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Uncertainty and investment: Evidence from the Australian mining industry

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ABSTRACT

Using Australian firm data, this study constructs an error correction model of capital stock adjustment to examine the uncertainty–investment relationship in the mining industry. As indicated, with firm features, the effect of demand uncertainty on the short run investment response to demand shocks is positive, while the effect of demand uncertainty on investment is negative. In addition, changes in exchange rate costs and Chinese ownership promote investment. More specifically, separating the sample period into before and after 2003, the estimation suggests that only after 2003 with the negative effect of Chinese GDP growth uncertainty, Chinese ownership had a positive effect on Australian mining investment. This suggests that rising Chinese demand after 2003 has a large impact on Australian mining investment.

1. Introduction

Recent theories of investment have shown more interests in the role of uncertainty.[1] Real options' theory developed by Bernanke (1983) and Dixit and Pindyck (1994) has shown that high levels of uncertainty can delay irreversible investment decisions.[2] However, as Bloom et al. (2007) argued, there are many doubts about the empirical evidence on the uncertainty–investment relationship. More importantly, much of attention has been drawn on the manufacturing industry (Price, 1995; Guo and Kliesen, 2005; Pattillo, 1998; Bloom et al., 2007). Investigations for the uncertainty–investment relationship in other industries are still sparse. Especially, there has been relatively little empirical work on the extent to which investment varies with uncertainty in the Australian mining industry.

Mining investment in Australia has played an important role in economy, and has been primarily driven by mining exports since the 1960s. Australian mining exports experienced two long periods of boom. In the first period, the share of mining exports in total exports was observed to increase from 10% in 1960 to 40% in 1980. This increase mainly originated from strong economic growth in Japan (Battellino, 2010). The second increase was when the share of mining exports doubled to nearly 70% after 2003, owing to large proportion of Australian exports to China (30%). While sharp increases in mining exports and investment were not sustainable after the global financial crisis. Much of this was due to concerns about the uncertain economic e5nvironment for investment. As documented by Bishop et al. (2013), global commodity market experienced increased volatility due to uncertainty and sustainability of future demand. Despite consecutive efforts taken by the Australian government and the reserve bank of Australia, such as increases in government expenditure and sustained low cash rates after 2008, investment and economic recovery was slow.

The aim of this study is to remedy this situation by investigating the impact of different uncertainties on firm investment using 1012 publicly listed mining firm data in Australia between 1990 and 2012. This model follows the seminal work by Bloom et al. (2007) in which the error correction model (ECM) is used to investigate the uncertainty–investment relationship based on manufacturing firm data. Bloom et al. (2007) demonstrate that high uncertainty slows firms' responsiveness of irreversible investment to demand shocks. To extend the breadth of uncertainty analysis in Bloom et al. (2007), this study used tax uncertainty,

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[1] Knight (1921) identified uncertainty as a key risk to investment. In this study, the concept of uncertainty is related to volatility in macro- and micro-indexes, such as GDP growth, interest rates and taxes. As discussed by Bloom (2014), uncertainty can be measured endogenously (slow economic recovery) or exogenously (financial panic, wars and resources prices surges).

[2] Irreversible investment is the one which has a large sunk cost. The cost of this investment cannot be recovered once it is installed.

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0301-4207/

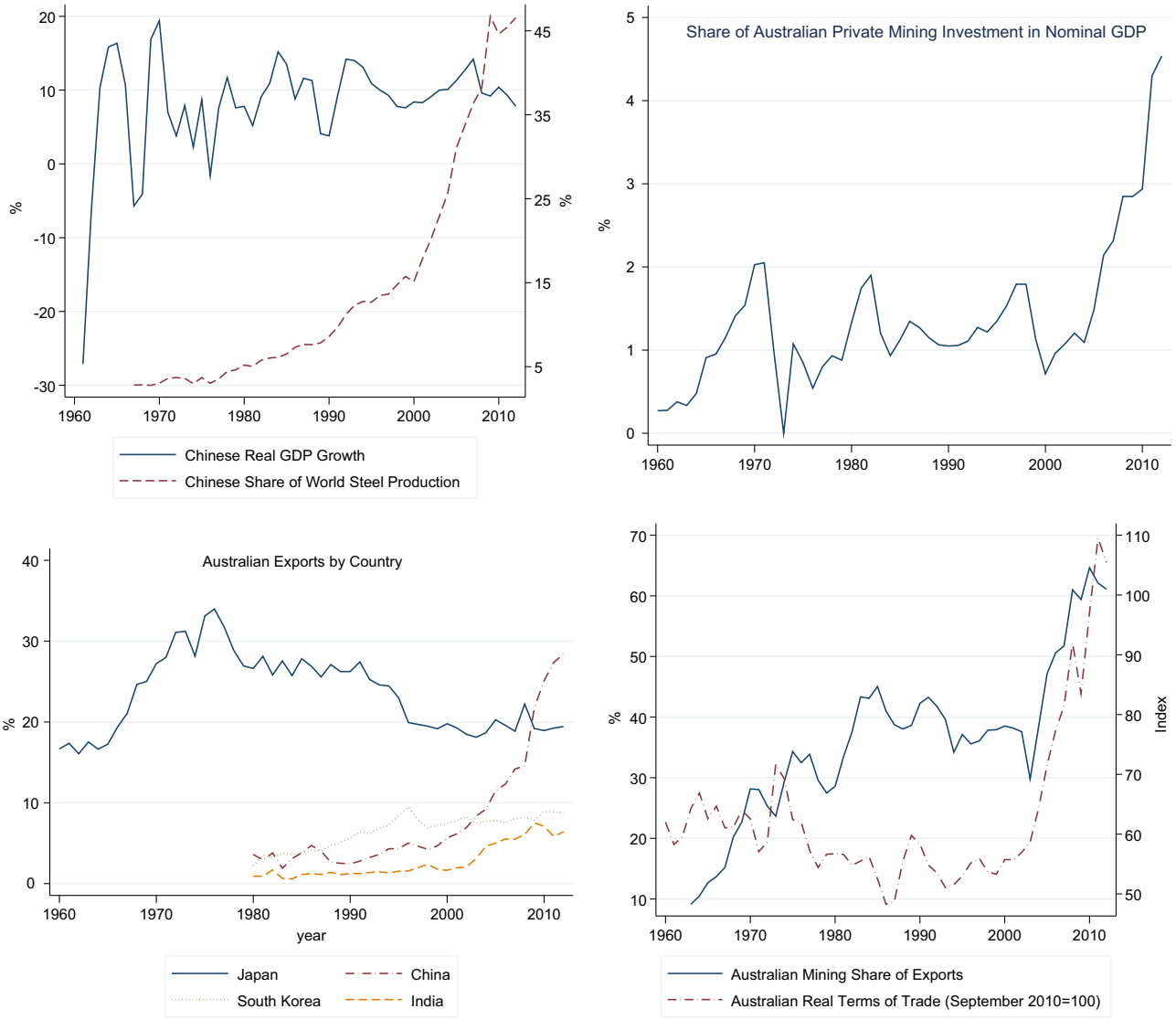

Fig. 1. Relationship between Chinese Economic Growth and Australian Private Mining Investment and Exports (1960–2012).
Source: Graphed using data from ABS ABS (2012), Author's Calculation.

exchange rate cost uncertainty,[3] demand uncertainty, interacted interest rate uncertainty and interacted Chinese GDP growth uncertainty. In another paper by Slade (2013), the uncertainty–investment association is empirically examined by US copper firm data from 1835 to 1986. As argued by Slade (2013), at the disaggregated level, high uncertainty discourages investment. This effect is intensified by firm features, such as the long time taken to build mining projects and capital intensity. Related to Slade (2013), this study attempts to test more firm features, such as firm size, firm age in 2012, market capitalisation and Chinese ownership. When discussing the uncertainty–investment relationship, the positive Hartman–Abel effect is contrast to vast papers. As documented by Carruth et al. (2000), in a competitive market, if the marginal product of capital is convex in price, an increase in price variance raises the expected return on the marginal product of capital and thus drives investment.

This study is organized sequentially as follows. Section 2 provides the relationship between Chinese economic growth and Australian mining boom. Section 3 outlines possible empirical models. Section 4 briefly describes the distribution of data. Section 5 explores the results of empirical analysis. Section 6 concludes the study.

2. Chinese economic growth and Australian mining boom

Chinese GDP growth rate averaged 10% per year after 2003. Fig. 1 presents historical Chinese GDP growth. After the introduction of economic reform, Chinese GDP growth ranged from 15.2% in 1984 to 3.8% in 1990. After the economic shock in 1997, Chinese GDP growth accelerated. From 2003 to 2007, this rate surged from 10% to 14.2% without any fluctuations. After the adjustment of the global financial crisis in 2008, Chinese GDP growth still remained at roughly 10%.

The high growth in Chinese GDP was accompanied by high demand for natural resources. There was a steep increase in the Chinese share of world steel production after 2003. During this period,

[3] Fluctuation in exchange rates results in extra costs for firm's exports.