GOODS, SERVICES, AND THE PACE OF ECONOMIC RECOVERY

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Abstract

We argue that service-based economies experience slower economic recoveries than goods-based economies. Using national and state-level data for the United States for post-WWII recessions, controlling for the depth of the downturn, we find that the higher is the share of services in output, the longer is it takes an economy to recover from recession using a variety of measures of the employment cycle. Extending our results to the 2007 recession, the marginal impact of rise in services will make the post-2009 recovery last about 1 year longer than it would have a half-century ago. We offer two hypotheses for this relationship and explore policy options to mitigate the negative external macroeconomic effects of a larger service sector.

Keywords: services, deindustrialization, economic recovery, employment, Great Recession

JEL classification codes: E24, E32, L80, N12

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1 INTRODUCTION

Recovery from recessions takes longer than it has in the past. The current crisis aside, this change has not happened because recessions themselves are longer. Nor has it occurred because recessions are deeper than in the past. Instead this change is the result of slower economic growth following the end of a recession.

As shown below in Figure 1, which reproduces a graph from the Calculated Risk blog (http://www.crgraphs.com/), the four longest recoveries since 1948, as measured by the number of months it took until the economy recovered all of the jobs lost during the recession, also have been the four most recent recoveries—those that followed the recessions of 1981, 1990, 2001, and 2007.¹

₁ A detailed data appendix and full data set are both available from the authors upon request.

Figure 1 here>

It is not simply that the downturns are longer; recoveries have become longer relative to the length of the downturn.² Figure 2 compares the number of months it takes private employment to recover to its previous peak (employment cycle) with the length of the downturn as determined by the NBER (recession length). The employment cycle relative to recession length has increased sharply since 1980.

Figure 2 here>

Over the same period, an ever-increasing share of the economy is services, as shown in Figure 3. Regardless of which measure we use, there is a striking increase in the service share over the past 60 years. In 1950, 40 percent of expenditures for U.S. GDP were for services and service-

² Although the recovery from the 2007 recession is not yet complete, we include it in our figures and tables for expository purposes. However, in our regression analysis we omit 2007 because the economy is not fully recovered.
producing jobs were 48 percent of employment. By 2010, services constituted over 65 percent of expenditures for GDP and service-producing jobs were nearly 70 percent of employment.\(^3\)

We argue that the shift from being a goods-producing economy to a service-producing economy—what some have termed “deindustrialization”—is causing the pace of economic recoveries to slow. Services can only be produced in response to actual—not anticipated—demand. As an economy begins its recovery, production of goods for inventory or export can spur increased incomes and further increase spending and production.\(^4\) But in the extreme, service-dependent economies will remain moribund: There is no source of increased incomes, spending, and production. The result is that the more services an economy produces relative to goods, the slower and thus the longer its recovery.

U.S. data at the national level supports this argument, but covers only 10 post-WWII recessions and is subject to spurious correlation as there are two increasing trends over time. We therefore test our hypothesis using a panel of state-level data for the United States covering the 5 recessions between 1969 and 2001. 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 economy over the last half-century added about one year to the current economic recovery.\(^5\) In other words, a recovery that would have lasted 6 months in the 1950s will last 18 months today. And one that should have unfolded over 6 years, such as the Great Recession, will now stretch on for more than 7 years.

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\(^3\) Section 3 provides a detailed descriptive analysis of the composition of the service sector.

\(^4\) We explore these hypotheses in more detail in Section 5.

\(^5\) 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 due to the combination of the popping of the housing bubble and the ensuing financial crisis in 2008. Our argument is a marginal one; that the rise of services since the 1950s will add an additional year to the current recovery.
2 THE PACE OF RECOVERY

As seen in Figure 1 above, recoveries have shifted from being V-shaped toward being more U-shaped. What might cause this? 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. Gali, Smets, and Wouters (2012) and Smets and Wouters (2007) argued that, since 1990, demand shocks during recoveries—lower investment spending, and less expansionary fiscal and monetary policy—have slowed recoveries, in addition to depressed credit conditions (Kannan 2012), which can lead to lead to permanent output losses (Cerra and Saxena 2008). For the current recovery, Lazear and Spletzer (2012) argued that “the problem is not that the labor market is underperforming; it is that the recovery has been very slow.” (p. 33). The issue is not jobless recoveries, but slow recoveries.

Turning to more secular trends, Stock and Watson (2012) found evidence that the recovery from the Great Recession, and all future downturns, 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, in addition to real wage stagnation stemming from rising income inequality (Saez, Slemrod, and Giertz 2012) and skill mismatch (Goldin and Katz 2008). Relatedly, Basu and Foley (2011) 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 because NIPA estimates of output are imputed from income.6

6 More directly, they argue “service industries tend to have a lower responsiveness of employment to output than non-service industries, in part because output is hard to measure in some service industries and incomes in service industries such as FIRE are weakly related to aggregate demand” (p. 3).
But the above analyses use national data, which can obscure important variation between states. Blanchard and Katz (1992) found that labor mobility—outward migration of workers from contracting states and inward migration of workers to expanding states—preceded by firm relocation is how states adjust to shocks. For example, the rapid employment growth in mining states since the late 1990s has been driven by the increased use of hydraulic fracturing technology, which 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.7

On a even more disaggregated level, and more directly related to our argument, but only covering the 2000-2011 sample, Charles, Hurst, and Notowidigdo (2013) used MSA-level data and found that 40 percent of the rise in non-employment—unemployment plus workers dropping out of the labor force—was caused directly by the decline in manufacturing employment, a drop that was masked by housing-bubble related increases in employment during their sample.

The primary take away is that 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.

3 THE SERVICE SECTOR

3.1 DESCRIPTIVE ANALYSIS

There are four main ways to measure the size of the service sector: services as a share of GDP based on expenditure accounts, services as a share of GDP based on value-added by industry, services as a share of private-GDP (excluding government sector) based on value-added by industry, and service-producing employment as a share of private employment (see Figure 3). In every case, the switch from goods to services is striking and shows no signs of abating.

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7 Our state-level results are insensitive to controlling for differences in population growth rates and labor mobility.
Yet, the service sector is quite heterogeneous and encompasses a wide range of activities. There are “bad” service jobs with low pay, no benefits, and insecure hours, and there are “good” service jobs with high pay, good benefits, and job security. Figure 4 shows employment in several sub-categories of services, expressed as a share of total employment. Little change was evident in several categories not shown in the figure: legal services, education, accommodations, wholesale trade, and transportation. Strong growth over the last half century is seen in health care, retail trade and restaurants, and “all other services.” In contrast to received wisdom, there is only moderate growth in employment in the finance, insurance, and real estate—the FIRE sector.

Figure 5 breaks out services by pay category based on wage and salary accruals per full-time equivalent (FTE) worker in 1950 and 2011. “Median-pay jobs” are those that fell within 5 percent of the overall median wage per FTE worker. Employment in high-paying service jobs—FIRE and legal—rose only slightly over the last sixty years. Employment in low-paying 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. Over the same period, goods-producing jobs, most of which are high-paying jobs, dropped precipitously.

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8 The breaks in 1998-2000 are necessitated by the change in classification strategies from SIC to NAICS coding. 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 cases, it is relatively easy to come up with close matches between SIC and NAICS. But in other cases it is nearly impossible without digging deeply into the data. Figure 4 shows the categories for which a reasonably close match between SIC and NAICS was possible.

9 “All other services” excludes legal services, education, accommodations, wholesale trade, and transportation, as well as the categories shown in Figure 4: FIRE, health, retail trade and restaurants.
3.2 THE RISE IN SERVICES

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 EU, U.S., and Japan from 1980-2005 and attribute it 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 to argued that the rise of services is due to faster productivity growth in manufacturing (affecting employment patterns), which change relative prices for goods and services (tempering the rise of services), and combined with rising incomes which will favor services demand because the income elasticity of demand for services is higher than income elasticity of demand for goods.

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.10

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.

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10 Although appealing for certain sectors—food, cleaning, education—Buera and Kaboski’s hypothesis falls short in explaining the rise of other, large service sectors, such as finance.
3.3 INPUT-OUTPUT ANALYSIS

Our hypothesis is that increases in service production will lengthen recoveries. But what if the production of services requires increased use of goods inputs? We use input-output tables from the Bureau of Economic Analysis to determine whether or not production of services is dependent upon inputs of goods and aggregated the data to provide estimates of the contributions to total output from primary inputs (agriculture and mining), manufactured inputs, services, and value added. Table 1 shows that the production of services requires relatively few goods inputs, but, in further support of our hypothesis, highlights that service inputs used in the production of goods has risen over time.11

<Table 1 here>

4 EMPIRICAL ANALYSIS

Using national time series data for the 10 recessions from 1948-2001 and a panel of state-level data for the 5 recessions from 1969-2001 (250 data points),12 we find that an increase in services lengthens economic recoveries.13 We omit the 2007 downturn because the recovery is not yet complete. But we are able to use our results for the previous recessions to estimate two values of the employment cycle length for 2007: a predicted value using the actual services share as the economy entered the 2007 downturn, and a counterfactual value using the services share as the economy entered the 1957 downturn. The difference between the predicted and counterfactual

11 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 decline.

12 Complete state-level GDP data by sector begin in 1963, thus the earliest recession we can analyze is 1969.

13 Our argument is that more service-dependent economies will experience slower and therefore longer recoveries. We do not make a symmetrical claim for recessions: we do not find, nor did we expect, that a shift from goods to service production affected the depth or length of the downturn. More detailed results are presented in the robustness checks in section 4.4.
values provides a measure of the marginal impact of services on recovery length: how much longer the recovery from the 2007-2009 downturn will be as a result of the rise of services over the last half century.

4.1 VARIABLES

The core variables in this analysis are employment cycle length, the share of services, and a control for the depth of the downturn. National data offer options for each variable, but state data are more limited. Our national results are consistent across measures, assuring us that the lack of data flexibility for the state level analysis is not problematic.

**Dependent Variable: Employment Cycle Length**

We have two broadly-defined measures of cycle length, both based on employment: the full employment cycle (peak-to-peak), and the recovery (trough-to-peak). The length of the employment cycle is the number of months it takes private employment to recover its previous cycle peak. The second measure is the recovery length, using slightly different measures for the national versus the state data. At the national level, recovery length is defined as the difference between the lengths of the employment cycle and NBER-defined recession. Because the NBER does not date state recessions, recovery length at the state level is defined as the number of months it takes private employment to recover its previous cycle peak once employment has reached the trough. Table 2 shows the national data.

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14 We 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 does not alter our results. Thus we only report values for the strong form of the employment cycle.

15 The raw data for total private 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
At the state level, there are two sets of special cases: states that never experience a downturn and states that do not achieve their previous peak before the next recession begins. Figure 6 shows the within-recession and between-recession variation in the employment cycle by state, along with the substantial re-ordering of which states have long versus short cycles, for the 1969 and 2001 downturns, while Figure 7 shows the variation in cycle length by state for all five recessions in our analysis. Table 3 shows high degree of between-recession variation using state averages of the employment cycle.

Therefore used to seasonally adjust the 1960-1989 data.

16 If firms, especially service producers, rely on part-time employees, they could procyclically adjust hours rather than employment. This would cause our measures of the length and depth of the cycle, which use total employment, to miss the movement in total worker hours and thus might be upwardly biased. We analyze this possibility using Bureau of Economic Analysis data by sector on the number of full-time and part-time workers, and the number of full-time-equivalent (FTE) workers. Although the data are only available annually, there is no evidence that our measure is biased. In fact, we find that goods workers are more likely to have full-time jobs than are service workers, and service workers are more likely to have full-time jobs than are government workers. The likelihood of a goods worker having a full-time job has not changed much over the past 60 years. Service workers were increasingly likely to be part-time workers from 1950 to about 1970, but since about 1980 they have been increasingly likely to be full-time workers. The real change is for government workers, who are more likely today to be part time than at any previous time.

17 Productivity data from the Bureau of Labor Statistics give some hints about business hiring patterns during recessions and recoveries. Data for productivity growth for services must be inferred from the differences between nonfarm business and manufacturing productivity growth. In recessions, productivity growth in manufacturing is 4.5 times as large as overall productivity growth, so productivity growth in services must be small or negative. If output fell proportionately in goods and in services, those results are consistent with manufacturing shedding workers and services hoarding workers in a downturn. However, during the recovery—the first four quarters after the NBER-end of the recession—manufacturing productivity growth is less than 0.1 times as large as overall productivity growth, implying that productivity growth in services in recoveries must be about the same than productivity growth in goods production. The implication here is that in the recovery phase we do not see vastly different patterns of employment relative to output between the two sectors. Our results are thus not contaminated by different hiring patterns in the goods and service sectors in recovery.

18 For the 1969-70 recession, AK, AZ, CO, FL, HI, ID, NE, NV, NC, ND, SC, and TN do not experience a downturn, while NY never recovers. For the 1973-75 recession, AK, ID, IA, LA, MT, NM, ND, OK, SD, TX, UT, WA, and WY have no downturn, and all states fully recover. For the 1980-82 recession, CO and FL do not experience a downturn, while LA, OK, WV, and WY never fully recover. For the 1990-91 recession, ID, LA, MN, TX, UT, and WA do not have a downturn. And for the 2001 recession, WY has no downturn, while IL, IN, MA, MI, MS, and OH never recover.
Independent Variable: Services

Services as a share of the aggregate economy is measured four ways at the national level: services as a share of GDP based on expenditure accounts, services as a share of GDP based on value-added by industry, services as a share of private-GDP (excluding government) based on value-added by industry, and service-producing employment as a share of private employment. Our national results were not sensitive to how we measured services share. At the state level, we have just one measure: GDP data based on value-added by industry which was aggregated by industry to calculate services as a share of GDP by state.¹⁹

We use the three-year average of the services share, ending in the year the recession began, to smooth out fluctuations that may themselves be due to the business cycle. There is a lot of variation in the share of services by state. Figure 8 shows the variation in the percentage of services by state for two periods, 1967-1969 and 2005-2007, and Figure 9 shows the variation in services share by state for all five periods in our analysis.

<Figure 8 here>

<Figure 9 here>

There are many interesting transformations in the composition of state output. Figure 8 shows that in 1967-1969 Nevada had the highest share of services at 72 percent, but by 2005-2007 it had fallen to 66 percent.²⁰ Delaware saw its service share nearly double from 47 percent to 86 percent—due to the relocation of financial firms—while its goods share fell from 47 percent to 10 percent. These figures also show that changes in the service share are not constant across states or

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¹⁹ The transition from SIC to NAICS coding in 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.

²⁰ 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.
recessions. By 2007, Alaska, Kentucky, and South Carolina no longer had the lowest shares of services; oil-rich states such as 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.

**Independent Variable: Depth**

Using national data, Wynne and Balke (1992) find that the pace of recovery measured as the first 12 months of growth from the trough is a function of the depth but not the length of a downturn, a factor we control for and one that strengthens our results. We measure depth as the percent change in employment from cycle peak to trough.  

4.2 NATIONAL ANALYSIS

The national regressions should be considered no more than a tantalizer because, although these data provide more flexibility, there are far fewer degrees of freedom since there are only 10 data points which might be subject to spurious correlation. We regress the employment cycle and the recovery length on the share of services, with and without controls for depth. Tables 4 and 5 present the results for the employment cycle and recovery length, respectively, using all four measures of the service share as independent variables in turn.

<Table 4 here>

<Table 5 here>

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21 In unreported national results, we also measured depth as the total percent change in real GDP from the NBER-beginning to the NBER-end of the recession, and as the percentage point change in the unemployment rate from the NBER-beginning of the recession to the peak unemployment rate reached. Our substantive results do not depend on the measure of depth we use. For the state analysis, we cannot use the second two measures because timing of downturns vary by state and so state-level change in real output from the NBER-dated beginning to the NBER-dated end of the downturn does not really control for the depth of the downturn in any one state. Each state has its own experience—some starting later, some ending earlier, some ending later, some never turning down at all.
In all specifications, our hypothesis is confirmed: more services are associated with longer business cycles. The coefficient on the services share is positive; the full employment cycle and the recovery both lengthen as the share of services increases. Our results are not only robust to controlling for the depth of the recession, they are strengthened. A 1 percentage point increase in the services share is associated with a 1.5-2.1 month increase in the employment cycle and a 1.2-1.7 month increase in the recovery length.

Despite the small sample size, the advantage of the national regressions is that they show that the choice of dependent or independent variables does not substantively change the results. We have two measures of cycle length and four different measures of the share of services. In all cases, our hypothesis is supported. We find the lack of variation in those coefficients encouraging.22

Counterfactual Analysis

Our results allow us estimate the marginal impact of the rise of services on the length of the recovery from the 2007 recession.23 We use the estimates from regressions that end with the 2001 downturn to forecast actual and counterfactual values for the 2007 downturn. The counterfactual value is estimated using the 1955-1957 shares of services—the service share as the U.S. economy entered the 1957 recession—and the 2007-2009 depth of downturn. The difference between the actual and counterfactual cycle length shows the marginal effect of the rise of services over the last half century on the length of recovery.

As the 2007 downturn began, the three-year average for services as a share of final output was 62 percent. Fifty years earlier, the three-year average as the economy entered the 1955-1957

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22 In addition to the variations shown in the text, when we use all three available depth controls and use nonfarm employment to measure recovery lengths, our results are, again, consistent across all measures.

23 Since we only have 10 data points, these results should be taken with a very large grain of salt. However, our state results which follow in Section 4.3, correct for the small sample size and temporal issues with the data.
downturn was 43 percent. The marginal impact of the rise in service production since the mid-1950s causes the recovery from the 2007 recession to be about 2-3 years longer.

### 4.3 STATE ANALYSIS

The national regressions have a small sample size and there are strong temporal effects, so with only 10 time series data points the models might simply be picking up spurious correlation. Therefore, we use a panel of state-level data for 5 recessions, giving us up to 250 observations. Controlling for depth and time, our results continue to support our hypothesis: the more services an economy produces, the longer its economic recovery.

State-level analysis also allows us to take advantage of the heterogeneity in output shares by state, which gives us a richer and more varied data set. The downside is that complete output data by sector by state begin in 1963, forcing our analysis to begin with the 1969 recession. Following Basu and Foley (2011), we treat the 1980 and 1981-1982 double-dip recession as one single business cycle, which on a national level begins in January 1980 and ends in November 1982, for a total length of 35 months.

Our dependent variable is the employment cycle: the number of months it takes employment to recover its previous peak. Since 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 within 12 months (minus or plus) of the NBER start date.

Eleven states never recover their previous-peak level of employment and are omitted from the analysis. These states do however reach a trough, so we are able to compute the depth of their

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24 We tried top-coding the states that never fully recover, measuring the cycle length as the number of months until the next recession began. Our results were consistent with our hypothesis but made no sense empirically. Because states begin their downturns in varying months, and because recession-to-recession lengths vary across the decades, the value of the top-code was different for each state. We attempted to address the top-coding issue directly by using employment-population ratios instead of employment levels because top-coded states are often states that were also
downturn, which we use in robustness checks described in section 5. For states that never experience a downturn, we bottom-code their cycle length at 0 and depth is set to 0. The independent variables are the share of services in gross state output and the depth of the downturn.

To check for the robustness of our results, we vary the data set in two ways. After including all 239 observations, we then exclude the states that never go into recession (“bottomcodes”). Second, we also exclude states with a high share of accommodations—which is our proxy for tourism services—and finance in their output.\(^{25}\)

Why do we exclude states with high shares of accommodations and finance? As discussed further in Section 5, our analysis implicitly assumes that the demand for services is generated internally—within a state, in this analysis. More services lead to slower recoveries, we argue, because there is less internal demand to spark a boom in output as an economy emerges from the bottom of the cycle. But there are two types of services that can easily be exported, allowing external demand to spark a recovery: tourism and finance.\(^{26}\) For example, 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 not be slowed. 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, and thus recovery in finance-heavy states might not be slowed. However, whether we include or exclude

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\(^{25}\) High accommodations states for all five recessions are HI and NV. The states with the top shares of financial services for the 1969-70 recession are, interestingly, HI and NV; for 1973-75 and 1980-82 they are CT and NY; for 1990-91 they are DE and NY; and for 2001 they are CT, DE, NY, and SD.

\(^{26}\) On the other hand, Goe (1994) in a study of two midwestern SMSAs found that revenue for services largely comes from local, not external, demand.
high-accommodation states or high-finance states or both, our core results are robust: more services means longer recoveries.

We face two data issues: temporal effects and truncated observations. Although not every state demonstrates monotonic increases in its services share, enough do that cycle length and the share of services are strongly correlated over time. (State-level measures of recession depth are not correlated with year.) To remove this temporal effect, we use OLS with fixed effects by year.

Nearly 15 percent of our data set—34 observations out of 239—is bottom-coded at 0 because the state never enters a recession. OLS forces a linear relationship on these data, resulting in biased coefficients. To address this truncation issue, we use Tobit regressions.

Because Tobit models are non-linear, we cannot use fixed effects to deal with temporal issues. Thus we transform the independent variables to be deviations from their year-specific means to account for temporal issues. For example, we compute the 1973 average share of services across all 50 states, and then subtract that from the state-specific values of services for 1973. This transformation removes the time effect; although state-level values of services shares are correlated with time, state-level values of deviations from the year-specific mean of services shares are not correlated with time.

Our results are in Table 6, where our hypothesis is confirmed: the more services, the longer the recovery from downturns. Furthermore, our results are insensitive to including or excluding high accommodations and high finance states. Excluding these states using OLS with fixed effects by year and robust standard errors strengthens the effect of services on recovery from the 10 percent to the 5 percent level, but while using the Tobit models—our preferred specification—the share of services is robustly significant at the 1 percent level in both cases.27

Table 6 here

27 In additional results available from the authors we excluded just the high-accommodation states, and then just the high-finance states. Our results are robust to these variations.
Counterfactual Analysis

What is the impact of the rise of services on the length of the recovery from the 2007 recession? Using models that end with the 2001 downturn, we compute the predicted cycle length for the United States using the 2005-2007 share of services and the 2007-2009 depth of downturn. We then compute a counterfactual value for the U.S. using the 1955-1957 shares of services and the 2007-2009 depth of downturn. The difference between the actual and counterfactual cycle length shows the marginal effect of the last half-century’s rise of services on the length of recovery. The results are shown in the bottom row of Table 6. Our favored results are in columns (4) and (5). The rise in services over the last half-century added about a year—13 months—to the current recovery.

We replicated this procedure for each recession from 1973 to 2001, and the results are shown in Figure 10. The difference between the actual cycle length and the counterfactual cycle length shows the marginal impact the rise of services since 1955-57 had on recovery length.

Because of structural shifts in the U.S. economy toward more service production and employment, we can expect the recovery from the 2007 downturn to be approximately 1 year longer than it would have been a half century ago. Using the monthly average of job gains per month from the start of the recovery in July 2009 until this writing (August 2013), we estimate that it will take approximately 7 years for the economy to recover all of the jobs lost since the start of the Great Recession. Without the rise in services, this recovery would have taken 6 years. A larger service sector will make all subsequent recoveries from downturns slower and longer—a negative macroeconomic externality due to the shift from a goods-producing economy to a service-producing economy.
4.4 ROBUSTNESS CHECKS

We conduct a series of sensitivity tests to assess the robustness of our results. In all cases, our results are insensitive to the alternative specifications.28

Selection of Peak and Trough

Business cycles are rarely perfect parabolas with obvious peaks and troughs. Sometimes there are several local peaks before or after a global peak; sometimes there are multiple local troughs before or after a global trough. As a robustness check, we re-ran all regressions with several variants of “peak” and “trough.” Our results were not dependent upon the specific choices of peak and trough.

In the results reported in Table 6, 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. In results available from the authors, 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 “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 “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.

Trough-to-Peak Cycle Length

In the results reported in Table 6, we use as our dependent variable the full employment cycle—the number of months from the start of the downturn to the time the state regains its previous peak.

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28 Detailed results for all sensitivity tests, including supplementary results using different peak and trough definitions and rounding parameters, are available from the authors upon request.
employment level. Our data allows us to break this into its two parts: the length of the peak-to-
trough decline (the downturn) and the trough-to-peak increase (the recovery). Our results are not sensitive to using the peak-to-peak employment cycle rather than the trough-to-peak recovery as our dependent variable. We estimated the models from Table 6 using OLS with fixed effects. In all instances, the coefficient on services was positive and its effect on recovery time is significant at the 5 percent level. The choice of recovery measure—peak-to-peak employment cycle or trough-to-peak recovery—does not alter our results.

Recession Length and Depth

Our analysis shows that recovery from recessions takes longer the higher the share of services. But due to the rise of services, are downturns themselves longer? Are they shallower? If recessions are shallower, then longer recessions and recoveries might not be such a concern for macroeconomists and policymakers. Certainly this is the common wisdom, borne of observations on a national level since 1990. However we do not find evidence to support this statement.

We checked three things. First, is the share of services correlated with the length of the downturn, the number of months from employment peak to trough—the first part of the employment cycle? We did not find supporting evidence for this claim. Using OLS with year fixed effects, the coefficient on services was positive, but with a p-value of 0.851. Second, is the share of services correlated with the depth of the downturn, the percent decline in employment from peak to trough? Again, we find no supporting evidence. Using OLS with year fixed effects, we obtain a negative coefficient, but the p-value on services is 0.713. Finally, is the share of services correlated with the likelihood that an economy experiences any size downturn at all? And again we do not find

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29 We did not need to replicate the Tobit results because we had no bottom codes. If a state had no downturn, it had no trough, and therefore had no measure of trough-to-peak recovery.
any supporting evidence. A dprobit regression of an indicator variable called “downturn,” which
equaled one if the state experienced any downturn, returned a positive but statistically insignificant
coefficient. Service-heavy states were slightly more likely to experience downturns, but the effect was
not significant at the 90 percent level.

Summary
Our empirical analysis stands up to a wide array of sensitivity tests. In all cases, we find a positive
statistically significant relationship between the size of a state’s service sector and the length of its
recovery from recessions. We explore two reasons why this might be the case in the following
section.

5 EXPLANATIONS
There is a strong and robust empirical relationship between the size of the service sector and the
length of recoveries. We show in this section that recoveries are longer because they are slower. We
offer two complementary explanations for the slow pace and resulting longer length of recoveries in
service-dependent economies: services cannot be produced in anticipation of demand, and services
cannot be exported. Both possibilities share a common theme in that services, unlike goods, can
only be produced when actual domestic demand exists.

5.1 BOUNCING ALONG THE BOTTOM
Recoveries are longer in more service-dependent economies because employment grows more
slowly from the trough. Visually, recoveries in service-dependent economies are more U-shaped
and less V-shaped. To demonstrate this, we calculated the growth rate in employment from the
trough over 1-, 2-, 3-, and 4-quarter periods and use this “bouncing on the bottom” measure as our
dependent variable. Our independent variables are the services share of state GDP, the depth of the downturn (percent decline in employment, peak-to-trough), and the length of the downturn (number of months, peak-to-trough). Using OLS with fixed effects by year and robust standard errors, we find that employment growth is slower in service-heavy economies than in goods-heavy economies. The results are in Table 7.

<Table 7 here>

Services exert a negative and statistically significant effect on the growth rate of employment at the 1st, 2nd, 3rd, and 4th quarter following the trough. The effect is not small. The average 1-quarter growth rate of employment following the 2001 trough was 0.4 percent. For every 10 percentage point increase in the share of services, the growth rate was one-half lower. A similar 10 percentage point increase in the share of services lowered the post-2001 trough 4-quarter growth rate by one-third, from 1.3 to 0.85 percent. These results become more pronounced and statistically stronger when high-accommodations and high-finance states are excluded, columns (2), (4), (6), and (8).

Why the slow growth in employment from the trough? When the economy hits a trough, service-dependent economies have fewer options for stimulating a recovery. In a manufacturing economy, anticipated demand can spur businesses to increase employment and output. In an export-based economy, external demand can call forth increased output and employment. But in a service-based economy, increased output and employment is dependent upon actual increases in demand. The result is that service-based economies exhibit slower growth as they begin the recovery phase of a business cycle.

5.2 ANTICIPATED DEMAND AND INVENTORY

Our first explanation is essentially a closed-economy story, allowing no role for external demand. Businesses producing goods or structures are not dependent on just actual demand to increase
production as the economy comes out of a recession; they can also produce in anticipation of future demand. In other words, domestic demand need not increase before goods production increases.

Goods producers want to produce ahead of demand because customers returning after a downturn do not want to confront empty shelves. The resulting inventory cycle is a long-known characteristic of recessions and recoveries. Wen (2005) found strong empirical support among OECD countries that inventory accumulation is countercyclical because firms want to avoid stockouts, or empty shelves, coming out of recessions (Kahn 1987).

However, service producers cannot respond to anticipated demand. A restaurant cannot produce a meal ahead of demand; 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—for only then can they produce. The greater the share of services in the economy, the greater the share of businesses that must wait for domestic demand to actually pick up before they can increase production. And thus the more services an economy produces, the longer it will take for a recovery to take hold.

If this is the case, is it possible that service-based economies have both longer expansions and less rapid entrances into recessions? In other words, is our first hypothesis symmetrical with respect to decreases in demand? The answer is no. Empirically, as noted in Section 4.4, we found no support for the symmetry argument. From a behavioral perspective, firms are unlikely to lay off workers when demand is strong, even if they think it will decline in the future because that would force firms to forgo revenue in the present period. Predicting the timing of a recession or a sharp downturn in demand is difficult. Indeed, professional economists can only date recessions in hindsight. Firms are unlikely to shed workers in advance of declines in demand, only concurrently or after the fact.
5.3 **EXPORTS**

Our second explanation is an open-economy story, with an explicit role for external demand—external to the state, in this case. Rather than dividing output into goods and services, consider the division between tradables and non-tradables. When an economy produces tradables, external demand can spur a recovery. But an economy that produces mostly non-tradables is dependent on internal demand.

There is a strong but imperfect correlation between the goods versus services division and the tradables versus nontradables. Goods can be exported, so businesses producing goods can respond to increases in external demand independent of the level of their home state’s demand. Most services, on the other hand, cannot be exported. Goe (1994) studied Cleveland and Akron, Ohio and found that the vast majority of revenue of producer services is locally generated. The two possible exceptions are accommodations and finance.

Accommodations are a proxy for tourism, a service that is exported whenever someone travels interstate. Some states—Hawaii and Nevada—are heavily dependent upon tourism. Most banking takes place within one’s own state, but some states have large finance sectors that provide interstate services: Connecticut, Delaware, New York, and South Dakota. These states can have robust recoveries, despite having a large service sector, because of tourism and finance’s exportability. Our results in Table 7 confirm this assertion: when high-accommodations and high-finance states are excluded from the analysis of post-trough growth rates, the negative effect of the rise of services on employment growth is even greater.

These two explanations—the role of anticipations and the role for exports—reinforce each other. Because services can’t be produced ahead of demand, there is no role for anticipations. Service-dependent states that are dependent upon internal demand must experience an actual
increase in demand before increasing output of services. A service-based economy stalls out with no way to restart its engine.

6 POLICY RECOMMENDATIONS

The rise of services is the result of changes in the economy that most people would probably cheer: faster productivity growth in manufacturing and increased incomes of workers (Rowthorn and Ramaswamy 1999). But we have found that this rise causes a significant negative macroeconomic externality—slower and longer recoveries. We present two sets of policies which could speed and shorten recovery time. The first addresses the root cause of our findings, the rise of services, and the second set addresses the result, longer and slower recoveries.

Instead of trying to reduce the size of the service sector, policy could be designed to increase goods production, thus decreasing the share of service output and employment. Any policy that reduces the share of services will increase the speed of recovery. This also suggests that an increased government share—particularly when the government sector does not institute austerity during a downturn—can accelerate recoveries. Industrial policy aimed at restoring the country’s manufacturing sector could be beneficial. For example, tax policy that provides large re-shoring tax credits for goods-producing firms and levies large tax penalties on firms that offshore goods production could increase the share of goods in total output. Additionally, targeted investment in public goods and infrastructure would accomplish the same end (Pollin and Baker 2010).

Alternatively, we could accept longer and slower recoveries as the new norm, but strengthen and expand the social and economic safety net so that it provides adequate support to the jobless and underemployed. The duration and amount of unemployment insurance could be increased, along with nutrition assistance. Health care subsidies and coverage could be more widely offered. Funding for job training programs could be increased. Direct job creation programs, such as an
employer of last resort, could be enacted (Minsky 1986, Wisman 2010). Longer and slower recoveries place a greater strain on state and federal budgets by decreasing tax revenue and increasing expenditures on automatic stabilizers. Since all states, with the exception of Vermont, are required to run balanced budgets, they must implement procyclical fiscal policy in recessions. State-level austerity can be avoided by increasing federal transfers to states during recessions and recoveries.

There is one final alternative, which is to do nothing. But inaction will keep output and employment below potential, causing large and protracted decreases in aggregate demand, not to mention the direct and everyday costs to the unemployed.

7 CONCLUDING THOUGHTS

We find strong empirical evidence for our argument that service-dependent economies experience longer recoveries. The marginal effect of rise in services in the U.S. will cause the current recovery to last about 1 year longer than it would have a half century ago. Our hypothesis is confirmed at the national and state level and the findings are robust to controlling for the depth of the recession and a variety of sensitivity tests.

We offer two possible explanations for why more services leads to longer recoveries. The first is a closed-economy hypothesis that argues that goods-producing businesses can produce in anticipation of increasing demand because retailers want to build up inventory to avoid stockouts once consumer demand appears. Service producers, however, cannot inventory their products and must wait until consumers appear. The open-economy hypothesis suggests that, since goods can be exported and services, for the most part, cannot, goods-producing firms can export their output if external demand increases.
Although the rise of services is a long-term, secular trend, policies to avert longer recoveries can be enacted. Doing so requires that politicians find the will to use aggressive fiscal policy to create full employment during a downturn. (This is especially crucial under current circumstances because monetary policy is up against the zero lower bound.) In the current political environment, though, we are not optimistic. But if the expansionary powers of fiscal policy are ignored, recoveries will continue to lengthen, exacting a severe toll on workers, firms, and the macroeconomy as a whole.
REFERENCES


Figure 1. The Lengthening of Employment Cycles, 1948-2007

Source: Authors’ calculations from Bureau of Labor Statistics data
Figure 2. The Lengthening of Economic Recoveries, 1948-2001

Source: Authors’ calculations from National Bureau of Economic Research and Bureau of Labor Statistics Data
Figure 3: Services as a share of GDP or employment, 1950-2011

Source: Authors' calculations from Bureau of Economic Analysis and Bureau of Labor Statistics Data
Figure 4. Employment Share by Service Industry, 1950-2011

Source: BEA.gov, Table 6.5 (Full-Time Equivalent Employees by Industry). SIC codes for 1950-2000; NAICS codes for 1998-2011. Some NAICS categories were combined for closer equivalency with SIC categories. Categories that showed little change over the time frame are omitted: legal services, education, accommodations, wholesale trade, transportation. "All other services" excludes omitted categories as well. Data accessed 4-16-13.
Figure 5. Employment Share in Goods; and Low-, Median-, and High-Pay Service Industries, 1950-2011

Source: BEA.gov, 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 1998-2011. Categories that can be matched across SIC-NAICS transition were sorted based on wages per FTE in 1950 & 2011. 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 6. Variation in Cycle Length by State, 1969 and 2001

Source: Authors' calculations from Bureau of Labor Statistics data
Figure 7. Variation in Cycle Length by State for Five Recessions

Box shows 25th and 75th percentile. Whiskers show range for adjacent values. Outliers shown as dots.
Figure 8. Services as a Share of Total Output by State, 1967-69 and 2005-07

Source: Authors’ calculations from Bureau of Economic Analysis data
Figure 9. Variation in Services Share of Output by State for Five Recessions

Box shows 25th and 75th percentile. Whiskers show range for adjacent values. Dots are outliers.
Figure 10. Counterfactual Employment Cycles

Source: Authors’ calculations
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<th>Year</th>
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<th>Goods</th>
<th>Services</th>
<th>Value Added</th>
<th>Agriculture &amp; Mining</th>
<th>Goods</th>
<th>Services</th>
<th>Value Added</th>
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<td>13.4</td>
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<td>10.2</td>
<td>23.0</td>
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<td>7.2</td>
<td>30.4</td>
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Source: Author’s Calculation from BEA data
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<th>Recovery length</th>
<th>Peak private employment month</th>
<th>Months until peak employment recovered</th>
<th>Employment Cycle Length</th>
<th>Recovery Length</th>
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<td>Sep-48</td>
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<td>24</td>
<td>Apr-57</td>
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<td>Apr. 1960-Feb. 1961</td>
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<td>12</td>
<td>Apr-60</td>
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<td>Mar. 2001-Nov. 2001</td>
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<td>47</td>
<td>Dec-00</td>
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<td>Dec. 2007-Jun. 2009</td>
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<td>Jan-08</td>
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Source: Author’s Calculation from NBER and BLS data
Table 3. Employment Cycle Length, State Averages

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<td></td>
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<td>20.4</td>
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<td>Excluding states that never fully recover</td>
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Source: Author's Calculation from BLS and NBER data
Table 4. National Regressions, Dependent Variable: Employment Cycle

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<tr>
<td>Expenditures</td>
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*** 1%
**  5%
* 10%

Robust standard errors in parentheses.
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<td>2.298</td>
<td>2.016</td>
</tr>
<tr>
<td></td>
<td>(1.776)</td>
<td>(1.353)</td>
<td>(1.504)</td>
<td>(1.675)</td>
</tr>
<tr>
<td>n</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>R²</td>
<td>0.63</td>
<td>0.72</td>
<td>0.66</td>
<td>0.61</td>
</tr>
</tbody>
</table>

*** 1%
** 5%
* 10%

Robust standard errors in parentheses.
<table>
<thead>
<tr>
<th></th>
<th>OLS with Fixed Effects by Year</th>
<th>Tobit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All States</td>
<td>Excluding Bottomcodes, High Accommodations, and High Finance</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Service Share of State GDP</td>
<td>0.566* (0.221)</td>
<td>0.690* (0.268)</td>
</tr>
<tr>
<td>Depth</td>
<td>7.850*** (1.037)</td>
<td>7.899*** (0.971)</td>
</tr>
<tr>
<td>n</td>
<td>239</td>
<td>205</td>
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<tr>
<td>Within R²</td>
<td>0.72</td>
<td>0.70</td>
</tr>
<tr>
<td>Between R²</td>
<td>0.40</td>
<td>0.18</td>
</tr>
<tr>
<td>Overall R²</td>
<td>0.66</td>
<td>0.60</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal Impact of Services on Recovery Length</td>
<td>10.6 months</td>
<td>12.9 months</td>
</tr>
</tbody>
</table>

*** 1%
** 5%
* 10%
Table 7. State Regressions, Dependent Variable: Employment Growth Rate from Global Trough

<table>
<thead>
<tr>
<th></th>
<th>1-Quarter Employment Growth Rate</th>
<th>2-Quarter Employment Growth Rate</th>
<th>3-Quarter Employment Growth Rate</th>
<th>4-Quarter Employment Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All states experiencing downturn</td>
<td>Excluding high-finance &amp; high-accommodation states</td>
<td>All states experiencing downturn</td>
<td>Excluding high-finance &amp; high-accommodation states</td>
</tr>
<tr>
<td>Service Share of State GDP</td>
<td>-0.020* (0.009)</td>
<td>-0.027** (0.009)</td>
<td>-0.025** (0.008)</td>
<td>-0.033*** (0.007)</td>
</tr>
<tr>
<td>Depth</td>
<td>0.139 (0.114)</td>
<td>0.189 (0.134)</td>
<td>0.198 (0.127)</td>
<td>0.259 (0.140)</td>
</tr>
<tr>
<td>Length of downturn peak-to-trough</td>
<td>-0.031 (0.024)</td>
<td>-0.047 (0.031)</td>
<td>-0.040 (0.028)</td>
<td>-0.059 (0.035)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1-Quarter Employment Growth Rate</th>
<th>2-Quarter Employment Growth Rate</th>
<th>3-Quarter Employment Growth Rate</th>
<th>4-Quarter Employment Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
</tr>
<tr>
<td>n</td>
<td>215</td>
<td>196</td>
<td>215</td>
<td>196</td>
</tr>
<tr>
<td>Within R²</td>
<td>0.14</td>
<td>0.2</td>
<td>0.18</td>
<td>0.25</td>
</tr>
<tr>
<td>Between R²</td>
<td>0.77</td>
<td>0.69</td>
<td>0.86</td>
<td>0.77</td>
</tr>
<tr>
<td>Overall R²</td>
<td>0.22</td>
<td>0.26</td>
<td>0.32</td>
<td>0.37</td>
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<tr>
<td></td>
<td>0.36</td>
<td>0.42</td>
<td>0.36</td>
<td>0.41</td>
</tr>
</tbody>
</table>

Significance based on p-value
*** 1%
** 5%
* 10%