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**Abstract:** Domestically-owned firms in mainland China have shown disappointing technological performance in higher-technology sectors. We argue that deficiencies in the system of finance and corporate governance are largely to blame. Private firms have been starved of financial resources. The key weakness of Chinese state-owned firms (SOEs), lies in their corporate governance: officials monitoring them have been ‘disengaged’, with the consequence that investment of money and effort which was *low in visibility* (*‘opaque’*) and/or *slow in pay-off*, has been discouraged. ‘Disengagement’ also discourages development of close inter-firm relationships, and employee ‘inclusion’. We examine a small number of sectors, notably telecoms and motor vehicles, in which Chinese firms appear to be doing well, showing that ‘untypical’ corporate governance produces untypically good results. We conclude by warning against relying, in monitoring large SOEs, on financial accounting measures, pointing to the British example. China should find Chinese ways of achieving engagement and inclusion.

**Keywords:** China, National Systems of Innovation, Finance, Corporate Governance, Inter-firm Relationship. [148 words]

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## 1. Introduction

The brilliant success of the mainland Chinese economy in terms of aggregate output, and output per head, may obscure the technological weakness of mainland China's own firms. In this paper we set out the evidence for such weakness, which is general though not universal across medium and high-technology industry, and then analyze its causes. We argue that in any national system of innovation (or technological learning) firms are key, and the most important factors which affect them are their governance and finance, while a key aspect of the behaviour are their relationships, particularly with other firms. We set out an analytical framework for understanding the effect of governance and finance on firms' technological learning in a developing country. We then examine corporate governance and finance in mainland China, particularly the governance of state-owned enterprises (SOEs), and their effects on the Chinese national system of innovation. We argue that a key weakness of Chinese SOEs lies in their corporate governance, very broadly defined (as 'who controls them, and how'): officials monitoring them have been 'disengaged', with the consequence that investment of money and effort which was *low in visibility* and/or *slow in pay-off*, has been discouraged. What is favored, on the other hand, is the purchase of 'packages' or 'bundles' of technology (and the equipment which 'embodies' it) from foreign firms in advanced economies. 'Disengagement' also discourages

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development of close inter-firm relationships, because they require effort which is low in visibility and slow in pay-off. The exception tests the rule: we examine a small number of high and medium high-technology sectors, notably telecoms and motor vehicles, where Chinese firms either have been successful already (telecoms), or are showing good promise (vehicles). We look at a number of cases in both sectors which show that ‘untypical’ corporate governance produces untypically good results. We conclude by looking at recent developments in the mechanisms government uses to monitor large SOEs. While in general movements towards Western models of market economy may be desirable, the developments we look at here threaten (we argue) to replace one form of disengaged control by another.

**2. The technological strengths and weaknesses of Chinese businesses**

Gu and Lundvall (2006, p.10) sum up the Chinese position (as of 2005): ‘The industrialization process has not resulted in building a widespread and robust indigenous innovation capability in Chinese firms. ... China’s economy has not been able to embark upon the competence upgrading track. China remains specialized in low value-added products...’ There is all too much evidence in support of this proposition. Patenting is one element of it. Mahmood and Singh (2003) show that patenting is a

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reasonable indicator of overall technological capability in developing as in developed countries. The remarkable Taiwanese drive up-market, for example, is mirrored by its patenting performance: from 176 US patents in 1975-79 through 1772 in 1985-89 to 12,366 in 1995-99 (their Table 2). In the same period mainland China – some 40 times larger in population – went from 2, through 129, to 332 US patents.

Equally striking, though at first sight mystifying, is the difference in patterns that Mahmood and Singh (2003) find at sectoral level (their Tables 7 and 9). In 1995-99 the five top sectors in Taiwan, in revealed technological advantage (RTA: relative patent share) quite closely reflected Taiwan's areas of specialisation so far as production and trade are concerned. Contrast mainland China, whose five top sectors in RTA terms in 1995-99 were: Miscellaneous chemical products; Basic industrial chemicals; Ship/boat building and repairing; Agricultural chemicals; Drugs and medicine. With the possible exception of shipbuilding, there is no sign of any mainland Chinese export drive in any of these areas. Chemicals (together) have been below 10% of Chinese exports since 1980, with a downward trend (Gu & Lundvall, 2006, Figure 5). Conversely, where is the Chinese patenting strength in the sectors where their exports have surged? The explanation for this oddity is simple: Chinese export successes are not, for the most part, based on technological

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capability. Exports by *Chinese firms* are mainly in the labour-intensive, low-technology areas like textiles and clothing. Mainland China *as a location* is doing very well as an exporter in some high-technology sectors – electronics, notably. The share of high-technology exports in total exports rose from 7.9% in 1995 to 29.9% in 2004. [[www.stats.gov.cn/tjsj/qtsi/zgktjnj](http://www.stats.gov.cn/tjsj/qtsi/zgktjnj)] But the Made in China label on finished goods conceals the fact that most of the machinery with which they were made, and their key components, were imported – mostly from elsewhere in East Asia. And most of its so-called high-technology manufacturing is under foreign ownership or at least control. In 2003 61.9% and 21.4% of high-tech exports were produced by fully foreign-owned and partly foreign-owned firms respectively (Gu & Lundvall, 2006 citing China S&T Indicators 2004). Between 1998 and 2005 the share of Chinese-owned firms (aside from joint ventures) in exports of high-tech products fell by more than half ([www.sts.org.cn/sjkl/kjtjdt/data2006](http://www.sts.org.cn/sjkl/kjtjdt/data2006), Fig 2-10) while that of wholly foreign-owned rose year by year. Gu and Lundvall (2006) mention one sub-sector of electronics, TV manufacturing, in which mainland China (including some Chinese-owned firms) has a ‘well-developed competitive advantage’, but in which value-added is low because key components are imported from elsewhere in East Asia, and profit margins were as of 2005 around or below 3%. An indicator of the domestic Chinese weakness is the R&D intensity, since R&D tends to be

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performed near a firm's home base: the R&D intensity (over value-added) of high tech industries overall, in mainland China, was 4.6% in 2004 (cf. 27.3% in US, 29.9% in Japan, in 2002). ([www.sts.org.cn/sjkl/kjtjdt/data2006](http://www.sts.org.cn/sjkl/kjtjdt/data2006), T1-15.) The breakdown by sector is even more instructive: for aircraft and spacecraft the intensity was 16.9, comparable to the US figure (18.9% 2002); but this sector is very small and dominated by state-owned firms (T1-5). For electronic and telecommunications equipment the corresponding figures are 5.6 (US, 25.4) and those for computers and office equipment, 3.2 (US, 32.8). (These two sectors together made up 72.4% of the value-added of high-technology industry in China in 2004 – the other sectors, in descending order, being pharmaceuticals, medical equipment & meters, and aircraft & spacecraft.)

There are scale-intensive industries where large, profitable, and reasonably efficient state-owned firms can be developed on the basis of a very large protected home market, and access to very large amounts of cheap long-term capital, which state-owned firms have consistently enjoyed (see below). This explains the three big Chinese oil and gas companies, Petrochina, Sinopec and CNOOC, now investing across the world; Baosteel, China's largest steel producer; Chalco, its largest aluminium producer; China Minmetals, its biggest base metals company.



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There are, likewise, labour-intensive low-technology industries in which it is easy for new private entrepreneurs to set up, and where with a huge pool of cheap and disciplined labour, plus a decent trading infrastructure, agglomerations of Chinese producers now dominate world markets. There are industrial districts, large and small, concentrating for example on socks, on chairs – and on software (Van Dijk & Wang, 2005). But Gu (2003) firmly denies many of these agglomerations of businesses the name of clusters – because clusters should have some kind of dynamic coherence, with cooperation as well as competition among their member firms. Some do; most do not.

There is, in the last analysis, only two major sectors, and one minor one, in which Chinese development of technological capability has been impressive. The minor sector is digital video players (Lu, 2005). The major sectors are telecommunications, led (in commercial terms) by Huawei, which in 2004 gained 40% of its over \$5bn revenues outside China (see Figure 2), and motor vehicles, which unlike telecommunications has only in the last few years become technologically dynamic. We shall consider below how these exceptions can be explained. We shall throughout the discussion give most emphasis to state-owned enterprises (SOEs) because it is these which have had the scale, the

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experience and the resources without which, in most sectors and sub-sectors, it is impossible to take on real technological challenges.

### **3. Key determinants of technological learning by firms in developing economies.**

#### *3.1 Firms in national systems of innovation*

National systems of innovation, being systems, involve interactions among their component parts. The institutions which have scientific and technological progress as their *raison d'être*, universities and research institutes, are important components; so of course is government, partly because it mostly funds and largely directs these institutions (eg. Nelson, 1993). Firms are however the core of any market economy, and thus the core of the NSI in any market economy – which China now is, predominantly. As such, government's impact on the NSI is mostly through its impacts on firms. In any economy, and particularly one emerging from full state control like China, industrial policy will have an important role in the NSI (Nolan, 1996, 2001). The extent and nature of competition is likewise important, and any shielding of firms from it by a 'nurturing' state will have important, and largely deleterious, effects (Lu & Feng, 2004). However in a capitalist economy, the source and nature of firms' capital (finance) and the source and mechanism of power over firms (corporate governance) are, we believe, most important of all (Tylecote,

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2007; Tylecote & Visintin, 2008). There is powerful support for this view in the innovation literature on developed economies, beginning with Schumpeter (Schumpeter (1911/1996) on finance; Schumpeter (1942) on corporate governance).<sup>1</sup> It is also quite consistent with Porter (1990). In ch.3 of *Competitive Advantage of Nations* he addresses the role of finance and corporate governance directly. In ch.4, he shows how it affects the relationships among firms. We do not seek here to exclude other factors from consideration, but to show how useful explanatory factors finance and corporate governance can be in the Chinese case. In this section we shall focus on two issues. The first is, how corporate governance and finance affect technological learning in a developing economy. The second is, what shapes the relationships of firms in a developing economy, and how their relationships affect their learning. Given their interactions within the system of innovation, this appears to us to be crucial too. We shall see that the two issues are quite closely linked.

*3.2 How corporate governance and finance affect technological learning in a developing economy.*

A framework for analysing the effects of corporate governance and finance on technological change in developed countries has been put

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<sup>1</sup> On the role of finance in the NSI see also Christensen in Lundvall (eds) (1992) and Pavitt (1999).

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forward in various formulations by Tylecote and Ramirez (2006), Tylecote (2007) and (Tylecote & Visintin, 2008). In this framework the challenges of technological change to the financial and corporate governance system are fourfold. In a developing country they can, with some simplification, be reduced to two:

1. *Opacity/slow pay-off*. The process of technological learning is typically *opaque*: an outsider cannot easily understand what is going on. Sometimes it is not even clear what is being spent, in money and effort, and universally it is uncertain for a considerable period what if any return there will be on that money and effort. There is then an acute case of the *information asymmetry* which has long been seen as a key problem of corporate governance. (Jensen & Meckling, 1976). Opacity and delay vary according to the sector and the strategy adopted – but strategies involving less opacity and delay are likely to involve relatively superficial learning (see below). Opacity can be countered by engagement, which gives the ability to look below the surface: thus the owner-manager of a small firm should understand what is going on in his/her firm, while an outside shareholder of a large firm might well not (see below). Understanding should give tolerance of delay. Alternatively, managers who have autonomy from shareholders

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can tolerate a long time to pay-off.

2. *Stakeholder spill-overs* Technological learning often requires inputs of money and (above all) effort from stakeholders – employees and related firms – which cannot easily be monitored or defined in advance and so cannot be well dealt with contractually. At the same time, much the same stakeholders are likely to benefit, too: the production of new economic knowledge “inevitably involves spillovers to others besides the shareholders such as the employees and the customers/suppliers” (Arrow, 1962, p.10). Where stakeholder spill-overs are high, much depends on the relationship among the parties being co-operative and close – *stakeholder inclusion*.

### *3.3 What shapes the relationships of firms in a developing economy? How do their relationships affect their learning?*

Macdonald (1998) (as likewise(von Hippel, 1988; , 2005) has shown that successful innovation typically requires important interchange of information among firms. Such interchange flourishes where the relevant relationships are informal and based mainly on personal contacts (Macdonald & Assimakopoulos, 2003). Moreover, the competition of the market encourages much more information exchange than collaboration,

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even collaboration intended specifically to facilitate innovation (Piekkari & Macdonald, 2005). But the information exchange referred to is that among competing firms. What of that between seller and buyer of machinery or components? There is an underlying formal relationship here, the contract of sale, on which a richer skein of informal relationships may be built. What determines the richness, the closeness of these relationships? The development and maintenance of close inter-firm relationships are opaque and slow pay-off activities in the sense explained above, and thus much affected by the degree of engagement of shareholders or others in control of the firm. For Britain, Cantista and Tylecote (Liu & Tylecote, 2008forthcoming) found that there was a clear connection between the ownership/corporate governance status of firms and their behaviour within relationships with industrial customers and suppliers. Those which were *public listed companies (PLCs)* had less close relationships than those which were not. The essential difference, in the British case, was that the PLCs had shareholders (mostly British financial institutions, through pension fund and mutual fund portfolios) that had power over management (they might sell to a take-over bidder or even intervene to get rid of them directly), but did not *engage* with it: they did not spend time to understand in depth what its strategy and performance were.

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Firms in developing countries face a particular choice, or spectrum of choices, with respect to ‘learning relationships’ with other firms. The most direct, quick and certain way of ‘acquiring’ more advanced technology than they currently have, is to engage in highly unequal relationships with foreign, advanced firms, in which the latter supply – sell - ‘bundles’ or ‘packages’ of technology in large discrete transactions. ‘Acquire’: they are able to produce more advanced products with more advanced processes, so that one can say they have improved their *static capabilities*, but the learning process is at best passive – they do not thus acquire dynamic capability, or (to use Gu and Lundvall’s phrase (2006)) ‘indigenous innovation capability’. Such deals are also expensive. At the other end of the spectrum of choice, they can depend on rather equal relationships with other domestically-owned firms. These need to carry a relatively heavy weight of trust, with both firms learning together and depending on the other’s support. (This is the classic pattern within Japanese *kigyo shudan*, or horizontal industrial groups.) They will also need to depend rather heavily on relationships with their lower-level employees, whose co-operation and initiative will be required much more in this situation than where processes and products are being ‘handed to them on a plate’. The latter relationships, and the technological learning that take place within them, are far more opaque than the former, ‘bundling’ relationships (Liu &

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Tylecote, 2008forthcoming). They are therefore much less likely to be encouraged by a governance system with low engagement.

#### **4. The Chinese national system of innovation, and its external tilt**

##### *4.1 Corporate governance and finance in China*

In China, the corporate governance issue started to arouse attention in the late 1980s and the concept became more familiar to China in the late 1990s (Fei, 2004). The discussion related mainly to state-owned enterprises. In order to revive a struggling public sector accounting for over 70% of the nation's economy in the late 1970s, Chinese authorities aimed at restructuring state-owned enterprises by establishing a 'Modern Enterprise System' (*Xiandai Qiye Zhidu*), in which corporate governance was the main focus. In 1984 SOEs became shareholding enterprises. In 1990 the Shanghai Stock Exchange, closed since 1949, was reopened; the following year the Shenzhen Stock Exchange was opened. As of end 2003 there were 1287 enterprises listed on the exchanges, of which 940 were SOEs (Hua *et al.*, 2006). In 1993 a Company Law was passed, which set up a two-tier board structure and replaced the *laosanhui*, the 'three old organisations' (Communist Party committee, labour union and employees representative meeting) by the *xinsanhui*, the 'three new organisations' (shareholders meetings, supervisory board, executive committee). Accounting Standards for Business Enterprises were issued in the same



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year (Hua et al., 2006). A code of corporate governance and guidelines were issued for listed companies (CSRC, 2001). However, despite the effort to reform and enforce formal arrangements, some fundamental flaws in the governance of Chinese firms, especially of SOEs, remained (Zhang, 1998), and these flaws have had an impact on firms' technological development. (What follows refers to the situation up to the further reforms of 2003. The latter are discussed later.)

Until 2003 the control and supervision of each SOE was almost entirely in the hands of the appropriate ministry. This gave ministry officials every opportunity to interfere with firms' operational decisions. Nonetheless, even more important than this interference was the way managers were appointed and assessed. The top managers of Chinese SOEs were selected by government "bureaucrats" rather than "capitalists"(Chen & Huang, 2001; Gronewegen, 2004), According to a survey conducted in 2000 by the Chinese Entrepreneurs Survey System, from 1979 to 2000 around 76 % to 80% of chief executives of SOEs were appointed by government authorities (<http://www.cess.gov.cn/dcyj/diaocha.htm#>), and traditionally the selection was largely based on the candidate's political merits. These managers were sent to a firm with a view to stay for a limited period of time (typically five years), and looked to be moved to a higher position, in a larger firm or a ministry. Their career paths were essentially that of

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officials. The short time horizon does not encourage managers to think long; on the contrary, they need to make a quick and good impression on senior officials (Zhang, 1998) – themselves subject to regular rotation and unlikely to ‘engage’ closely with the firm. Thus one of the key effects of the governance flaws of Chinese SOEs is managerial short-termism (Tylecote & Cai, 2004). The incentive for commitment to real technological learning, and the development of ‘indigenous innovation capability’, is therefore lacking – the process being slow in pay-off, high in uncertainty, and opaque – for incumbent managers, it is unlikely to bring them a pay-rise or promotion. (For recent developments see Section 6.)

Administratively appointed managers have little time for *employee inclusion* and *inter-firm relationship building*. The continuing powerful state hierarchy and the unique blend of “capitalism with Chinese characteristics” means that although many firms have gone through the process of ‘marketisation’, the state’s major stake remains in most, especially large-scale SOEs. Firms in China still have certain idiosyncratic political aspects (this also applies to POEs). According to an interview with Chief Party Secretary (also Chief Operations Officer as well as board member) of an SOE<sup>2</sup>, he needed to report regularly to the city’s Party Organisational Committee (*Zuzhi Weiyuanhui*) about details of the firm’s

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“state of political stability, the programme and progress of moral and political education”, etc. Top managers’ remunerations and career perspective are associated with such political performance. On the other hand, personal *guanxi* with bureaucrats is also important and needs cultivation/ maintenance – therefore managers have limited time or incentive to build *stakeholder relationships*.

Privately-owned firms (POEs) in China have had a very different situation. Being very recently established (since 1980), the CEO is usually the majority, often sole, shareholder. In consequence they have *fully-engaged* shareholders well able to cope with opacity; there is no significant information asymmetry in corporate governance. Their most obvious problem has been poor access to finance (as to some other resources, such as land and licenses) (Cai & Tylecote, 2005). Less obviously, private firms’ managers/owners also need to invest time and money in building *guanxi* with officials. It is clear that relationships among Chinese firms and between firms and government are subject to unusual pressures arising from the nature of the political structure and of the process of transition (Krug & Hendrichke, 2007). The insecure nature of property rights means that private firms have depended heavily on connections with powerful officials to protect what would elsewhere be protected by the law.

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<sup>2</sup> Interview, face-to-face, May 2006.

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Likewise they cannot rely simply on the market to give them access to key resources such as finance: connections are needed for that too, either with officials to give them access to cheap state-controlled finance (banks, stock market) or with other private firms and rich individuals to get access informally to private finance.

#### *Finance in China*

State-owned banks dominate the Chinese financial system and as of 2000 held more than 60% of the country's banking assets (Saussure *et al.*, 2001) – much more than that, ten years previously. They prefer to lend to (central) state-owned firms, and among the rest they show particular aversion to private enterprise. Even at the end of 2001, the private sector received less than 1% of all loans granted by the state banking system (Tsai, 2002). For SOEs, bank loans are or used to be very cheap – in the early 90s, typically 1% interest from a state-owned bank (Oi, 1995); in early 2004 interest rates were 4%-7% on loans, but as little as 2% on discounted bills ([www.bank-of-china.com](http://www.bank-of-china.com)).

Outside the state banking system many shareholding commercial banks and city or regional private banks have recently appeared in the financial system. Even these, however, appear to discriminate against the private sector: the new banks respond to *guanxi* like everybody else – rationally

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enough. Private firms are more likely to be hit by bureaucratic actions or inactions beyond their control, and if in trouble for any reason will not be bailed out by the state. They are thus worse risks. So most of the new banks prefer to lend money to those large private firms with good credit, or provide loans only against collateral (Langlois, 2001; Liu, 2002).

As another actor in the Chinese financial system, the Chinese stock market (mainland) has developed very quickly since it was established in 1992. But it is hardly used by the private sector as a channel to raise funds. The state decides the quotas of listing and selects the firms which may list on the stock market (Langlois, 2001). If a private firm wants to be listed in the stock market one pragmatic way is to buy an already listed enterprise, which not only incurs high cost but is also subject to regulations (Bruton & Ahlstrom, 2003).

Venture capital financing on a limited scale has been taking place in China in recent years. By the end of 1999, China had 92 venture capital companies with 7.2 billion yuan (US\$870 million) of funds (People's Daily, 2002). More than 80% of the venture capital funds in China were provided by the government, with the remaining less than 20% from foreign and private investors (Lo, 2000; ). A number of factors deter

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venture funds from flowing into start-up private firms. Firms seeking funds are required to show at least three years of financial accounts – and accounts in China are unreliable anyway. To evaluate a firm a venture investor needs in particular to know the sort of *guanxi* which are possessed by the firm and by its managers as individuals: as we have seen, these contacts constitute valuable assets in Chinese business (Bruton & Ahlstrom, 2003).

#### *4.2 The relationships of Chinese firms, and their ‘external tilt’.*

One notable feature of the Chinese NSI, before the reforms, was the dependence of the system on the R&D institutes (Gu, 2003; Gu & Lundvall, 2006). Any technology brought in from abroad came to them, in the form of technology licensing or sample machine procurement: they then ‘fed’ the enterprises, particularly the capital goods producers, whatever innovation or technological change took place. In the reform process of the 1980s and 1990s the government required the institutes to put their relationship with the producing enterprises on a market basis, selling their services. The selling of knowledge is a precarious business, as economic theory has demonstrated, and the preference of the institutes was to become capital-goods producing enterprises (NTEs, new technology enterprises) themselves (Gu, 2003), which generated some notably successful firms (e.g. Datang, Lenovo). By 2005 the proportion of

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business-funded R&D performed by research institutes had fallen to 1.1%, below that performed by universities (5.4%); more than 80% of R&D performed by research institutes was government-funded, whereas only 54.9% of that performed by universities was ([www.sts.org.cn/sjkl/kjtjdt/data2006](http://www.sts.org.cn/sjkl/kjtjdt/data2006), Table 1-2).

So Chinese businesses do not now choose to have much of their R&D performed externally. But this does not mean that they are looking to improve their technological capability ‘indigenously’ – as we can infer from their low R&D intensity. They are still sourcing new processes and products externally, but now the main source is external to the country: their preference is typically to get new technology in a ‘bundle’ or ‘package’ from a leading foreign firm (Liu & Tylecote, 2008). If innovation expenditure is broken down by class of innovative activity, the costs of acquisition for *embodied* technology, such as machines and production equipment, account for about 58% of the total innovation expenditures, compared with 17% internal R&D, 5% external R&D, 3% marketing of new product, 2% training cost and 15% engineering and manufacturing start-up (Guan, 2000). This has applied particularly to state-owned firms, which have good access to finance and other resources – most particularly to the ‘insider’ firms (Lu & Feng, 2004) of the ‘national team’ (Nolan, 2001) which have had the best access.

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Let us now connect Chinese firms' approach to learning within relationships to the arguments above. The 'acquisition' of technology within a 'bundle', in a discrete transaction, minimizes opacity and reduces time to pay-off, thus representing an optimal strategy given typical SOE corporate governance. The reduction in opacity relates not only to the processes within the firm, but also to the relationship-building. Dependence on close and co-operative relationships with related domestic firms, and with lower-level employees, would make the process of technology acquisition less easy for monitoring officials to understand. At the same time, the time spent on cultivating relationships with officials leaves less time for cultivating what could be called 'constructive' relationships. This will apply particularly to relationships between SOEs and private firms, since the career paths of private sector managers have been unlikely to cross with those of SOE managers. Finally, we must also refer to Macdonald's finding that information interchange among rivals was stimulated by competition. This points to the weakness identified by Lu and Feng (2004): the 'featherbedding' of the 'insider' firms, protected from competition by government control of market access.

##### **5. The pattern of success in 'indigenous innovation'.**

There is evidence that poor corporate governance (broadly defined) has



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been a major factor in inhibiting technological development in Chinese state-owned firms, while poor access to finance has had a similar inhibiting effect in privately-owned firms (Tylecote & Cai, 2004; Cai & Tylecote, 2005; Cai & Tylecote, 2006; Liu & Tylecote, 2006). (Poor access to finance also discourages investment in slow pay-off activities.)

In this section we review the pattern of success among and within sectors, and show that it is consistent with our arguments about the characteristics of the Chinese NSI and the specific nature of corporate governance, finance and inter-firm relationships. We shall begin by considering the exceptional successes: why telecoms and DVPs have succeeded and the motor industry *is* succeeding.

*5.1. The small exception.*

The digital video player industry has an obvious key feature: its products are not sold to industrial customers. There are thus no inter-firm relationships with customers that need to be developed. The DVP manufacturers may need good IFRs with component suppliers – and indeed since these are ‘assembled’ products, they probably *will* need them – but at least they are in control: the component suppliers are likely to be smaller than them and will dance to their tune. (The exception will be foreign suppliers of high-technology components.) Lu’s account (2005) of

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the development of the DVP industry shows a Darwinian process of natural selection at work in which private firms with little capital but the right strategies came to the forefront. (To be exact, this process began only after a state-owned firm had made a crucial technological breakthrough which it proved unable to exploit commercially – bearing out the vital role of SOEs.) Government policy and favour to ‘insider’ firms was irrelevant because the government did not really have a policy for these sectors.

There is a connection here with ownership and corporate governance. The successful ‘outsider’ firms in all sectors all seem to have one thing in common: they are not majority-owned by the central government. Most common are minority-state-owned firms like TCL and (Ningbo) Bird where the original state owner was a city or town in one of the go-ahead regions, and where the managers were allowed to build up a large shareholding (Cai & Tylecote, 2005). From a ‘Darwinian’ point of view, this is significant simply because there are many cities and towns in China, and therefore many potential owners of firms, some of which may be properly managed (and governed), and will rise to the top in open market competition. But it is also significant because, as Cai and Tylecote (2005; , 2006) argue, the minority SOE form of ownership, with management shareholding, does produce a combination of engaged shareholders (the managers, at least) and reasonably good access to finance and other

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resources (through the role of the local government).

*5.2 Telecommunications*

Telecommunications equipment is an industry which is exceptional within the broader area of 'electronics/ICT' in at least two ways. The first is its success – to be precise, the success of mainland Chinese firms - in international competition. See

Figure 1, Figure 2 and Table 1. The rise of Huawei, the largest Chinese telecoms equipment manufacturer, has been remarkable. In less than 10 years, Huawei has set up 20 branches and 100 offices outside China, selling to over 100 countries and regions with over 1 billion customers. It has 12 foreign-based research centres and 28 regional training centres. In 2007, over 72% of its sales revenue was generated from the overseas market. In December 2005, Huawei, together with three other multinationals: Ciena, Lucent and Siemens, became supplier of British Telecom's \$17.4 billion 21st Century Network (21CN) , which "... has been one of the largest single procurement programmes ever undertaken in the communications industry worldwide" (BT Group, 9/12/05,<http://www.btplc.com/21CN/WhatisBTsaying/Keymilestones/Keymilestones.htm>()). ZTE, the second-largest telecoms equipment manufacturer, is following the same trajectory, approximately two years behind. **Its overseas expansion started off with a US\$95 million turnkey**

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contract in Pakistan in 1998, followed by a series of trials in Islamabad. In 2003 it became the largest CDMA system provider in BSNL - India's largest telecoms service company, and constructed Africa's largest CDMA WLL network in Algeria. Equally evident is ZTE's ever growing technological competence. After its first R&D centre opened in the USA in 1998 (designated for developing CDMA technologies) it successfully claimed a few world's records: world's first dual frequency hand set in 1999, first CDMA handset with detachable SIM card in 2000 and first CDMA 2000-based digital Trunking architecture in 2004. (ZTE website: <http://www.zte.com.cn/main/about/Intro/overall/index.shtml?catalogId=12070>).

From 2004 to 2006, the company entered partnerships with the top 50 global GSM/WCDMA systems equipment operators, as well as six of the top ten WCDMA telecom vendors in terms of terminals. In 2006, it secured 10 WCDMA deployment contracts in Western Europe, South America and Asia Pacific. In 2007 its total revenue was \$4.6bn, of which 57.8% was generated from overseas markets, and its sales growth in Europe and North America was 155%. (ZTE website: (<http://www.zte.com.cn/main/News%20Events/Whats%20New/2008040260720.shtml>)). 'It is believed that the recent merger and acquisition deals between Ericsson and Marconi, Alcatel and Lucent, and Nokia and

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Siemens were at least partly designed to “fight off competition from Huawei and ZTE”.’ (Cheng Li, 2007, p.2). We are not aware of any other part of the ICT industries in which the leading players are (or seem to be) afraid of their Chinese rivals.

The second exceptional feature is that Chinese firms in telecoms equipment never had the option of the technological dependence implied in the ‘bundling’ strategy. Advanced technologies were simply not available on the international market because the US government treated the sector as strategic. It was therefore necessary for Chinese firms to develop their own technology, starting from the relatively backward technologies which were available (Cai & Tylecote, 2006). It can be, and has been, argued that it was this ‘forced’ independent development which made Chinese telecoms more successful than (for example) television manufacture (Gao *et al.*, 2007).

But it is also significant that the most successful Chinese firms – Huawei, ZTE – are, again, ‘outsider’ firms, in spite of the resources that were poured into, and favour shown to, other, ‘insider’ firms. Huawei is a secretive firm, and its ownership structure is not altogether clear, but it is officially described as a private firm, and it has at least one feature characteristic of private firms: its founding CEO, Ren Zhengfei is still its

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CEO. And although Ren was an entrepreneur with good connections, the limits of his connections were shown by the way Huawei was obliged to develop over many years depending heavily on reverse engineering (rather than conventional R&D, which it could not originally afford much of - with a start-up capital of a mere \$3000 in 1988), and on relationships cultivated slowly and with much effort, with relatively small, mainly rural local governments which needed telecoms equipment and could not pay much for it. An engaged shareholder – in Huawei’s case, the CEO himself – was willing and able to support the slow, low-visibility development of real endogenous technological capability. ZTE was set up in 1985. Unlike Huawei, it was a state-owned enterprise, but a quite untypical one. It was initially called Zhongxing Semiconductor Co. Ltd, and it was set up by three founding SOEs, headed by No.691 Factory, which was under the former Ministry of Aerospace Industry (the others were Changcheng Industrial Co. Ltd (Shenzhen Office) and Yunxing Electronic Trading Co., Ltd.). Conflicts of interests among the shareholders led some of the senior management, led by Hou Meigui, the founding CEO, to set up a company named Zhongxing-Weixian Telecommunication Equipment Co., Ltd (ZXWXT), in December 1992, which four months later took over the management of the newly-renamed Zhongxing Telecommunication Equipment Co. Ltd., by agreement with its now two SOE shareholders, No.691 Factory and Guangyu Industrial Co. Ltd. (Shenzhen). “The three

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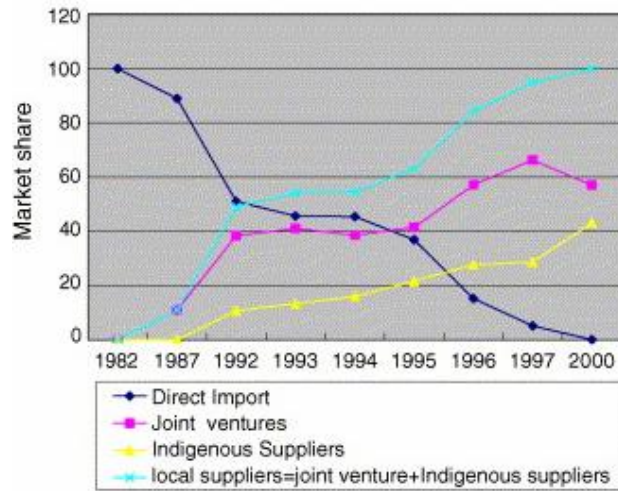
sponsors signed a contract that ZXWXT take charge of the business with their assets as mortgage. If they achieve all the goals, they could earn more; otherwise, they would pay for the losses.” (internal memorandum.) ZXWXT had only a small minority of the shares, but held effective control, under the not-uncommon rule of ‘State-owned but empower others to operate.’ ZTE Corporation was listed in Shenzhen Stock Exchange in 1997 and Hong Kong in 2004. Its state shares dropped below 50% in 2003. One clear sign of the exceptional nature of corporate governance in ZTE (for an SOE) is the attachment of top management to the firm. Hou Meigui, the founder of the firm, is still in control, albeit as chairman rather than CEO, after more than twenty years. Such permanence in authority can be found, strikingly, in five of the largest six Chinese electronics/IT firms – Legend, Haier, BOE, Huawei and Midea<sup>3</sup> - whose founders were still in charge in 2006 after an average of 22 years. (Cheng Li, 2006). Opaque, slow-pay-off strategies would have been much more attractive to them than to the typical, short-stay official CEO.

**Figure 1: Local products vs. imported products in the telecom switch market in China (1982–2000)**

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<sup>3</sup> Haier and Midea were originally, and are still largely, home appliance manufacturers, which have moved into electronics rather recently.

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Source: (Mu & Lee, 2005)

**Table 1 Stored Programme Control Exchange (SPC) annual market share by three groups in China (1982 -2000)**

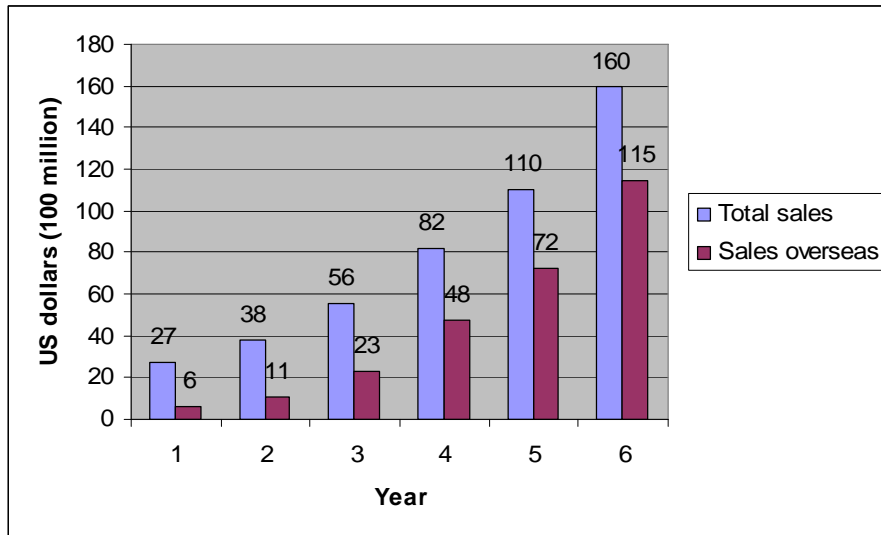
	1982	1987	1992	1997	2000
Direct import (%)	100	89	54	5	0
Joint venture (%)	0	11	36	63	57
Domestic supplies (%)	0	0	10	32	43

Source: (Tan, 2002)

**Figure 2 Value of sales contract of Huawei: 2002-2007 (100 million US dollars)**



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Source: Huawei website: <http://www.huawei.com/about/AboutIndex.do>  
(Accessed 08, June 2008)

### *5.3 The motor industry*

The motor industry resembles telecommunications in respect of the strategic importance that the government gave to it, with the selection of ‘insider’ firms for favour and support. It was quite different, however, in its freedom to buy technology from abroad, which the Big Three firms (Shanghai Automotive, Dongfeng, First Automobile Works) did through joint ventures with major multinationals. Until the last decade the privileged position they enjoyed gave them industry dominance, and the industry was one which showed all the bad effects both of ‘featherbedding’, profitability without effort or real competition, and of the classic mal-governance of state-owned firms. Over the last ten years the industry has been transformed, with the gradual introduction of increasing competition from abroad, and the sudden introduction of increased domestic competition from relatively small new entrants such as Chery and Geely. Figure 3 and Figure 4 show how ‘domestic brands’ – made by domestically-owned firms outside joint ventures – have held their position in the domestic market in spite of the increased openness to foreign competition (from wholly-owned subsidiaries as well as imports) following WTO entry in 2001-5. Chery is the first Chinese domestic passenger car brand to have sold 300,000 units in a year. In the same year one of its models ranked No. 1 in the best-seller list on the Chinese market;

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and Chery's domestic market share growth also surpassed all of its competitors – foreign or domestic. Exports of these domestic brands have also begun to climb rapidly. Chery has become the biggest car exporter based in China, with highest total sales growth in 2006. According to the statistics of International Organization of Motor Vehicle Manufacturers, in 2006, Chery has become the world's fastest growing car manufacturer at the rate of 65.62% (<http://oica.net/wp-content/uploads/2007/07/chery.pdf>).

What we have shown (Liu & Tylecote, 2008) is that, again, success has come from better corporate governance. The main change in corporate governance has been that new entrants have better CG. The most successful new entrants, Chery and Geely, are respectively an SOE owned by Wuhu (a city in Anhui province) and the Anhui provincial government, and a private firm built up originally to produce vehicle parts. Chery however does not appear to have had significant managerial shareholding, and nor did Guizhou Tyre (GTC), a firm which has also been notably successful in developing technological capability, albeit over a much longer period. What both appear to have had is managerial 'ownership' in a much more general and slightly metaphorical sense: the management was assured by the formal owners, the local/provincial government, that they would support them over a long period, and that if they were successful over that period they would be suitably rewarded. In the

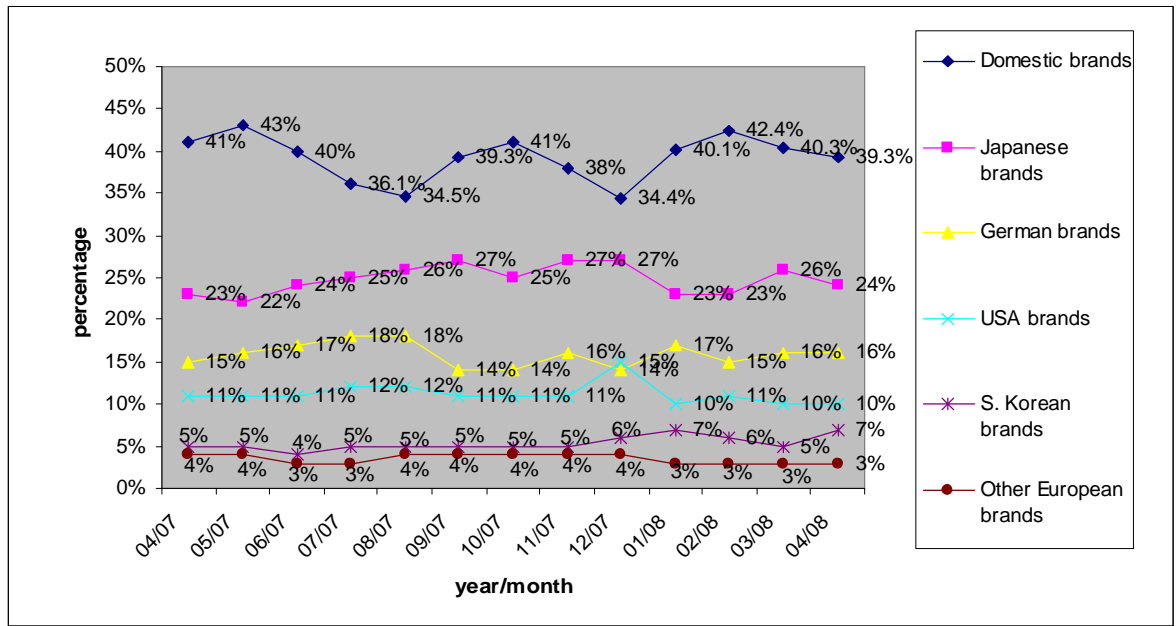
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Chinese context, given the insecurity of private property to which we referred in section 4, such a secure relationship with power is as good as a shareholding. Indeed in some ways it is better. A private entrepreneur, at least until very recently, would have some inclination to avoid focusing his energies and capital on one area, because of the threat from official caprice. Safer to 'hedge his bets' by investing in several areas. (This indeed applies to entrepreneurs anywhere, because of market and technological uncertainties; the Chinese situation is simply *more* uncertain.) He may indeed choose to move much of his capital out of the country, to make it as safe as possible. The managers in Chery and Guizhou Tyre have no alternative to focusing their energies.

Another improvement in corporate governance seems to have taken place in the incumbent firms. SAIC, at least, has moved from being run by a succession of CEOs who were recruited as officials rather than industry specialists and moved on after 5 years or so, in the classic manner – to a CEO (Hu Maoyuan) who is an industry specialist and has been in post already for considerably longer (Liu and Tylecote, 2008).

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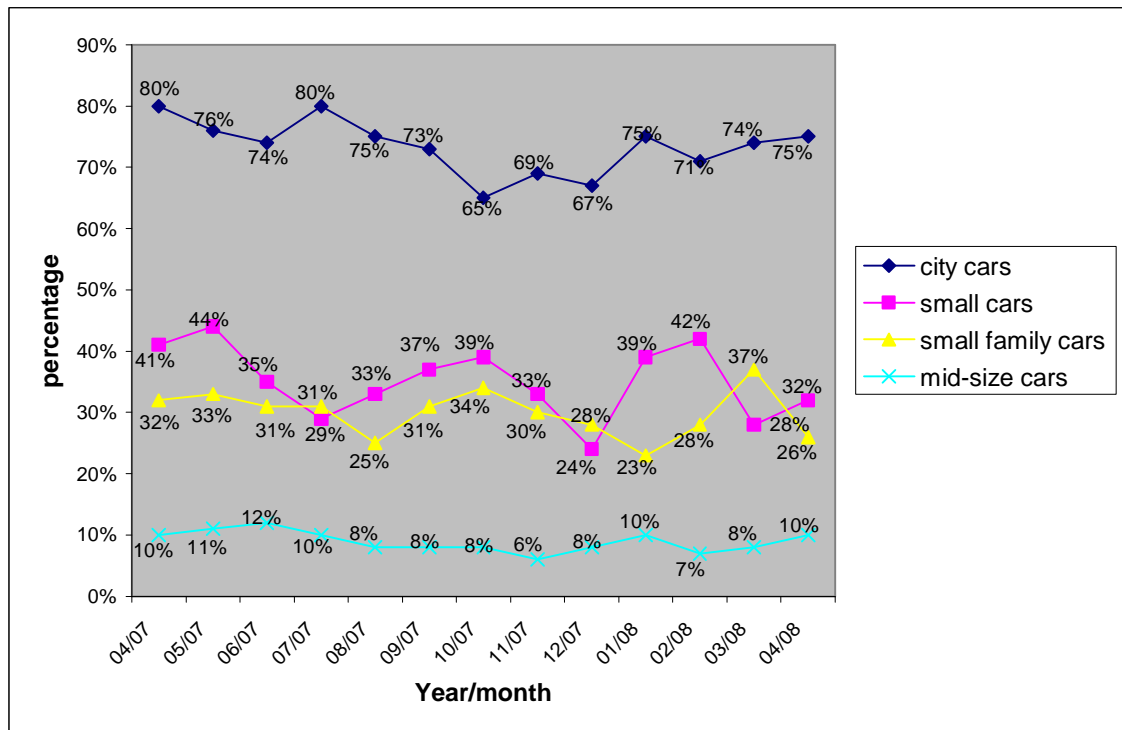
**Figure 3 Market shares of various brands, 2007-2008**



Source: Beijing Lange Steel Information Research Centre.

URL: <http://www.lgmi.com/shanghai/info/detailnewsb.asp?info=514634>  
 (accessed in June 2008)

**Figure 4 Market shares of domestic brands in passenger car segments, 2007-2008**



Source: Beijing Lange Steel Information Research Centre.

URL: <http://www.lgmi.com/shanghai/info/detailnewsb.asp?info=514634>  
(accessed in June 2008)

#### 5.4 Inferences from the successes

We have seen from the cases described in this section that Chinese firms which have been successful in building up dynamic technological

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capability (or ‘indigenous innovation’) have had one common, and unusual feature – managerial continuity – even though they covered the full spectrum of ownership types, from full state ownership to full private ownership. It appears that this continuity made them more disposed than the average SOE to opaque, slow-pay-off activities and expenditures.

The relation between the corporate governance of individual successful firms, and the characteristics of the sectors in which they operated, is more complex. The digital video player industry was one in which (once the initial groundwork was laid by an SOE) entrepreneurial private firms could thrive: it was new, it did not require large scale, it dealt directly with the mass consumer market. Telecoms equipment was a sector in which the ‘easy’ (though expensive) option of buying a ‘bundle’ of advanced technology from a multinational (in a joint venture or separately) was, because of the military sensitivity of the sector, not available. This meant that the SOEs with more typical governance were unable to use their preferred method of getting a strong position in the market. This left the market relatively open to those firms which, due to their ‘long-termist’ governance, were prepared to do it the hard (and ultimately more productive) way. The motor industry was quite different again – the SOEs with typical governance, the Big Three, had an excellent means open to them of getting a strong market position - joint ventures with leading foreign firms. What they proved unable to do was to advance from there to real ‘indigenous innovation’ capability. Given the size, rate of growth and profitability of the Chinese car market, this left an opportunity open to

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new firms, whether SOE or private, which (due to their ‘long-termist’ governance) were prepared to follow ‘unbundled’ strategies with opaque technological activities. Entering at the bottom end of the market (where the Chinese consumer cared most about cheapness and least about fashionable foreign brands) they were able to build up technological capability before moving up-market to challenge the foreign brands (manufactured in joint ventures involving the Big Three). The highly-competitive situation thus created has stimulated technological learning throughout the industry. Meanwhile, the corporate governance of the Big Three has improved, partly through the establishment of SASAC (see next section).

## **6. The reform of SOE corporate governance, and its dangers**

The state-owned enterprises which once dominated the economy have changed in two directions. First, many, particularly of the smaller SOEs, have been privatised, wholly or partly. This may in many cases have involved an unacceptable transfer of wealth from government to private hands (Hua et al., 2006), but from a corporate governance point of view it must be generally an improvement. Second, those which remain, particularly those under central government ownership, are being governed in an increasingly conventional Anglo-American manner, with their performance being evaluated by normal Western financial accounting



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measures, and with the stress on their responsibility to shareholders (including the state). ‘Chinese authorities generally consider the Anglo-American legal and regulatory systems to be the prototype for their “modern” institutional and enterprise reforms.’ The *State-owned Assets Supervision and Administration Commission* of the State Council is a special commission, directly under the State Council. It is responsible for controlling China's 189 large central government owned firms, including appointing top executives and approving any mergers or sales of stock or assets, as well as drafting laws related to state-owned enterprises. Since its foundation in 2003, SASAC has been trying hard to formulate systematic performance measurement for its SOEs (see Table 2 for the details of evaluation method for central enterprises by SASAC). Compared to its predecessors (industrial ministries at the central level and bureaus at the local level), SASAC has more expertise in external supervision over the firms’ operational activities. We can expect that SASAC officials, given that their job is mainly about supervising firms, would be able and willing to engage more closely and intelligently. Meanwhile, it attempts to include innovation performance in the comprehensive assessment system. To this extent, there should be a positive impact on firms’ technological strategy.

There are still problems associated with the current arrangement. First of all, the short-termism issue is not fully addressed. According to the recent

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measures for assessing “persons in charge of central enterprises” (Chief Executives and Chief Operations Officers) (Shousheng Li, 2007), if within three years a firm fails to reach the target set by SASAC (70% of which is composed of financial indicators, and <5% based on innovation performance), the person in charge runs a risk of job loss. Such financial pressures can be highly positive in bringing a new emphasis on efficiency through the reduction of waste, and focus on what is commercially rewarding. The difficulty is that if a CEO has a relatively short time to make his or her mark on a firm, and that mark will be measured financially, slow pay-off investments in technological capability will be discouraged. Precisely that has been the situation in British plcs, with a clear damaging effect on their technological capability and (by now) on their growth in higher-technology areas (Tylecote & Ramirez, 2006). In the United States, too, the ill-effects of such pressures have been noted (Porter, 1992; Lazonick & O’Sullivan, 2000).

Happily Chinese SOE governance in practice continues to be extremely diverse, as Hua et al. show, distinguishing four types of SOE according to the strength or weakness of the new and old governance regimes, *xinsanhui* and *laosanhui* (supervisory and executive boards and shareholders’ meetings; party committee, labour union and employees’ meetings). Their ‘hybrid’ type, in which both new and old regimes are

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strong, is of particular interest. The example they give had a minority state shareholding, minority shareholdings held by private institutions, and a substantial employee shareholding which in effect held the balance between state and private shares. This balance among shareholders helped to make the new governance regime a reality, because no one player held all the cards. It also played a key role in giving life to the old governance regime. Because the employees had both a direct interest in the profitability of the firm, and a share of power over its management, they participated actively in the *laosanhui*. They also (we would expect) worked harder individually. In terms of our framework of analysis, this firm has engaged shareholders (including its employees) well able to appreciate and support opaque and slow-pay-off activities; and it has stakeholder inclusion, at least as regards employees, thus making it easier to deal with spill-overs. It is striking that while this type can be regarded as peculiarly Chinese in the specific institutions involved, the outcome is not very different from the practice in many US firms, where employee inclusion is achieved, as here, largely through substantial employee shareholdings (Tylecote and Ramirez, 2006).

**Table 2 Portfolio of performance assessment in central enterprises by SASAC**

Financial Performance (70%)					Managerial Performance (30%)		
Content and Weight (%)		Basic indices	Weight (%)	Reference indices	Weight (%)	Assessment Item	Weight (%)
Profitability	34	Net asset earning ratio	20	Sales profit rate	10	Strategic management	18
				the surplus cash cover ratio	9		
		Return on asset	14	Profit/cost of capital (EVA)	8	Development and innovation	15
				Rate of earnings on equity	7		
Asset quality	22	Total asset turnover	10	NPL ratio	9	Operational decisions	16
		Acct. receivable turnover	12	Current asset turnover	7		
				Cash/asset ratio	6	Risk management	13
Debt risk	22	asset/liability ratio	12	Quick ratio	6	Basic management	14
				Cash ratio	6		
		Paid interest/debt	10	Ratio of liabilities to interest	5	Human resource management	8
				Contingent liability ratio	5		
Operational growth	22	Sales growth rate	12	Sales profit growth	10	Influence in the industry	8
		Ratio of value maintenance and appreciation of capital	10	Growth rate of total asset	7		
				Technological input ratio	5	Contribution to society	8

Source: Central Government of People's Republic of China website: [http://www.gov.cn/gzdt/2006-10/27/content\\_425677.htm](http://www.gov.cn/gzdt/2006-10/27/content_425677.htm) (accessed in June 2008)

## 7. Conclusion

We have argued that the disappointing performance of Chinese firms in terms of technological capability arises largely from faults of corporate

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governance and finance. Whereas the faults of the financial system have done most damage to privately-owned firms, and denied most of them the resources required to develop real technological capability in medium and high technology industries, it is the faults of corporate governance which are most apparent in state-owned enterprise, on which mainland China still relies to make an impact in medium and high technology sectors. This applies even to the deficiencies of inter-firm relationships, which have contributed greatly to weakness in certain important areas (notably, but not only, machinery). In some degree these faults can be remedied, and are being remedied, by 'normalisation' to a Western model. However the mechanical application of certain Western rules, such as financial accounting used as a means of corporate governance, is dangerous: the British example shows that to have real close, understanding relationships between shareholders (or their representatives) and managers is more valuable than simply to apply the 'correct' accounting formula. To evaluate firm performance by accounting criteria alone (or mainly) will be particularly dangerous now that the Chinese economy is heavily exposed to international competition (including that of multinational firms' subsidiaries within China): even more than ever, the development of real technological capability is likely to reduce profits before it increases them. Happily there are elements within the corporate governance systems of many Chinese SOEs which tend to confer the engagement and inclusion

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which we have argued is necessary. They have contributed to the sectoral successes we have described. It will be necessary to foster them.

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