Regional Science and Urban Economics 59 (2016) 75–89

Contents lists available at ScienceDirect

Regional Science and Urban Economics

journal homepage: www.elsevier.com/locate/regec

Time-to-plan lags for commercial construction projects☆

Jonathan N. Millar [a], Stephen D. Oliner [b,c,*], Daniel E. Sichel [d,e]

[a] Board of Governors of the Federal Reserve System, 20th and C Streets, NW, Washington, D.C. 20551, United States
[b] American Enterprise Institute, 1150 17th Street, NW, Washington, D.C. 20036, United States
[c] UCLA Ziman Center for Real Estate, 110 Westwood Plaza, Gold Hall, Suite B100, Los Angeles, CA 90095, United States
[d] Department of Economics, Wellesley College, 106 Center Street, Wellesley, MA 02481, United States
[e] National Bureau of Economic Research, 1050 Massachusetts Ave., Cambridge, MA 02138, United States

ARTICLE INFO

Article history:
Received 5 November 2014
Received in revised form 30 April 2016
Accepted 11 May 2016
Available online 13 May 2016

Keywords:
Commercial construction
Time-to-plan
Time-to-build
Business cycles
Regulation

ABSTRACT

Gestation lags have long been understood to be an important feature of the investment process. However, previous research has focused on the time-to-build part of the gestation period and has provided little information on the earlier time-to-plan period during which key decisions are made about the project's scope and financing. We develop new estimates of time-to-plan lags for commercial construction projects in the United States, using a large project-level dataset that allows direct measurement of planning lags. We find that these time-to-plan lags are long, averaging about 16 months when we aggregate the projects without regard to size and about 26 months when we weight the projects by their construction cost. The full distribution of time-to-plan lags is very wide, and we relate this variation to the characteristics of the project and its location. In addition, we show that time-to-plan lags lengthened by 3 to 4 months, on average, over our sample period (1999 to 2010). Regulatory factors are associated with the variation in planning lags across locations, and we present anecdotal evidence that links at least some of the lengthening over time to heightened regulatory scrutiny.

1. Introduction

Gestation lags for capital goods – the time required for planning, construction, and installation – have played an important role in macroeconomics for decades. One source of interest in gestation lags is evident in Fig. 1, which shows the average cyclical behavior since the early 1970s of investment in equipment as well as commercial real estate compared with that of real GDP.[1] The chart shows that upturns in both categories of investment have lagged significantly after the start of the recovery in real GDP and that recoveries in commercial real estate have been especially sluggish. Gestation periods for investment have been one way of incorporating such lags into models of aggregate economic fluctuations.

Much recent work has focused on time-to-build models, following on the seminal research of Kydland and Prescott (1982).[2] These models capture some key features of aggregate data and tend to fit the data better than models that do not incorporate such lags.[3] Though there are exceptions, most papers with time-to-build lags assume that investment or construction is spread over about four quarters and that the distribution of spending across quarters is uniform.[4]

Most of the research in this area has focused on the time to *build* or *install* new capital and not on the time to *plan* and *design* new capital projects. Christiano and Vigfusson (2003) labeled this planning period as a time-to-plan lag. Christiano and Vigfusson (2003) and Christiano and Todd (1996) demonstrated that time-to-plan lags are more important for capturing business cycle dynamics than are time-to-build lags.

Notwithstanding the evident importance of time-to-plan lags, relatively little empirical evidence is available on their length. Christiano and Todd (1996) assume that time-to-plan lags are about one-third of

☆ The views expressed in this paper are ours alone and do not represent those of the institutions with which we are affiliated. We thank the editor (Dan McMillen) and two anonymous referees for very helpful comments on an earlier version of the paper.

* Corresponding author at: American Enterprise Institute, 1150 17th Street, NW, Washington, D.C. 20036, United States.
E-mail addresses: jonathan.n.millar@frb.gov (J.N. Millar), stephen.oliner@aei.org (S.D. Oliner), dsichel@wellesley.edu (D.E. Sichel).

[1] We include all business cycles since 1973 except for the 1980 recession and recovery, which was too short to allow the lag dynamics to play out.

[2] For papers with cites to the extensive time-to-build literature, see Altug (1989), Jung (2013), and Kydland et al. (2012). For early work on gestation lags for business investment, see Jorgenson and Stephenson (1967) and Hall (1977).

[3] For business cycle models, see Kydland and Prescott (1982), Jung (2013), Gomme et al. (2001), and Kydland et al. (2012). Bernanke et al. (1999) also emphasize the importance of a delay before investment comes on line for capturing key features of aggregate data. For a horserace comparing investment models with and without time to build see Oliner et al. (1995).

[4] A handful of papers have actually estimated time-to-build lags and the distribution of spending. Mayer (1960) used survey results and estimated a time-to-build lag of five quarters. Montgomery (1995) relied on data from the U.S. Department of Commerce and estimated a lag of five to six quarters; he also found that the distribution of spending is hump-shaped rather than uniform, with a concentration of spending earlier in the construction period. Jung (2013) used estimates from a DSGE model and concluded that lags were six quarters with a hump-shaped distribution of spending.

http://dx.doi.org/10.1016/j.regsciurbeco.2016.05.002
0166-0462/

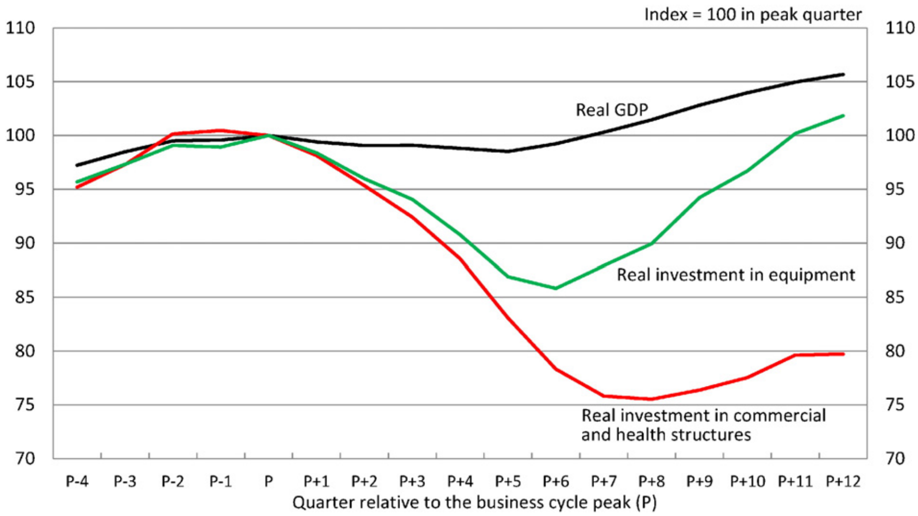

Fig. 1. Real GDP and real business investment around business cycle peaks. Note: Each series calculated as the average across business cycles with peaks in 1973:Q4, 1981:Q3, 1990:Q3, 2001:Q1 and 2007:Q4. Source: Authors' calculations based on data from the Bureau of Economic Analysis (NIPA tables 1.1.3 and 5.3.3).

the total time from a project's conception to its completion. This assumption is consistent with Mayer's (1960) empirical study that identified a preconstruction planning phase of about seven months out of 22 months from when plans are drawn up to project completion. Krainer (1968) also identified significant planning lags in a study of 25 investment projects. And, Millar (2005) identified a time-to-plan lag of about a year based on aggregate data, while Del Boca et al. (2008) highlighted the importance of these lags for structures in a panel of Italian firm-level data. While useful, this evidence is relatively scant, often is based on inferences from aggregated data, and, in some cases, was developed many years ago.

This paper contributes new empirical evidence on time-to-plan lags from individual investment projects. We focus on time-to-plan lags for commercial real estate, where these lags are likely to be especially important given that the projects can be large, complex, and require extensive regulatory review.

We estimate time-to-plan lags using a large project-level dataset from CBRE Economic Advisors/Dodge Pipeline, a commercial vendor of real estate data, supplemented with information about the project's locality from the Census Bureau and other governmental sources. The dataset covers more than 80,000 commercial construction projects in the United States from 1999 to 2010. Our goal is to present new stylized facts about time-to-plan lags from a rich and previously untapped dataset, and our approach is strictly empirical. We leave for future work the development of structural models that incorporate the new stylized facts we develop.

Our analysis generates four main results. First, time-to-plan lags are quite lengthy for commercial construction projects – about 16 months on average – a considerably longer lag than assumed in most prior work. Large projects, which account for a disproportionate share of total construction spending, tend to have even longer lags. Indeed, when we weight the projects by their construction cost, we find that the average time-to-plan lag associated with a given dollar of commercial construction spending is about 26 months. Second, time-to-plan lags vary considerably around these averages depending on the characteristics of the building and its location. For example, as would be expected, time-to-plan lags are longer for larger, more complex projects; we also find that the metropolitan statistical areas (MSAs) with the longest time-to-plan lags are concentrated in California and the Northeast corridor. Third, time-to-plan lags lengthened significantly from 1999 to 2010, rising by an average of three to four months. This increase was widespread, occurring for all types of buildings, in MSAs across the population spectrum, and in most regions of the country. Finally, we find some evidence that the variation in planning lags across locations is associated with differences in land-use regulation, and we present anecdotal evidence that links at least some of the lengthening in planning lags over time to heightened regulatory scrutiny.[5]

Our new empirical results on time-to-plan lags are relevant for several strands of literature. First, as noted above, these lags have been demonstrated to be important in macroeconomics for correctly capturing the lead–lag relationship between investment and output. The lengthy time-to-plan lags that we estimate for commercial real estate are consistent with the delayed and sluggish recovery generally seen for this type of investment. This pattern was especially evident in the aftermath of the Great Recession: real investment in commercial construction did not hit bottom until nearly two years after the trough of GDP in mid-2009 and has since recovered very slowly.[6]

Second, considerable research has focused on how macro variables respond to uncertainty shocks.[7] The planning period captures the phase during which investment projects can be resized, adjusted, delayed, or abandoned at relatively low cost and likely would be the time when the effect of uncertainty shocks is heightened. Thus, to more fully understand the effects of uncertainty on investment, it is essential to look back to the planning period.

Third, our results have implications for the literature on regional and state-level business cycles.[8] A key finding from this literature is that industry mix matters, with the most pronounced cycles typically in areas with a concentration of manufacturing or construction activity. To our knowledge, no study has taken the next step to disaggregate construction activity into the separate influences of housing and commercial construction. Our results suggest that areas with a high concentration of commercial construction or a severe adverse shock to that sector would tend to have slower, more tepid recoveries from recessions.

[5] We are not aware of other research on the effects of land-use regulation on the commercial real estate sector. On the residential side, papers that have examined the effects of land-use regulations on housing supply and home prices include Mayer and Somerville (2000), Ihlanfeldt (2007), Saks (2008), Glaeser and Ward (2009), Saiz (2010), and Huang and Tang (2012). For reviews of this literature, see Quigley and Rosenthal (2005) and Gyourko (2009).

[6] Interestingly, the lag between GDP and investment is not particularly evident around peaks, as shown in Fig. 1. This asymmetry in the pattern of the lag around peaks and troughs has received relatively little attention in the literature and we believe would be worthy of analysis.

[7] For example, see Bloom (2009), Bloom et al. (2012), and Bloom et al. (2007).

[8] See Crone (2006), Owyang et al. (2009), and Magrini et al. (2013). Part of this literature has focused on the regional and state-level effects of monetary policy; see Crone (2007) for a review of this research and Beckworth (2010) for a more recent analysis.