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ON THE CAUSAL RELATIONSHIP BETWEEN FISCAL AND MACROECONOMIC VARIABLES: A DIRECTED GRAPHS APPROACH

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Abstract. *This study uses an error correction model and directed acyclic graphs to investigate the dynamic structure of the budget deficit, private investment and economic growth of Taiwan over the period 1971-2004. Our findings indicate that the budget deficit, private investment and economic growth are cointegrated. The directed graph results show that the innovations in private investment lead real GDP and the innovations in budget deficits lead real GDP and interest rates in contemporaneous time. And, the budget deficit is the major contribution to the changes of private investment and economic growth.*
Keywords: Directed graph, Cointegration, Budget deficit

1. **Introduction.** While the rising budget deficits trouble the OECD countries since the 1980s, the widening budget deficits have also threatened the economic development of Taiwan over the past two decades. To solve the budget problem effectively, Taiwan's government may well need to learn the causes of the increased budget deficits and the relationship between the budget deficit, private investment and economic growth.

Studies [1-4] on the relationship between the budget deficit and macroeconomic variables generally show that government expenditure has a crowding-out effect on private expenditure. Although Aschauer [3] supports the neoclassical crowding-out effect, he finds that an increase in public sector capital would increases the rate of return on investment in private capital, which in turn attracts further private investment.

The works of [5-8], by contrast, argue that there is a crowding-in effect derived from public sector investment. Eisner [6] shows that the real full employment budget deficit is positively correlated with the consumption expenditure and domestic private investment in the following year, of which evidences the existence of a crowding-in effect. Bahmani-Oskooee [8] finds that the U.S. federal budget deficits produce a crowding-in effect on private investments over the period 1947-1992.

According to the Ricardian equivalence theorem, given a certain level of government expenditure, choice between financing from government bonds and financing through taxation will not affect real economic variables. The studies of [9-11] all support the Ricardian equivalence theorem. Barro [12] argues that the theorem provides useful measures in the