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# Effects of public investment on sectoral private investment: A factor augmented VAR approach <sup>☆</sup>



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### ABSTRACT

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Public investment decreases aggregate private investment in both neoclassical and Keynesian models. There are no findings, however, on how public investment affects private investment on a disaggregated basis, such as sectoral private investment. More specifically, previous research has neglected the distinctions of sectoral investment behavior in response to public investment and the possibility of crowd-in effects in some industries, such as industries blessed with public demand. Meanwhile, public investment decreases sectoral private investment not only by keeping rental cost high, but also by differences in the resource misallocation effect of public investment itself; one sector receives a positive wealth effect while another suffers the opposite. In this paper we use a factor-augmented VAR (FAVAR), a model capable of analyzing large-scale VAR models, to investigate the extent to which public investment is crowded out or crowded in in different categories of industrial investment. Our results demonstrate that public investment confers different effects, both quantitative and qualitative, in individual sectors. This implies that public investment reaps different benefits in different sectors and that it can bring

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the worse effect of resource misallocation on some sectors. *J. Japanese Int. Economies* 27 (2013) 35–47. Kobe University, 2-1 Rokko-dai, Nada, Kobe, Hyogo 657-8501, Japan; Keio University, 2-15-45 Mita, Minato-ku, Tokyo 108-8345, Japan; University of Marketing and Distribution Sciences, 3-1 Gakuen-Nishimachi, Nishi-ku, Kobe, Hyogo 651-2188, Japan.

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## 1. Introduction

Capital investment affects not only the supply side via capital accumulation in the long run, but also the demand side in the short run. This is known as the “duality of investment”. The relatively high fluctuation and instability of capital investment in Japan affects the business cycle.<sup>1</sup>

There are several papers which insist that capital investment is relevant to Japan’s “lost decade”. Hori et al. (2006) and Hayashi (2007), for example, implicate capital investment stagnation as one of the main causes of this lost decade. Using data from the pre- and middle-bubble period (1980–1991) and post-bubble period (1991–2003), Horioka (2007) points to capital investment stagnation as a principal cause of the lost decade and analyzes its relation to economic growth and the contribution rates of GDP components. Numerous studies in capital investment in relation to fiscal policy, and to the crowding out problem, have long been developed since Smith (1776). Under the present circumstances, this is a critical issue. As stated by Fukuda et al. (2011), beginning in mid-2007, major countries in the world introduced aggressive fiscal policy in response to the global financial crisis. As a result, they ran huge budget deficits. In addition, long term interest rates in countries such as Greece and Spain rose dramatically because of sovereign risk (see e.g., Laubach (2010)). Furthermore, though we cannot observe the increase in the long-term interest rate now, the situation in Japan is critical. As stated by Doi et al. (2011) and other papers, the Japanese public debt exceeds Italy’s and is currently the highest among the G7 countries.<sup>2</sup> These circumstances suggest the possibility of revealing the crowding-out problem.

Public investment crowds out aggregate private investment, following both the transitional neo-classical and Keynesian models. Voss (2002) uses a structural VAR model to show that government spending decreases private investment. In contrast, findings from Aschauer (1989a,b) show the opposite effect.<sup>3</sup> These papers fail, however, to analyze the transitional sectoral private investment, which responds differently to additional public investment from sector to sector. The construction sector, for example, often receives orders from government to construct public capital such as roadways, bridges, and dams, while the service industry ordinarily receives no direct orders from government at all. Differences of this type cause differences of investment behavior.

In light of the above, this study investigates the dynamic response of sectoral capital investment to public investment. Large-scale variables are analyzed by the factor-augmented VAR (FAVAR) model, a dynamic factor model that allows us to analyze VAR models even when the independent variables are too numerous for the sample size. Estimations by FAVAR combine factor analysis with VAR containing factor loadings and policy variables, which allows us to decrease the variables within the VAR and obtain the large-scale information necessary to introduce many independent variables. FAVAR can also contain variables that include expectations, such as stock prices, and thus compensate for the often criticized weakness of VAR, its lack of forward-looking components.

Several papers have been published on sectoral capital investment behavior in response to fiscal policy. When Nekarda and Ramey (2011) compare which type of model, neoclassical or New

<sup>1</sup> Yoshikawa (1991), Miyagawa (1997, 2005) show that the capital investment rate is higher and fluctuates more in Japan than in other advanced countries.

<sup>2</sup> In fact, Doi et al. (2011) conclude that the Japanese fiscal policy is not sustainable.

<sup>3</sup> Aschauer (1989a) shows that public investment complements private investment via social capital externality, and Aschauer (1989b) investigates the crowd-in or crowd-out effect.

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