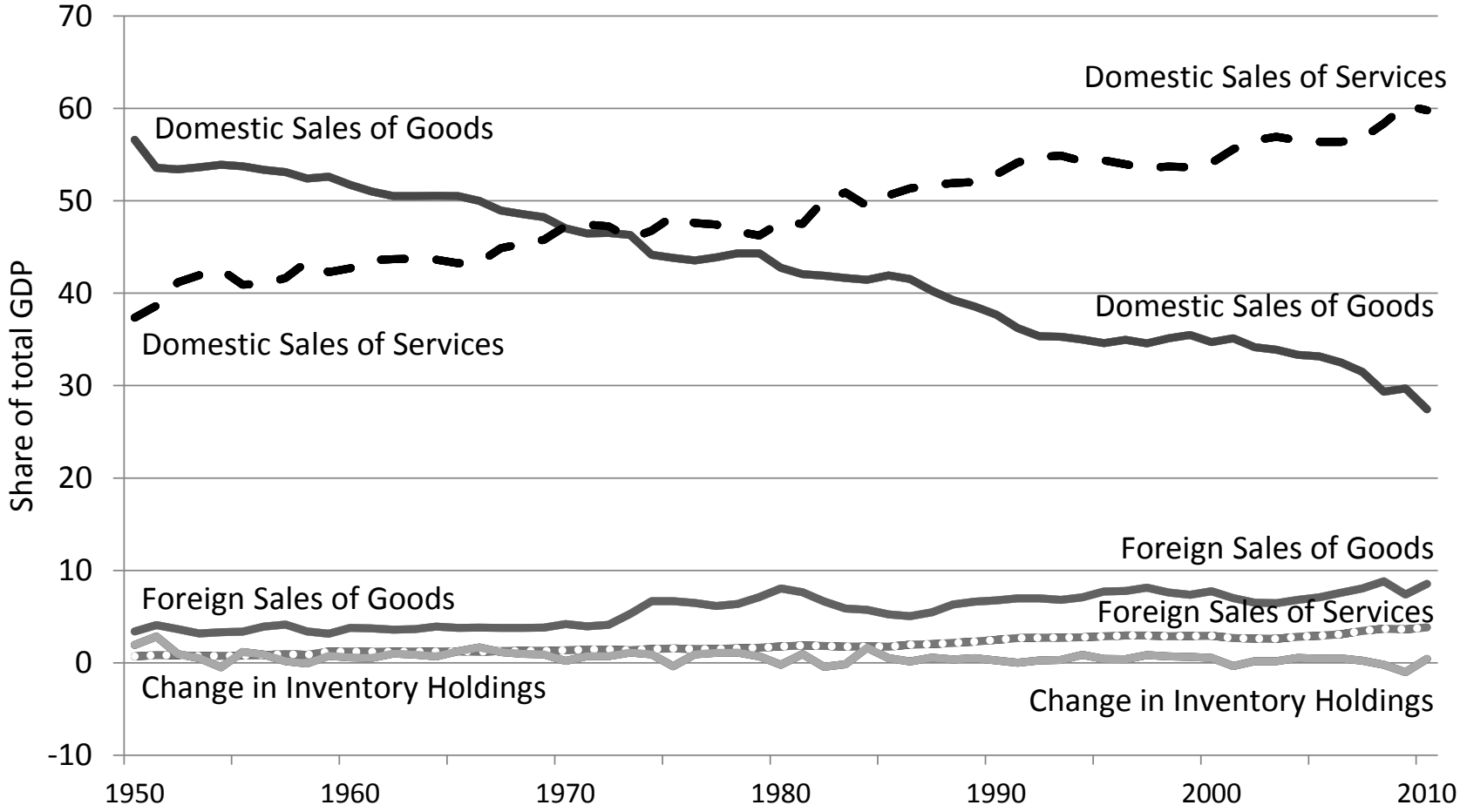
Source: Bureau of Economic Analysis, NIPA Table 6.5 (Full-Time Equivalent Employees by Industry). SIC codes for 1950-2000; NAICS codes for 1998-2010. Some NAICS categories were combined for closer equivalency with SIC categories. Little change was evident in several categories not shown in the figure: legal services, education, accommodations, wholesale trade, and transportation. Data accessed 4-16-13.

Figure 3. Employment Share in Goods; and Low-, Median-, and High-Pay Service Industries, 1950-2010



Source: Bureau of Economic Analysis, NIPA Table 6.5 (Full-Time Equivalent Employees by Industry) and Table 6.6 (Wage & Salary Accruals per Full-Time Equivalent Employees by Industry). SIC codes for 1950-2000; NAICS codes for 1998-2010. Categories that can be matched across SIC-NAICS transition were sorted based on wages per FTE in 1950 & 2010. Median-pay jobs fell within 5% of the domestic industry average. Goods jobs (construction & manufacturing) are a mix of high- and median-pay jobs. Data accessed 7-29-13.

Figure 4. Shares of Total Output, 1950-2010



Source: Author's calculations from Bureau of Economic Analysis, NIPA Table 1.2.5, accessed November 2014.

Table 1. Employment Cycle, Downturn, and Recovery Lengths

	Months				Ratios			
					Employment Cycle to		Employment Recovery to	
NBER Recession Dates	NBER Recession Length	Employment Downturn (Peak-to-Trough)	Employment Recovery (Trough-to-Peak)	Full Employment Cycle (Peak-to-Peak)	Employment Downturn	NBER Recession Length	Employment Downturn	NBER Recession Length
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Nov. 1948-Oct. 1949	11	13	9	22	1.7	2.0	0.7	0.8
Jul. 1953-May 1954	10	13	10	23	1.8	2.3	0.8	1.0
Aug. 1957-Apr. 1958	8	14	10	24	1.7	3.0	0.7	1.3
Apr. 1960-Feb. 1961	10	10	10	20	2.0	2.0	1.0	1.0
Dec. 1969-Nov. 1970	11	8	10	18	2.3	1.6	1.3	0.9
Nov. 1973-Mar. 1975	16	9	10	19	2.1	1.2	1.1	0.6
Jan. 1980-Jul. 1980	6	4	6	10	2.5	1.7	1.5	1.0
Jul. 1981-Nov. 1982	16	17	11	28	1.6	1.8	0.6	0.7
Jul. 1990-Mar. 1991	8	11	21	32	2.9	4.0	1.9	2.6
Mar. 2001-Nov. 2001	8	30	18	48	1.6	6.0	0.6	2.3
Dec. 2007-Jun. 2009	18	25	50	75	3.0	4.2	2.0	2.8

Source: Authors' calculation from Bureau of Labor Statistics data, "Employment, Hours, and Earnings from the Current Employment Statistics," Series ID CES0000000001 (total nonfarm employment, U.S.), accessed April 3, 2015. "Employment downturn" is the number of months from previous employment peak to trough. "Employment recovery" is the number of months from trough until employment reaches its previous peak. "Full Employment Cycle" is the sum, the number of months from peak until employment reaches its previous peak. NBER Recession dates from http://www.nber.org/cycles.html.

Table 2. Contributions to Output, Benchmark Years, 1947-2012

	Output of Goods				Output of Services			
	% of inputs that are				% of inputs that are			
	Agriculture & Mining	Goods	Services	Value Added	Agriculture & Mining	Goods	Services	Value Added
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
1947	13.6	36.2	11.0	36.3	2.1	12.2	20.1	65.1
1967	7.0	38.3	13.4	38.6	1.2	10.2	23.0	65.0
1987	6.5	33.7	17.3	42.0	0.9	8.5	24.6	65.5
1992	6.2	34.2	19.4	39.9	1.1	7.4	23.2	67.9
1997	6.0	35.5	24.0	34.1	0.7	6.1	25.8	67.0
2002	6.0	33.1	22.0	38.4	0.6	6.6	29.2	63.0
2007	9.5	33.5	20.7	35.9	0.8	7.2	30.4	61.1
2012	12.4	31.8	17.7	37.6	0.4	7.5	29.3	62.4

Source: Authors' calculation. 1947 and 1967 data from U.S. Bureau of the Census, *Historical Statistics of the United States: Colonial Times to 1970*, Series F668-696. 1987 to 2012 data from Bureau of Economic Analysis, "Input-Output Accounts Data" (http://www.bea.gov/industry/io_annual.htm, accessed April 2015). Inputs by industry aggregated into the three categories shown. Goods includes construction and manufacturing; services includes utilities, transportation, government, and other services.

Table 3. Source of Growth in Recovery

Recession Trough	Lead Contributor to Growth during Recovery: End Quarter*	+1 Quarter	+2 Quarter	+3 Quarter	Real GDP: 4-Quarter Percent Change from Trough	Contributions to 4-Quarter Percent Change in Nominal GDP (Share of Total Change in Nominal GDP): Domestic Sales: Goods	Domestic Sales: Services	Foreign Sales: Goods	Foreign Sales: Services	Change in Goods Inventory
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
1949:IV**	Inventory	DS^{goods}	DS^{goods}	Inventory	13.4%	47	32	5	1	15
1954:II	FS^{goods}	DS^{goods}	DS^{goods}	DS^{goods}	7.8%	55	21	1	1	23
1958:II	$DS^{services}$	Inventory	DS^{goods}	DS^{goods}	9.2%	52	21	-1	5	22
1961:I	Inventory	$DS^{services}$	Inventory	DS^{goods}	7.6%	36	38	0	2	24
1970:IV	$DS^{services}$	Inventory	$DS^{services}$	$DS^{services}$	4.4%	50	47	-3	2	4
1975:I	$DS^{services}$	$DS^{services}$	DS^{goods}	$DS^{services}$	6.2%	47	40	1	0	12
1980:III	DS^{goods}	$DS^{services}$	Inventory		4.4%	36	40	2	2	19
1982:IV	$DS^{services}$	$DS^{services}$	DS^{goods}	$DS^{services}$	7.8%	40	38	5	1	16
1991:I	$DS^{services}$	$DS^{services}$	$DS^{services}$	$DS^{services}$	2.9%	15	65	9	7	5
2001:IV	$DS^{services}$	Inventory	$DS^{services}$	$DS^{services}$	2.0%	-21	81	5	8	27
2009:II**	FS^{goods}	Inventory	$DS^{services}$	$DS^{services}$	2.7%	-29	40	32	9	49

*"End quarter" is first quarter of positive nominal GDP growth. For all but 1949 and 2009, the quarter of the recession trough is the first quarter of positive nominal GDP growth.

**Subsequent quarter is the first quarter of positive nominal GDP growth.

DS^{goods}: Domestic sales of goods & structures

$DS^{services}$: Domestic Sales of services

FS^{goods}: Foreign Sales of goods

$FS^{services}$: Foreign sales of services

Inventory: Change in inventory holdings of goods

Source: Author's calculations from Bureau of Economic Analysis, NIPA Tables 1.2.5 and 4.1, Recession dates from NBER.

Table 4. Employment Cycle and Recovery Lengths, and Services as a Share of GDP

		Employment Cycle Length		Recovery Length		Total Services		Non-Tradable Services	
recession	# of States	Mean (s.d.)	Range	Mean (s.d.)	Range	Mean (s.d.)	Range	Mean (s.d.)	Range
		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Including all states (n = 249)									
Dec. 1969-Nov. 1970	50	15.0 (14.0)	0 - 49	---	---	49.3 (6.1)	37.0 - 72.2	44.7 (4.9)	34.0 - 59.7
Nov. 1973-Mar. 1975	50	18.7 (15.0)	0 - 65	---	---	50.4 (5.9)	39.3 - 71.0	45.6 (4.8)	35.8 - 58.8
Jan. 1980-Nov. 1982	50	48.4 (36.3)	0 - 130	---	---	51.8 (6.3)	35.5 - 70.4	46.3 (5.0)	31.9 - 56.8
Jul. 1990-Mar. 1991	50	30.7 (33.8)	0 - 119	---	---	57.1 (7.0)	39.0 - 70.6	50.2 (5.6)	35.7 - 60.5
Mar. 2001-Nov. 2001	49	47.7 (23.5)	0 - 91	---	---	64.9 (6.6)	51.6 - 78.7	56.4 (4.8)	45.1 - 66.9
Dec. 2007 - Jun 2009	50	---	---	---	---	65.3 (7.9)	43.7 - 79.8	56.2 (6.5)	39.5 - 67.4
Including only states that enter recession & fully recover (n=208)									
Dec. 1969-Nov. 1970	37	19.0 (11.9)	2 - 45	9.8 (6.6)	1 - 26	48.3 (4.0)	39.5 - 56.0	44.0 (3.7)	36.0 - 51.4
Nov. 1973-Mar. 1975	40	23.4 (13.1)	4 - 65	13.5 (7.8)	2 - 35	51.2 (6.1)	41.2 - 71.0	46.2 (4.9)	37.7 - 58.8
Jan. 1980-Nov. 1982	44	45.0 (32.0)	2 - 118	21.7 (19.7)	1 - 82	52.2 (5.6)	43.9 - 70.4	46.6 (4.1)	39.9 - 55.6
Jul. 1990-Mar. 1991	44	34.9 (33.9)	2 - 119	21.1 (23.1)	1 - 88	57.4 (7.3)	39.0 - 70.6	50.4 (5.9)	35.7 - 60.5
Mar. 2001-Nov. 2001	43	44.0 (19.0)	2 - 87	21.8 (10.8)	1 - 49	65.3 (6.3)	55.3 - 78.7	56.4 (4.9)	45.1 - 66.9

Source: (1) to (4): Authors' calculation from Bureau of Labor Statistics data, "State and Metro Area Employment, Hours, & Earnings" establishment survey for nonfarm employment, Series ID CES0000000001, (http://bls.gov/data/#employment, accessed July 2013). Means are unweighted averages of state data. (5) to (8): Authors' calculation from Bureau of Economic Analysis data, "Gross Domestic Product by State," (http://www.bea.gov/regional/index.htm), accessed October 2013. Raw data are current-dollar GDP by industry by state. Data prior to 1997 use the SIC industrial classification system; subsequent data based on NAICS. For each state, value is 3-year average of [total or non-tradable] services as a share of GDP with the average ending in the first year of the recession. Table reports unweighted means across states.

Table 5. Regressions Results: Employment Cycle

Dependent Variable: Employment Cycle (months)	*All States*		*Excluding States that Never Fully Recover*		*Excluding States that Never Enter Recession*		*Including Only States that Enter Recession and Fully Recover*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Total Services / GDP	1.058*** (0.388)		1.029*** (0.331)		0.816* (0.425)		0.796** (0.368)	
Non-tradable Services / GDP		1.397*** (0.399)		1.321*** (0.344)		1.411*** (0.421)		1.348*** (0.381)
Depth of downturn	7.655*** (0.512)	7.659*** (0.502)	7.946*** (0.424)	7.909*** (0.423)	7.760*** (0.540)	7.774*** (0.531)	8.056*** (0.467)	8.018*** (0.468)
Length of downturn	1.249*** (0.142)	1.241*** (0.141)	1.233*** (0.157)	1.228*** (0.157)	1.230*** (0.147)	1.212*** (0.147)	1.211*** (0.163)	1.196*** (0.163)
Mean of Dependent Variable (months)	32.0	32.0	29.5	29.5	36.6	36.6	33.9	33.9
n	249	249	239	239	218	218	208	208
Recession FE	yes	yes	yes	yes	yes	yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes
F-statistic	110.4	125	207.7	188.4	87.0	102.1	152.0	143.3
Within R^2	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. OLS. Robust standard errors clustered by state in parentheses. Non-tradable services excludes accommodations and finance and insurance from Total Services. Length is residual of actual length versus predicted length. Predicted length calculated from a linear regression of length on depth and [total or non-tradable] service share with recession and state FE, with same sample restrictions. Columns (1) and (2) exclude MI in 2001. Columns (3) and (4) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001. Columns (5) and (6) exclude AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN in 1969, AK, ID, LA, NM, ND, OK, TX, UT, WA and WY in 1973, CO and FL in 1980, ID, LA, MN, TX, UT and WA in 1990, and MI and WY in 2001 recession. Columns (7) and (8) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001 recession.

Table 6. Regressions Results: All-Sector Analysis of Employment Cycle

Dependent Variable: Employment Cycle (months)	*All States*		*Excluding States that Never Fully Recover*		*Excluding States that Never Enter Recession*		*Including Only States that Enter Recession and Fully Recover*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Goods / GDP	<omitted>	-2.046*** (0.383)	<omitted>	-1.787*** (0.356)	<omitted>	-1.900*** (0.429)	<omitted>	-1.605*** (0.404)
Non-tradable Services / GDP	2.047*** (0.382)	<omitted>	1.788*** (0.355)	<omitted>	1.901*** (0.428)	<omitted>	1.606*** (0.403)	<omitted>
Finance / GDP	0.607* (0.355)	-1.439*** (0.491)	0.642* (0.367)	-1.146** (0.476)	0.457 (0.366)	-1.444*** (0.510)	0.443 (0.362)	-1.163** (0.472)
Accommodations / GDP	2.380 (1.864)	0.328 (1.714)	0.385 (1.076)	-1.408 (0.926)	1.316 (2.459)	-0.591 (2.341)	-1.134 (1.477)	-2.746** (1.344)
Farm / GDP	1.092*** (0.354)	-0.953** (0.429)	0.910*** (0.325)	-0.876** (0.375)	0.724 (0.437)	-1.176** (0.548)	0.488 (0.354)	-1.117** (0.479)
Mining / GDP	1.465*** (0.453)	-0.582 (0.588)	1.392*** (0.397)	-0.396 (0.455)	1.607*** (0.521)	-0.293 (0.632)	1.319*** (0.448)	-0.286 (0.527)
Construction / GDP	4.717*** (0.958)	2.674** (1.097)	5.015*** (0.888)	3.230*** (0.960)	4.925*** (1.173)	3.024** (1.386)	5.530*** (1.060)	3.925*** (1.187)
Government / GDP	1.858*** (0.460)	-0.187 (0.510)	1.313*** (0.426)	-0.473 (0.424)	2.102*** (0.581)	0.201 (0.668)	1.287** (0.629)	-0.318 (0.670)
Depth of downturn	7.302*** (0.454)	7.302*** (0.454)	7.625*** (0.381)	7.625*** (0.381)	7.438*** (0.485)	7.438*** (0.485)	7.734*** (0.419)	7.734*** (0.419)
Length of downturn	1.161*** (0.117)	1.161*** (0.117)	1.150*** (0.130)	1.150*** (0.130)	1.154*** (0.123)	1.154*** (0.123)	1.134*** (0.143)	1.134*** (0.143)
Mean of Dependent Variable (months)	32.0	32.0	29.5	29.5	36.6	36.6	33.9	33.9
n	249	249	239	239	218	218	208	208
Recession FE	yes	yes	yes	yes	yes	yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes
F-statistic	90.3	90.3	125.5	125.5	73.3	73.3	117.7	117.7
Within R^2	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90

Notes: * p < 0.10, ** p< 0.05, *** p < 0.01. OLS. Robust standard errors clustered by state in parentheses. Length is residual of actual length versus predicted length. Predicted length calculated from a linear regression of length on depth and all sectors shares with recession and state FE, with same sample restrictions. Columns (1) and (2) exclude MI in 2001. Columns (3) and (4) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001. Columns (5) and (6) exclude AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN in 1969, AK, ID, LA, NM, ND, OK, TX, UT, WA and WY in 1973, CO and FL in 1980, ID, LA, MN, TX, UT and WA in 1990, and MI and WY in 2001 recession. Columns (7) and (8) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001 recession.

Table 7. Regressions Results: Downturn Length and Depth

	Dependent Variable: Downturn Length (months)							*Dependent Variable: Downturn Depth (percent decline)*						
	All States		*Excluding States that Never Enter Recession*		*Including Only States that Enter Recession and Fully Recover*			*All States*		*Excluding States that Never Enter Recession*		*Including Only States that Enter Recession and Fully Recover*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
Total Services / GDP	0.289		0.291		0.595*			0.006		0.047		0.115**		
	(0.336)		(0.331)		(0.335)			(0.067)		(0.059)		(0.047)		
Non-tradable Services / GDP		0.417		0.486		0.982**	<omitted>		0.001		0.022		0.136*	<omitted>
		(0.452)		(0.452)		(0.402)			(0.098)		(0.089)		(0.073)	
Goods/GDP							-1.109**							-0.155*
							(0.435)							(0.078)
Finance / GDP							-0.933**							-0.111
							(0.442)							(0.073)
Accommodations / GDP							-1.272							0.230
							(0.900)							(0.188)
Farm / GDP							-1.289*							-0.213
							(0.762)							(0.131)
Mining / GDP							-0.809							-0.257**
							(0.789)							(0.119)
Construction / GDP							2.955**							0.524**
							(1.198)							(0.260)
Government / GDP							-1.730							-0.578***
							(1.277)							(0.120)
Mean of dependent variable	15.2	15.2	13.9	13.9	16.0	16.0	16.0	3.1	3.1	2.9	2.9	3.3	3.3	3.3
n	249	249	218	218	208	208	208	249	249	218	218	208	208	208
Recession FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-statistic	34.7	35.9	29.6	32.1	23.6	25.5	10.3	15.0	14.8	13.0	12.4	8.8	8.2	5.4
Within R^2	0.35	0.35	0.33	0.33	0.31	0.32	0.39	0.21	0.21	0.22	0.22	0.18	0.18	0.28

Notes: * p < 0.10, ** p< 0.05, *** p < 0.01. OLS. Robust standard errors clustered by state in parentheses. Columns 1, 2, 8 and 9 exclude MI in 2001. Columns 3, 4, 10 and 11 also exclude AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN in 1969, AK, ID, LA, NM, ND, OK, TX, UT, WA and WY in 1973, CO and FL in 1980, ID, LA, MN, TX, UT and WA in 1990, and WY in 2001 recession. Columns 5, 6, 7, 12, 13, and 14 also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001 recession.

Table 8. Regressions Results: Recovery Length

Dependent Variable: Recovery Length (months)	*All States*		*Excluding States that Never Fully Recover*		*Excluding States that Never Enter Recession*		*Including Only States that Enter Recession and Fully Recover*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Total Services / GDP	0.780** (0.388)		0.672** (0.331)		0.688 (0.425)		0.585 (0.368)	
Non-tradable Services / GDP		0.986** (0.399)		0.794** (0.344)		1.002** (0.421)		0.819** (0.381)
Depth of downturn	4.181*** (0.512)	4.184*** (0.502)	4.636*** (0.424)	4.620*** (0.423)	4.286*** (0.540)	4.301*** (0.531)	4.706*** (0.467)	4.700*** (0.468)
Length of downturn	0.249* (0.142)	0.241* (0.141)	0.233 (0.157)	0.228 (0.157)	0.230 (0.147)	0.212 (0.147)	0.211 (0.163)	0.196 (0.163)
Mean of Dependent Variable (months)	16.9	16.9	15.6	15.6	19.3	19.3	17.9	17.9
n	249	249	239	239	218	218	208	208
Recession FE	yes	yes	yes	yes	yes	yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes
F-statistic	27.8	30.8	53.2	47.2	21.2	24.8	38.0	35.3
Within R^2	0.68	0.68	0.71	0.71	0.66	0.66	0.69	0.69

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. OLS. Robust standard errors clustered by state in parentheses. Non-tradable services excludes accommodations and finance and insurance from Total Services. Length is residual of actual length versus predicted length. Predicted length calculated from a linear regression of length on depth and [total or non-tradable] service share with recession and state FE, with same sample restrictions. For states that never enter recession, recovery length equals 0. Columns (1) and (2) exclude MI in 2001. Columns (3) and (4) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001. Columns (5) and (6) exclude AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN in 1969, AK, ID, LA, NM, ND, OK, TX, UT, WA and WY in 1973, CO and FL in 1980, ID, LA, MN, TX, UT and WA in 1990, and MI and WY in 2001 recession. Columns (7) and (8) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001 recession.

Table 9. Regressions Results: All-Sector Analysis of Recovery Length

Dependent Variable: Recovery Length (months)	*All States*		*Excluding States that Never Fully Recover*		*Excluding States that Never Enter Recession*		*Including Only States that Enter Recession and Fully Recover*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Goods / GDP	<omitted>	-1.350*** (0.383)	<omitted>	-1.061*** (0.356)	<omitted>	-1.295*** (0.429)	<omitted>	-1.008** (0.404)
Non-tradable Services / GDP	1.351*** (0.382)	<omitted>	1.062*** (0.355)	<omitted>	1.296*** (0.428)	<omitted>	1.009** (0.403)	<omitted>
Finance / GDP	0.480 (0.355)	-0.870* (0.491)	0.477 (0.367)	-0.584 (0.476)	0.467 (0.366)	-0.828 (0.510)	0.410 (0.362)	-0.598 (0.472)
Accommodations / GDP	1.953 (1.864)	0.598 (1.714)	-0.043 (1.076)	-1.108 (0.926)	2.547 (2.459)	1.246 (2.341)	0.299 (1.477)	-0.714 (1.344)
Farm / GDP	0.804** (0.354)	-0.546 (0.429)	0.681* (0.325)	-0.379 (0.375)	0.678 (0.437)	-0.617 (0.547)	0.474 (0.354)	-0.533 (0.479)
Mining / GDP	0.638 (0.453)	-0.713 (0.588)	0.779* (0.397)	-0.283 (0.455)	0.684 (0.521)	-0.611 (0.632)	0.679 (0.448)	-0.328 (0.527)
Construction / GDP	3.016*** (0.958)	1.667 (1.097)	3.454*** (0.888)	2.394** (0.961)	3.191*** (1.173)	1.896 (1.386)	3.708*** (1.060)	2.700** (1.187)
Government / GDP	1.011** (0.460)	-0.339 (0.510)	0.617 (0.426)	-0.444 (0.424)	1.213** (0.581)	-0.082 (0.668)	0.509 (0.629)	-0.499 (0.670)
Depth of downturn	3.980*** (0.454)	3.980*** (0.454)	4.393*** (0.381)	4.393*** (0.381)	4.083*** (0.485)	4.083*** (0.485)	4.429*** (0.419)	4.429*** (0.419)
Length of downturn	0.161 (0.117)	0.161 (0.117)	0.150 (0.130)	0.150 (0.130)	0.154 (0.123)	0.154 (0.123)	0.134 (0.143)	0.134 (0.143)
Mean of Dependent Variable (months)	16.9	16.9	15.6	15.6	19.3	19.3	17.9	17.9
n	249	249	239	239	218	218	208	208
Recession FE	yes	yes	yes	yes	yes	yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes
F-statistic	21.7	21.7	30.6	30.5	16.2	16.2	25.9	25.9
Within R^2	0.71	0.71	0.74	0.74	0.69	0.69	0.72	0.72

Notes: * p < 0.10, ** p< 0.05, *** p < 0.01. OLS. Robust standard errors clustered by state in parentheses. Length is residual of actual length versus predicted length. Predicted length calculated from a linear regression of length on depth and all sectors share with recession and state FE, with same sample restrictions. Columns (1) and (2) exclude MI in 2001. Columns (3) and (4) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001. Columns (5) and (6) exclude AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN in 1969, AK, ID, LA, NM, ND, OK, TX, UT, WA and WY in 1973, CO and FL in 1980, ID, LA, MN, TX, UT and WA in 1990, and MI and WY in 2001 recession. Columns (7) and (8) also exclude NY in 1969, LA, OK, WV, and WY in 1980, and IL, IN, MA, MS and OH in 2001 recession.

Table 10. Regression Results: Employment Growth Rate from Trough

Dependent Variable:	*1-Quarter Employment Growth Rate*		*2-Quarter Employment Growth Rate*		*3-Quarter Employment Growth Rate*		*4-Quarter Employment Growth Rate*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Goods / GDP	<omitted>	0.072* (0.040)	<omitted>	0.073* (0.042)	<omitted>	0.092* (0.053)	<omitted>	0.073 (0.060)
Non-tradable Services / GDP	-0.072* (0.040)	<omitted>	-0.073* (0.042)	<omitted>	-0.092* (0.053)	<omitted>	-0.073 (0.060)	<omitted>
Finance / GDP	-0.015 (0.016)	0.057* (0.033)	-0.005 (0.016)	0.069* (0.035)	0.010 (0.024)	0.102* (0.053)	0.033 (0.031)	0.106* (0.055)
Accommodations / GDP	-0.306* (0.179)	-0.233 (0.158)	-0.235 (0.149)	-0.161 (0.123)	-0.269 (0.170)	-0.177 (0.139)	-0.060 (0.207)	0.013 (0.172)
Farm / GDP	-0.022 (0.028)	0.050 (0.046)	-0.022 (0.031)	0.051 (0.053)	-0.025 (0.076)	0.067 (0.111)	0.023 (0.061)	0.096 (0.103)
Mining / GDP	-0.053 (0.044)	0.018 (0.034)	-0.058 (0.051)	0.015 (0.041)	-0.030 (0.051)	0.063 (0.053)	-0.059 (0.058)	0.014 (0.063)
Construction / GDP	-0.143 (0.097)	-0.071 (0.091)	-0.276** (0.118)	-0.203* (0.107)	-0.426*** (0.159)	-0.334** (0.152)	-0.469** (0.204)	-0.397** (0.191)
Government / GDP	-0.127 (0.081)	-0.056 (0.072)	-0.091 (0.086)	-0.018 (0.078)	-0.045 (0.099)	0.048 (0.100)	0.013 (0.098)	0.085 (0.106)
Depth of downturn	0.044* (0.024)	0.044* (0.024*	0.099*** (0.033)	0.099*** (0.033)	0.151*** (0.041)	0.151*** (0.041)	0.187*** (0.053)	0.187*** (0.053)
Length of downturn	-0.030** (0.014)	-0.030** (0.014)	-0.038** (0.019)	-0.038** (0.019)	-0.034 (0.024)	-0.034 (0.024)	-0.029 (0.024)	-0.029 (0.024)
Mean of Dependent Variable (growth)	0.84	0.84	1.43	1.43	2.06	2.06	2.85	2.85
n	218	218	218	218	218	218	218	218
Recession FE	yes	yes	yes	yes	yes	yes	yes	yes
State FE	yes	yes	yes	yes	yes	yes	yes	yes
F-statistic	6.2	6.2	17.9	17.9	23.7	23.7	24.9	24.9
Within R^2	0.28	0.29	0.42	0.42	0.54	0.54	0.62	0.62

Notes: * p < 0.10, ** p< 0.05, *** p < 0.01. OLS. Robust standard errors clustered by state in parentheses. Length is residual of actual length versus predicted length. Predicted length calculated from a linear regression of length on depth and all sectors shares with recession and state FE, with same sample restrictions. Sample excludes AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN in 1969, AK, ID, LA, NM, ND, OK, TX, UT, WA and WY in 1973, CO and FL in 1980, ID, LA, MN, TX, UT and WA in 1990, and MI and WY in 2001 recession.

Table 11. Counterfactual Analysis: Marginal Effect of the Rise of Non-Tradable Services

	All States (n = 249)		*Excluding States that Never Fully Recover (n = 239)*		*Excluding States that Never Enter Recession (n = 218)*		*Including Only States that Enter Recession and Fully Recover (n = 208)*	
	Only Non-Tradable Services	All-Sector	Only Non-Tradable Services	All-Sector	Only Non-Tradable Services	All-Sector	Only Non-Tradable Services	All-Sector
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
	Panel A. Employment Cycle							
Predicted 2007 Employment Cycle (months)	71.2	70.4	71.6	70.0	71.9	70.9	71.6	70.5
Counterfactual 2007 Employment Cycle (months)	50.0	43.8	51.4	43.6	50.4	44.9	51.1	44.2
Marginal Impact of Non-Tradable Services on Employment Cycle (months)	21.3	26.6	20.1	26.4	21.5	26.1	20.5	26.3
Mean Value of Employment Cycle (months)	32.0	32.0	29.5	29.5	36.6	36.6	33.9	33.9
Marginal Impact of Non-Tradable Services on Employment Cycle (%)	67%	83%	68%	90%	59%	71%	61%	78%
	Panel B. Recovery Length							
Predicted 2007 Recovery (months)	46.2	45.4	46.6	45.0	46.9	45.9	46.6	45.5
Counterfactual 2007 Recovery (months)	31.2	27.9	34.5	28.7	31.6	29.8	34.2	29.9
Marginal Impact of Non-Tradable Services on Recovery (months)	15.0	17.5	12.1	16.3	15.3	16.1	12.5	15.6
Mean Value of Recovery (months)	16.9	16.9	15.6	15.6	19.3	19.3	17.9	17.9
Marginal Impact of Non-Tradable Services on Recovery (%)	89%	103%	78%	105%	79%	83%	70%	87%

Source: Authors' calculations from regression results. Predicted value for 2007 uses actual values of the independent variables for 2007-2009 downturn. Counterfactual value uses non-tradable services share of GDP for 1955-1957 and actual values for 2007-2009 downturn for all other independent variables.

Table 12. 2007 Employment Cycle by State		
	Recovered as of April 2015	**Not Recovered as of April 2015**
High Service Share	California	Arizona
	Colorado	Connecticut‡
	Delaware‡	Florida
	Maryland	Illinois
	Massachusetts	Nevada
	Minnesota	New Jersey
	New Hampshire	Pennsylvania
	New York‡	Rhode Island
Medium Service Share	Georgia	Maine
	Hawaii	Michigan
	Iowa‡	Missouri
	Kansas	Ohio
	Montana	
	Nebraska	
	South Dakota‡	
	Tennessee	
	Utah	
	Vermont	
	Virginia	
	Washington	
	Wisconsin	
Low Service Share	Alaska†	Alabama
	Arkansas	Idaho
	Indiana	Mississippi
	Kentucky	New Mexico†
	Louisiana†	
	North Carolina	
	North Dakota	
	Oklahoma†	
	Oregon	
	South Carolina	
	Texas†	
	West Virginia†	
	Wyoming†	
† = high mining share		
‡ = high finance share		
Mining and finance shares are ranked by natural breaks in the data.		
States listed alphabetically by group. States in the top third of the service-share distribution are considered high service states, etc.		
Source: Author's calculations from BLS State and Area Employment and BEA Gross Domestic Product by State.		