

Intangible Investment in China: An Industry Perspective

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Intangible assets are assets that cannot be physically touched or seen, and are key assets of today's "knowledge economy". Examples of intangible assets are as software, design, market research, R&D, training and business processes in various aspects. Intangible assets are deemed especially important for China. The remarkable rapid growth over the past three decades has enormously enlarged Chinese manufacturing size relative to that of the US, but in terms of labor productivity China appears to be still far away from the US. By 2016, while the value added of China's manufacturing sector had reached a level that was about 160 percent of the US, its output per worker was only 14 percent of the US level. Facing continuously rising costs, especially in labor, land and environment, the Chinese government now seeks to shift the economy from extensive to more intensive growth through technological advancement and innovations to upgrade the Chinese manufacturing sector. Ambitious plans and strategies have been announced by the Xi-Li administration ever since they official term in 2012, such as "China Innovation 2020", "China Industry 2025", and "Global Innovation Leader 2030" according to the 13th Five Year Plan, laid out by the government.

Becoming truly innovative in manufacturing is a big challenge to Chinese manufacturing in the decades to come, and intangible investment is even more important than tangibles to that end. Advanced economies invest heavily in intangible assets. The U.S. business invested more in intangible assets than in tangible assets since the 1990s, and the rate of investment was 10.4 percent of GDP in 2015. Other advanced economy also invested heavily in intangibles. The list includes such countries as Germany, France, the UK, and Japan. It is a big question how China has performed in intangible investment, which may shed important light on China's potential in the near future. So far we know that based on a preliminary estimation by Hulten & Hao (2012), China invested 7.06 percent of GDP in intangibles in the market sector in 2006, indicating China might have indeed been catching up.

In this study we propose a work that turns the estimation of intangible investment from the aggregate to industry level. It is deemed necessary to estimate intangibles at the industry level because, as studies show in the case of the UK manufacturing, ignoring intangible investment is missing three quarters of the total investment (Borgo et. al. 2011). Intangible estimates for the UK, Germany, Japan and Korea all show significant difference across industries (Borgo et. al. 2011, Hyunbae et. al. 2012, Crass et. al. 2014, Miyagawa et. al. 2013). In this research, we aim to estimate Chinese intangible investment across 37 industries

nationwide for about two decades from 1995 to 2014. We basically follow the method of Corrado et al. (2005) to measure ten types of intangible assets. We pay special attention to the industry-specific relationship between tangibles and intangibles. We take advantage of China KLEMS-type growth accounts at the industry level carried on by Wu and his associates (Wu 2016; Wu et al. 2015), which allows our work to be conducted in a coherent framework despite data deficiencies. Other data sources are diverse, ranging from China Statistical Yearbooks, Chinese Census and data from trade associations. Facing difficulties in data availability and especially data quality (most data on intangibles are not collected by national statistical offices even in the advanced economies), we resort to creative ways beyond the methods of Corrado et al. (2005). Our preliminary estimates at this stage have shown that China invested 8.4 percent of GDP in intangibles in 2013, rising from 7.0 in 2006 (Hulten and Hao). Sectors differ greatly in their intensity of intangible investment. The industrial sector invested 15.4 percent of value added in intangibles in 2013, followed by the financial and real estate sector, 8.5 percent, and the sector of least investment in intangible assets is agricultural, only 1.0 percent of value added. Intangible investment was equivalent to about one fifth of the tangible investment in the industrial sector in China, which was similar to the total economy of China, implying that Chinese industries are still heavily relying on machines, equipment and structures, and still have a long way to go before they can operate in ways similar to their counterparts in advanced economies.