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## **Paper Tigers, Hidden Dragons. Douglas Fuller.**

Pity the Chinese Communist Party: most Chinese expect it to take their country back to its rightful place as an advanced economy. But mainland China's ascent is slowing. The Middle Income Trap is beckoning, where a country's labour becomes too expensive to be competitive before it has become competitive as a knowledge economy. Its East Asian neighbours escaped the Trap, but they did so with a labour force which advanced quickly and evenly. Mainland China is vastly more unequal than Japan, Taiwan or Korea were or are, and so it has a bottom half-billion (or so) whose education and training has lagged behind the rest. Their workplaces are resourced accordingly - in the countryside, and in the cities where they reside as migrant workers - and their low productivity is a drag on the economy.

Douglas Fuller's excellent book is not concerned with this malfunctioning part of the Chinese economy, but with another part whose underperformance is more surprising - high technology. China's leaders clearly care about high tech. The top universities' science and engineering departments, and leading research institutes, are lavished with funds so that China's high tech firms can employ their graduates and draw on their research. Those firms are funded with generous venture capital and cheap loans, force-fed with subsidies, cosseted with preferential public purchasing - as Fuller shows. And yet, as he shows too with sometimes vivid detail, most of them fail. He argues persuasively that their failure arises at bottom from government failure: the officials in charge of the funding and subsidising and public purchasing do not have the industrial expertise to know what they are doing. Those lower down often know just what they are doing: they are gaming the system. And whom they are helping: often their friends and relations.

For anyone with a dark sense of humour, the story is amusing: take patents. The government has come to the unimpeachable conclusion that successful economies take out rather a lot of patents. Further, successful high-tech firms in such economies patent as a key part of their strategy. So, 'the National Patent Development Strategy 2011-20 called for an increase from 1.2 million patents filed in 2010 to 2 million by 2015' (p.105). We must all be thrilled to hear that this demanding goal was reached *in 2012*. But such Stakhanovite achievements have to be worked for. '...150 local patent targets were set by municipal and provincial governments, and patent applications are one of the criteria by which the central government judges its SOE managers...the state has provided SMEs with over 10billion RMB since 1999 both as rewards for and incentives to patent'. With so many people trying so hard to oblige the central government with patents, it is not surprising that those who grant them - the State Intellectual Property Office, SIPO - are understanding of their needs. In 2011, even the head of research at SIPO admitted that patent quality remained a concern. And 'another report led by a scholar related to SIPO found the quality of Chinese invention patents [the highest type] below those of developed countries'. Fuller is, rightly, harsher.

Surely the senior officials in charge of this gamed system understand roughly what is going on? Why don't they do something about it? Fuller's explanation is as usual exhaustively researched and thoroughly persuasive. They try, but they are caught in their own net. Take zhaoshang yinzi (attracting investment) which 'remains a priority task for local cadres who still feel under great pressure to secure industrial investments'. Fuller shows the disastrous consequences of this crude 'economic metric' - it leads to bidding wars to attract multinationals, without any of the efforts at embedding in local supply chains or technology transfer which their counterparts in Taiwan and Singapore have long undertaken. Repeatedly Premier Li Keqiang has 'reiterated the intention to move away from hard economic targets for cadre evaluation' (p.47); but repeatedly - when faced by economic slowdown or the threat of it - he has 're-emphasised hard economic targets for local officials'. 'Unwinding China's investment-centric model is necessary and yet such reforms will lower growth in the short term to levels that are politically painful to a regime predicating its legitimacy in large part on delivering the economic goods.' (p.54).

In his long and thorough research on the integrated circuits sector(s), Fuller has discovered a gleam of light in China's high-tech darkness. Not multinationals, which do not commit to China; not domestic firms, which are either stifled (as above) by state favour, or starved of funds by the lack of it. 'Hybrids' are Chinese in their commitment, in having their 'operating system' in mainland China, but they draw much of their capital and thus of their governance from outside it, and this plays a crucial role in preventing the encroaching state taking

control - which would in the long run be fatal. The 'non-mainland' element tends to be mainly ethnic Chinese from Taiwan, Hong Kong or Singapore - better than mere foreigners at operating in China.

Fuller makes a strong case for these 'hybrids' (the Hidden Dragons of his title) as better managed than state-controlled domestic enterprises (the Paper Tigers) and contributing to the build-up of competences in integrated circuits in mainland China. But can we really look to the Hidden Dragons to make up for the failure of mainland firms in high technology generally? Do they really (to quote the blurb) 'promise an alternative way to avoid the middle income trap'? There are two reservations to enter. One he makes plainly himself: because of their limited financial resources they can only succeed in sectors which are 'modularisable', that is where new entrants can depend on other firms for most components and competences, and with 'fast clock speed', that is where there is rapid turnover of competences and IP so that being new is on balance an advantage. The other reservation emerges from his discussion: it is not enough for a Hidden Dragon to be on the side of all the angels technologically. It has to make serious money. If it doesn't it will go under or be taken over by the state. That is, alas, what appears to have happened to most of his hidden dragons in integrated circuits. Now as he points out, there are splendid hidden dragons in the internet sector - Alibaba, Tencent - and they are thriving. So what have those HDs got that the IC HDs haven't got? Protection from foreign competition. But that is a policy instrument that China has in general forsworn.

This book is nonetheless required reading for anyone who seriously wishes to understand China's difficulties, and successes, in high tech. It is well written and most thoroughly and perceptively researched. Fuller's Hidden Dragons are not only promising for China, they show how in an ever-more-connected world, developing economies can draw creatively on foreign institutions.

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