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DISCUSSION PAPER SERIES

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ABSTRACT

Political Connections, Business Groups and Innovation

It has been argued that Asia's remarkable economic achievements of the past 50 years build on institutional arrangements very different from the West, notably the central role of business groups (BGs). As Asian economies move from extensive to intensive growth, we enquire whether the business group organsational format will be as effective going forward. We argue that the ubiquity of BGs has been associated with the accretion of major market power, as well as overall concentration. Our empirical work, drawing on a sample of more than 9000 Asian firms, finds that while BGs are more innovative than non-affiliates, this is unsurprising given their access to additional resources. However, when we look at innovation at the country level, we find that the wider consequences of BGs on innovation may be negative.

JEL Classification: L22, O30, O53

Keywords: innovation, R&D, Asian business groups, market power, overall concentration

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Political connections, business groups and innovation

1. Introduction

Asia is the great economic success of the last 50 years. However, that success has been achieved through policies and with institutional formats that have often been radically different from those in most advanced economies (Commander and Estrin, 2022). Not only have governments commonly pursued industrial policies, including of a vertical variety (Rodrik, 1997; 2007), but many of Asia's leading companies are organised in business groups (BGs), rather than traditional Western corporations. BGs are multi-business entities defined as "a collection of firms bound together in some formal and informal ways" (Granovetter, (1994): p454). Although the entities may be legally independent, they are "accustomed to taking coordinated action" (Khanna and Rivkin), 2001: p47) and are mostly family owned or dominated[1]. Business groups are sometimes favorably viewed in the development literature because they are argued to internalise market failures (Leff, 1978; Khanna and Palepu, 2000; Khanna and Yafeh, 2007) but they are seen as a source of tunnelling and a mechanism to defraud minority shareholders in the finance literature (Morck, Wolfensen and Yeung, 2005). Asian BGs often have significant market power while the wider economies, of which they are a part, are also marked by high levels of overall concentration (Commander and Estrin, 2022). Asian BGs also tend to have very strong political connections which they deploy in a variety of ways (Almeida and Wolfenzeon, 2006). Those connections can facilitate the acquisition of assets or securing resources on preferential terms, as well as enabling access to public sector contracts and/or finance, including from public sector banks and financial institutions. At the same time, Asian politicians are closely connected with BGs and their oligarchic families, requesting favours, financial support and jobs for their extended families. The highly transactional nature of the relationships binding business with politics ensures that all parties involved benefit; sometimes very significantly. At the same time, the complexity of business group structures – most are highly diversified in terms of both activities and companies – can serve as a deterrent to predatory behaviour by politicians.

Despite these somewhat unusual features, the combination of interventionist policies and pervasive BGs has clearly not impeded Asia's economic renaissance in the past thirty years.

1. In Asia, BGs are generally diversified firms in which pyramidal structures mean that their owners have levels of control far in excess of the levels of actual ownership (Bertrand, Mehta & Mullainathan,2002).

That revival has so far mainly been built through extensive growth (e.g., Brandt, Debin, Rawski, 2014). But those days are largely numbered, at least in the more successful economies. As incomes have risen and exposure to trade and investment, and hence technological capacity, has grown, the question is whether Asia has become – or is becoming – an innovative place. And if so, who does the innovating and with what consequences? Innovation is, of course, a broad term encompassing a wide variety of actions and activities. In this paper, we focus on a range of innovative actions including process and product innovation at the level of the firm as well as investment in research and development (R&D).

The paper is organised as follows. Throughout, our focus is on the larger and/or middle-income economies of Asia. *Section 2* lays out our framework for thinking about politically connected and the possible implications that their organisational formats may have for competition and innovation. *Section 3* provides some basic descriptive information about market structure and the role of BGs. It shows that levels of market and overall concentration in Asia are relatively high. *Section 4* then uses a large firm level dataset with over 9000 observations for seven Asian economies to examine whether there is any measurable difference in innovative activity between firms that are part of a business group and those that are not. We find that BGs tend to be more innovative. But even if BGs are more innovative, the wider consequences of their presence on innovation may be negative. Thus, BGs may crowd out innovative activities by non-affiliates as well as raising barriers to potentially innovative entrants. *Section 5* suggests that this is the case as innovation levels in aggregate are below what might have been expected given the level of GDP and GDP per capita. We argue that this is not because BGs are lotus eaters but because their presence has consequences for other firms; consequences that hold back innovation and, *inter alia*, lead to employment and productivity outcomes that are not supportive of innovation. *Section 6* concludes.

2. Competition and innovation

Most thinking about innovation has emphasised the role of competition in spurring companies to innovate. In a classical framework, lack of competition will translate into rent taking and a failure to invest in innovation. The lack of rivalry spurs organisational complacency. However, Schumpeter (1943) also argued that competition can itself suppress the incentive to innovate if it erodes the returns to innovation too quickly. Further, Aghion et al (2005) have argued that market power in itself may not be an impediment to innovation.

When there is monopolistic competition, leading edge companies may have strong incentives to innovate as they try to seek out opportunities to escape competition. This sort of neck-and-neck rivalry can promote investing in, and operationalising, innovation.

What difference would it make if instead of businesses in the conventional sense, there were BGs? Bear in mind that the comparison is implicitly between similar types of firms but with different organisational formats. *A priori*, there are three possible reasons for thinking about possible differences. The first, (a) is the extent of market power. For example, BGs may have far greater market power than stand-alone businesses. The second, (b) is that BGs' political connections may increase their ability to extract rents and this may, in turn, affect their appetite for investing in innovation. The third, (c) concerns the ability of BGs to attract and leverage resources from other parts of the group or to obtain financial support from the government to fulfill plans or other targets: China is an obvious case in point.

Even if these differences are present, they do not necessarily yield clear predictions. For (a), the sign is [+/-] . If BGs compete with each other and operate at or near the frontier, they will be as inclined to invest as 'standard' businesses under monopolistic competition. For (b), the sign could be presumed to be [-] , as rents would dilute the incentive to innovate. But, again, that would in part depend on the objective function of politicians and their horizons. Although most models assume politicians to be driven by short-term objectives, it is clear that in both China and South Korea, longer term objectives have been in play. For (c), the sign would be [+] , if directed funding or other supports bolster investment in innovation.

3. BGs and concentration

In Asia, not only is the role of the listed company less prominent but there is a central role for family – often dynastic – ownership coupled with control in both privately-held and listed companies. As a result, minority, or even majority, external shareholdings are typically combined with concentrated, strategic ownership by families or founder-managers. These in turn then tend to be wrapped up in BGs. Most of these have highly-diversified portfolios of activities, commonly operating across many sectors.

To get a sense of their prevalence, in the mid-1990s the share of listed firms affiliated with BGs ranged between 37 per cent in Thailand and 73 per cent in Indonesia. In East Asia as a whole (including Japan) the average was 68 per cent.(Claessens, Fan & Lang, 2006). A later

estimate for 2005 found that 20 per cent of Chinese companies were affiliated and around 30 per cent in India (Carney, Gedajlovic, Heugens, Van Essen, M., and Van Oosterhout, J. (2011). There are few reasons for thinking that these shares have declined significantly in recent years (Carney, Estrin, Liang, Shapiro, 2019).

Among the reasons for why BGs are so widespread are low trust in external institutions (Meon and Sakkat, 2015; Grief and Tabellini, 2017; Gorodnichenko and Roland, 2017) but also 'missing institutions' that may affect not only access to capital but also legal recourse (Khanna and Palepu, 2000). However, the problem of missing markets could have been expected to diminish over time as income growth and institutional development has occurred. This suggests that an important factor behind BGs' persistence lies in the way that they are embedded in broader political relationships and networks. At the same time, those relationships have aided incumbency and entrenchment over time.

When considering innovation, the obvious starting point is to consider whether BGs act to attenuate competition or are, in effect, neutral with respect to the competitive environment. The evidence from Asia suggests that the former is more likely to be true. Using concentration ratios (CRs) for the top 5 and top 10 firms in a country (CR5 and CR10 respectively), *Table 1* shows that Asia is marked by high levels of concentration. This is especially true in Thailand and South Korea. Even in China and India, the largest ten listed – as well as unlisted and state-owned – companies account for more than 15% of GDP. And whilst not all of these companies are BGs, the majority commonly are.

[Table 1 about here]

Getting a precise measure of the share attributable to BGs is difficult and likely to be under-estimated, given their complex reporting practices. But in India, for example, four of the ten largest companies are members of the Tata group, which does not report consolidated accounts. In Indonesia, re-calculating the CR with firms in the country's top fifty companies consolidated into their business groups, the CR5 ratio increased by more than 25%.

In short, in Asia not only are there many BGs – an organisational format for businesses that is rare in advanced economies – but this is also accompanied by high levels of concentration.

To put this in context, the CRs reported in *Table 1* are very substantially higher than comparable measures for the United States[2].

4. Firm level evidence on BGs and innovation

We now use firm level evidence to examine whether BGs innovate relative to firms that are not affiliated. Of course, the results have to be treated with caution as economic and financial variables for BGs are often problematic due to their non-transparent accounting and transfer practices. Even so, we aim to circumvent this by focussing on entities that are, or are not, self-declared members of a business group.

4.1 Data and Variables

The database that we use is the World Bank Economic Survey (WBES) which has been administered in a number of Asian economies. The sample size for those countries that are covered is given in parentheses; Bangladesh (817), China (1306), India (5042), Indonesia (682), Pakistan (552), Philippines (562) and Thailand (463). In addition, we are able to distinguish between medium sized firms (20-99 employees) and large firms (>=100 employees). The latter are typically around 50% or slightly less of the sample for Bangladesh, China, Indonesia and Thailand and closer to 40% in India, Pakistan and the Philippines. We focus our attention exclusively on firms that are formal, that are in manufacturing, have 20 or more employees and are domestically and privately owned using a criterion of 50% to exclude foreign and state-owned enterprises.

The WBES contains questions on BG membership and innovation, as well as information about firm size (number of employees), firm age and industry, classified into sixteen sectors[3]. WBES uses a standard definition of group affiliation across jurisdictions, requiring firms to identify themselves as group members or independent. Firms are defined as independent according to the following criteria: a firm must i) be legally registered for tax purposes, ii) make its own financial decisions and iii) have its own financial statements separate from those of the group, iv) have its own management and control over its payroll and v) be owned by private domestic individuals, companies, or organizations. Thus, we classify firms that self-identify as related to a larger enterprise as a group affiliated firm and we code them as 1,

[2] The CR5 for the US is around 3%. See also Philippon (2019).
[3] These approximate SIC three-digit level.

and 0 otherwise. Turning to innovation, for consistency across samples, we work with three questions concerning whether the firm undertakes:

a) product innovation ("during the last three years, has this establishment introduced new or improved products or services?");
b) process innovation ("during the last three years, has this establishment introduced any new or improved process?"), and
c) R&D (during the last fiscal year, did this establishment spend on R&D?).

All three variables are coded as binary. We also combine the three variables to create an innovation index comprising the sum (a+b+c) and, hence, varying between 0 and 3.

The proportion of firms in the sample that are BG members is reported in *Figure 1* for each country and varies from around 9% in Pakistan to more than 30% in Bangladesh. There is also variation by sector. For example, in India the BG share is highest in chemicals and chemical products (around 35%) and lowest in non-metallic minerals products (18%).

[Figure 1 about here]

4.2 BG affiliation and innovation

We first explore whether BG affiliation is associated with higher rates of innovation. From a theoretical point of view, there are two perspectives. In the first, BGs are characterised as having opaque and often pyramidal governance structures, designed for the most part to aid self-dealing among related parties (Morck, Wolfensen and Yeung, 2005; Jia, Shi and Wang, 2013). This is seen to lead to the transfer of profits across units to the benefit of ultimate (family or dynastic) owners and at the expense of other shareholders (Bae, Kang and Lee, 2002; Masulis, Phan and Zein, 2011; Siegel and Choudhury, 2012). Minority investors are particularly exposed to the risk of expropriation (Bertrand, Mehta and Mullainathan, 2002).. With respect to innovation, this view of BGs suggests that unless BG owners have ambitions that can be achieved through innovation – this might include competitive pressure from peers – they will mostly undertake less R&D than non-BGs.

As noted above, there is also a more positive perspective on BGs, in which they are seen as a functional response to deficiencies in institutions, notably weaknesses in capital and labour (especially managerial) markets (Khanna and Rivkin, 2001; Khanna and Yafeh,2007).. Thus, the high transaction costs of operating in factor markets in developing countries may lead

firms to internalise access to these resources by holding a portfolio of companies and operating an internal capital and skilled labour market (Khanna and Palepu, 2000). The capacity to allocate resources centrally and the greater availability of internal financing leads to the prediction that BG affiliates might innovate more than non-BG affiliates.

To test these competing perspectives, we estimate four separate innovation functions for each country in our sample, using the three separate measures of innovation, as well as the innovation index as dependent variables. The equations take the general form:

$$Y_i = \alpha + \beta_1 BG_i + \beta_2 \ln(Size_i) + \beta_3 \ln(Age_i) + SFE + \varepsilon_I \qquad (1)$$

where;

Y_i: dummy variable indicating product innovation, process innovation, R&D activity or innovation index

BG_i: dummy variable indicating whether firm is part of a BG

$Size_i$: number of employees in firm

Age_i: firm age

SFE: dummy variable for the sector to which the firm belong (Sector fixed effects)

ε_i: error term

The regressions therefore control for some of the standard factors in knowledge production functions such as scale (firm size), experience (firm age) and industry (sector) (Grilliches, 1979). The estimator is logit, except for the index where we use ordered logit.

[Table 2 about here]

The results are reported in Table 2. The findings are consistent with the view that innovation will usually be higher in BG affiliates than non-affiliates; a finding which has been noted previously on a different sample and for an earlier period (Belenzon and Berkovitz, 2010). The coefficient on BG is positive and highly significant for all four indicators of innovation and in all countries. The scale of the positive BG effect is also quite large. If we consider the coefficients on the innovation index, for example, their values range from 0.496 in India to

1.344 in Thailand. Looking at, perhaps, the most important innovation indicator - R&D - the impact is often even more marked than for the index, ranging from 0.490 in Bangladesh to 1.798 in Thailand. Even in China, with its rather different political and institutional environment, the coefficient for BGs is 0.61 for the innovation index and 0.499 for R&D.

4.3 Internalising resources and innovation in BGs

The WBES also allows investigating whether BG affiliation enhances innovation through access to factor inputs, in particular capital, as would be predicted by the Khanna and Palepu (2000) "paragons" view of BGs. We therefore explore whether BG affiliates are more easily able to obtain external financing by considering the sources of finance for fixed capital formation in the three Asian countries for which the WBES has sufficient data on the issue; Bangladesh, China and India.

We find that there are considerable differences between the proportion of fixed capital financed *internally* by BG affiliates and non-affiliates in each of these three countries. On average, in Bangladesh, internal finance represents as much as 72% of total finance for non-affiliates, with the share being 90% in China and 67% in India. The proportions are lower for BG affiliates; 60%, 85% and 50% respectively. While China has much higher internal financing of fixed capital formation in general (consistent with the somewhat lower impact of BG affiliation on innovation), even there, BGs rely less on internal finance.

The main reason for these differences in the structure of capital finance comes from the provision of owners' equity and from the supply of bank loans. Both of these, the literature has suggested, may be amplified in the organisational framework of a BG (Khanna and Yafeg, 2007). Thus, if we consider the share of fixed assets financed by banks (both private and state-owned), this is 25% in BGs as against 14% in non-affiliates in Bangladesh. The respective shares are 7% as against 5% in China and 38% as against 25% in India.

Access to equity is, of course, a less common way to finance fixed assets. However, we see a similar pattern. The shares for BGs are 12% in Bangladesh as against 9% for non-affiliates, with comparable figures for China being 6% against 3% and India being 10% against 7%. The data therefore provide some *a priori* evidence to support the view that BG advantages in innovation in part stem from access to external finance; access that may be less easily

available to non-affiliates. This would be consistent with the way in which political connections open up financing opportunities to BGs.

4.4 Innovation, firm size and BG affiliation

It is well established that innovation at the firm level is an increasing function of firm size (Crescenzi & Gagliardi, 2018). It is therefore interesting to consider how BG affiliation affects that association. In fact, as we show in *Figure 2*, the size of the significant positive BG effect actually diminishes as the share of BGs in the economy rises.[4] This suggests that as BGs become larger (and perhaps therefore more prevalent in the economy as a whole), the benefits of BG affiliation (and therefore the internalisation effects) on innovation tend to decline.

[Figure 2 about here]

To explore these size effects further, we extend the previous equation so that the impact of BGs on innovation is allowed to vary with firm size (as measured by the number of employees). To that end, we include an interaction term between BG affiliation and firm size. If the impact of BG affiliation is positive for innovation, and this is enhanced as the scale of available resources rises, then we would expect the coefficient on the interaction term to be positive.

For this experiment, we focus on a single innovation variable – R&D – and test whether the predicted impact of BG affiliation was influenced by the size of the firm[5]. The results for each country are plotted in *Figures 3a to 3g*. For most countries, our results are consistent with the benign view of BGs concerning innovation. The positive impact of BG affiliation on R&D increases with firm size. We find this association to hold in Bangladesh, India, Indonesia, and Thailand. However, the interaction effect is marginal in Pakistan, while in China and the Philippines, the effect is reversed, suggesting that non-affiliates are more likely to undertake R&D as firm size increases. In other words, in China and Philippines, small BG affiliates will be more likely to innovate than non-affiliates, but large ones less.

[4] In *Figure 2*, we use the coefficient on innovation index as the BG effect on innovation. When we use the coefficient on the individual innovation measures, the effect is still negative.

[5] Note that these results are to some extent compositional, with some 64% of BGs being in our "large firm" category (>=100 workers) but only 36% of non-affiliates. BGs are thus more likely to be larger than non-affiliates.

[Figures 3a-3f about here]

4.5. BG affiliation and exporting

A further insight from the wider literature is that innovative firms often tend to be those exposed to foreign markets (Van Long, Raff and Stähler, 2011; Coelli, Moxnes and Ulltveit-Moe, 2022). To explore this, we use the same independent variables but use exports as a percentage of sales as the dependent variable to explore the impact of business group affiliation on export intensity. Thus we estimate using Tobit:

$$Y_i = \alpha + \beta_1 BG_i + \beta_2 \ln(Size_i) + \beta_3 \ln(Age_i) + SFE + \varepsilon_I \qquad (2)$$

where;

Y_i: exports as a % of total sales

BG_i: dummy variable indicating whether firm is part of a BG

$Size_i$: number of employees in firm

Age_i: firm age

SFE: dummy variable for the sector to which the firm belong (Sector fixed effects)

ε_i: error term.

[Table 3 about here]

The results are reported in Table 3, and are consistent with the literature in that firm size and age are positively associated with higher export intensity (e.g., Bernard &. Jensen, 2004). One might also have expected that the concentration of resources would allow BGs to export relatively more than non-affiliated firms. However, for the most part, this is not the case; rather BGs display a home country bias. Thus, we find that BG affiliation does not have a significant effect on exporting in Bangladesh, China, Pakistan, and Philippines although we do identify a positive and significant effect in India, Indonesia and Thailand.

In sum, while there is some evidence that BG affiliation is associated with higher exports, in most Asian countries BGs do not appear to use their enhanced access to factor inputs to increase their exporting. This is consistent with another characteristic of BGs which is that they tend to focus on the domestic economy where their political networks and connections are most relevant and useful (Carney et al, 2018).

4.6 Summary

Although our analysis is not causal, the correlations we have assembled tell a consistent story. While there undoubtedly are some BGs that aim to maximise rents and transfer resources to their ultimate owners, the data suggest that in Asia many BGs actually exploit their advantages in terms of pooled factor inputs to enhance their market position. This leads them to innovate more than non-affiliates. This may be driven by competition between themselves as well as from abroad. This is consistent with a version of Aghion et al's (2005) neck-and-neck rivalry. However, there is also some evidence that these benefits of BG affiliation begin to decline as firms become larger. Moreover, in much of Asia, BGs are domestically oriented, suggesting that while they may channel their strong resource base in Pareto improving ways, they are simultaneously seeking to entrench themselves in the domestic economy. This involves building market power, as well as overall concentration, through erecting barriers to entry and new competition while also limiting the ability of new entrants to undertake innovation. Hence, while BGs themselves may innovate more than their current non-affiliated competitors, their behaviour may at the same time limit the extent of innovation at the national level. In effect, they may crowd-out innovation in other parts of the economy. Although we cannot explore this conjecture directly, we now try to observe whether the predicted outcomes show up in more aggregate data.

5. Aggregate measures of innovation in Asia

Our analysis has so far focussed on firm level data where BGs appear to innovate more than non-affiliated companies. What is lacking, however, is a sense of the level of innovation in the economy as a whole. This section addresses this issue and places the findings in a comparative context.

Despite considerable rhetoric about Asia's innovative presence, the evidence from the various indices suggests that, to date, Asia has some clear loci of innovation but that on average at the country level, the region does not perform particularly strongly. For example, World Intellectual Property Organization (WIPO)'s Global Innovation Index (GII) which tracks over 130 countries shows that between 2013-2019 most Asian economies saw broadly stable innovation scores. However, there are two countries that stand out - China and South Korea. In China, there has been significant improvement in recent years towards the frontier. South Korea has been consistently even closer to the frontier; at least when measured by this index.

Although such indices are useful, they obviously combine judgements about many facets of innovation. For simplicity – and consistent with our emphasis in Section 4 – we now revert to using R&D as the main measure of innovation for a large number of countries. *Figure 4* uses information for 112 countries and relates R&D spending as a share of GDP to GDP per capita when controlling for the size of the economy. This is done for the period from 2015-2019. The figure reports the (upward) slope of the fitted line, as well as individual countries' standing relative to that line with a 95% Confidence Interval (CI). South Korea lies significantly above the line in the R&D region occupied by leading innovators, such as Israel and Sweden. China also lies above the line albeit at different levels of spending on R&D and income. India also lies slightly above the line. The other Asian economies mostly fall below the line; some significantly so[6].

[Figure 4 about here]

In short, most countries in Asia have R&D expenditures below the advanced economies (as might be expected) and sit at about, or below, the level that exists elsewhere in the world for their level of development and GDP. Some, such as Indonesia, Philippines, Thailand clearly lie below the 95% CI for the line. With respect to our findings in Section 4, pockets of innovation concentrated in entrenched BGs may be associated with low entry and exit rates and weak incentives in the broader economy for innovation; hence the aggregate outcomes.

Whilst R&D is obviously both a standard and important measure of innovation, a parallel consideration is, of course, how effective that spending proves. After all, some of that spending may be done in laboratories or institutes – often state run - with little or no connection to the market. To get at a better sense of the value of R&D commonly involves looking at patents, normally patent applications. However, in Asia this can also be misleading. The clearest instance comes from China where there has been an enormous growth in patent applications, particularly domestically. Yet, many of those applications are not actually granted and their value is questionable[7].

[6] It seems likely that Bangladesh would also fall below the line but we lack comparable data on R&D expenditure.
[7] See Commander, Estrin & De Silva (2022) for a more detailed discussion of Chinese patents and how to interpret them.

One way of avoiding measures of spurious innovation is to looks at patents filed in multiple jurisdictions, including international ones. This is because the cost of doing this and the standards applied in those jurisdictions should be a good predictor of the perceived quality – hence value - of the underlying patent. *Figure 5* accordingly relates the number of patent families filed in at least two offices – in multiple countries - to R&D spending as a share of GDP on average for 2016-2018. Most Asian economies lie close to the fitted line at the left of the distribution. China falls way below the fitted line, while South Korea lies substantially above it. This may in part reflect the fact that China has a far larger domestic market and hence patenting abroad will be less important. But it is also likely to reflect the fact that most Chinese patent applications have limited value. Trying to capture the benefits of innovation in international markets – a strong feature of South Korea – appears to be far less true for China.

[Figure 5 about here]

If South Korea and China stand out – albeit in somewhat different ways - what can we say about the role of BGs in those economies in driving innovation? Here, some patent data can also offer insights. In this instance, we can use filings made under the Patent Cooperation Treaty (PCT) and focus on the recent, three year period, 2018-2020. Filings under the PCT occur in either national or regional offices as well as the international bureau. By filing, the aim is to secure patent protection in a multiplicity of jurisdictions. Chinese PCT filings amounted to nearly 23% of total global PCT filings between 2018-2020.

[Figure 6 about here]

Figure 6 shows the number and share of PCT filings between 2018-2020 for the United States, China and South Korea. The Chinese and US shares were broadly comparable at around 22-23% and South Korea accounted for a further 7% of total filings[8]. Chinese filings under the PCT system have increased very sharply in recent years. Between 2010-2020 they rose by over five times, even though they accounted for no more than 5% of total patent applications in China[9].

[8] Other large contributors are Japan and Germany. These five countries account for nearly 80% of global PCT filings. It is notable how low the number of filings has been from India (c2000 per annum).
[9] Given that PCT applications are initially with a national or regional office, it is possible that – in common with patent applications more generally in China – there is a discrepancy between applications and grants. However, this discrepancy is likely to be far smaller than for patents filed solely in national offices.

When looking at the companies making the filings, for South Korea two major BGs – Samsung and LG – account for over a third of total PCT filings from that country. In China, Huawei, ZTE and Ping An BGs also accounted for close to 13% of total Chinese filings with Huawei alone accounting for 8%[10]. Aside from these prominent BGs, other major filings in China came mostly from large telecom companies with international operations.

What the data suggest is that BGs are indeed prominent players in posting high quality patents. However, the number of BGs that are so doing are few in number. In South Korea this reflects the extraordinary place that Samsung, in particular, but also LG, have in the economy and in innovation. Whilst highly innovative, there is a very limited, set of innovative companies that has been able to flourish outside these behemoths. In China, quality patents also seem to be concentrated in a limited number of companies, most of them, BGs.

6. Conclusion

BGs' close connections to political power in Asia has tended to translate into superior access to resources and assets, often including market power and protection from competition (Commander and Estrin, 2022). Some egregious instances have been the so-called License Raj period in India or the Suharto era in Indonesia when favoured groups, such as the Salim Group, exerted an enormous economic influence. These examples have, however, mutated over time, even if many of the BGs that were influential earlier have managed to entrench themselves. Although the era of blatant rent seeking by incumbents has by no means disappeared, it has been modified in the past few decades. New preferred groups have also come into existence and flourished. In today's India, the Adani Group is probably the most striking example of a relatively recent business group that has grown enormously quickly due to its connections to power. Whilst foreign competition may be restrained by combinations of tariffs or outright prohibitions – as in China – domestic BGs have, for the most part, faced more competition, including from other BGs. This seems likely to be a major reason for why firms that form part of a business group appear to innovate more than others.

[10] To put this in context, Huawei's PCT applications were two and a half times larger than those by Qualcomm from the United States.

However, even if – as we find in this paper - BGs undertake innovation, their existence and the accompanying market structure, has significant consequences for the aggregate level of innovation in the economy. There are two main channels through which BGs might effectively hold back a wider incidence of innovation. The first is that they could effectively crowd out other non-business group firms, whether by limiting access to finance or other resources, as well as reducing likely returns to innovation from non-connected and non-affiliated companies. Non-BG firms thus tend to have low innovation rates and this, naturally, affects their productivity.

The second major channel is that the entrenched economic space occupied by BGs might directly affect the relative size of the formal economy and, hence, the extent of product and labour market segmentation. Allied to this is the fact that BGs and their market power tend to suppress entry and exit and hence the churning characteristic of most dynamic economies. This holds down possible sources of innovation. Manifestations of this are a firm size distribution that has a missing middle with few paths of growth for newer and smaller firms along with a mass of small and low productivity firms stuck in informality. Indeed, this may be a far greater barrier to innovation than any differences attributable to BG/non-BG differences. This is of course difficult to quantify, given that it is mostly about unobservables. However, the aggregate information on innovation presented in this paper suggests that these effects are by no means trivial.

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Table 1: Concentration ratios in Asia (5 & 10 firm revenue–GDP CRs)

Country	Unlisted & Listed CR5 (%)	Listed CR5 (%)	Unlisted & Listed CR10 (%)	Listed CR10 (%)
Bangladesh	3	3	4	4
China	11	9	16	13
India	11	11	17	16
Indonesia	4	4	7	7
Malaysia	11	10	18	16
Pakistan	6	5	8	7
Philippines	19	19	27	27
South Korea	30	30	43	43
Thailand	27	27	40	36
Vietnam	36	10	46	15

Source: Commander and Estrin (2022)

Table 2: Regressions on the impact of BG affiliation on innovation

Bangladesh

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	0.712***	0.569***	0.490**	0.724***
	(0.170)	(0.189)	(0.204)	(0.150)
Ln (Employees)	0.00677	0.182***	0.104	0.110**
	(0.0622)	(0.0679)	(0.0748)	(0.0532)
Ln (Firm Age)	0.0967	-0.0941	-0.0827	-0.0474
	(0.117)	(0.119)	(0.143)	(0.0993)
Constant	-0.558	0.0864	-1.781***	
	(0.450)	(0.468)	(0.547)	
Sector FE	Yes	Yes	Yes	Yes
Observations	817	817	817	817

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

China

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	0.611***	0.794***	0.499**	0.610***
	(0.196)	(0.247)	(0.194)	(0.170)
Ln (Employees)	0.237***	0.172***	0.289***	0.269***
	(0.0572)	(0.0633)	(0.0577)	(0.0505)
Ln (Firm Age)	0.177	0.259**	0.0171	0.163
	(0.115)	(0.125)	(0.116)	(0.102)
Constant	-1.143***	-0.437	-1.052***	
	(0.406)	(0.448)	(0.406)	
Sector FE	Yes	Yes	Yes	Yes
Observations	1,306	1,306	1,306	1,306

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

India

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	0.202***	0.430***	0.643***	0.496***
	(0.0696)	(0.0786)	(0.0706)	(0.0625)
Ln (Employees)	0.184***	0.238***	0.289***	0.266***
	(0.0295)	(0.0329)	(0.0304)	(0.0265)
Ln (Firm Age)	0.0416	-0.0753*	-0.0714*	-0.0349
	(0.0401)	(0.0433)	(0.0418)	(0.0359)
Constant	-1.148***	-0.305	-1.994***	
	(0.193)	(0.206)	(0.204)	
Sector FE	Yes	Yes	Yes	Yes
Observations	5,042	5,042	5,042	5,042

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Indonesia

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	0.680**	0.746***	0.855**	0.814***
	(0.293)	(0.271)	(0.363)	(0.248)
Ln (Employees)	0.308***	0.478***	0.693***	0.492***
	(0.0967)	(0.0881)	(0.138)	(0.0808)
Ln (Firm Age)	0.795***	0.488**	0.796**	0.523***
	(0.242)	(0.197)	(0.371)	(0.173)
Constant	-5.827***	-5.279***	-8.614***	
	(0.883)	(0.727)	(1.384)	
Sector FE	Yes	Yes	Yes	Yes
Observations	682	682	682	682

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Pakistan

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	0.616*	1.100***	0.593*	0.866***
	(0.335)	(0.332)	(0.356)	(0.280)
Ln (Employees)	0.197**	0.175**	0.361***	0.252***
	(0.0775)	(0.0754)	(0.0848)	(0.0671)
Ln (Firm Age)	0.615***	0.622***	0.610***	0.675***
	(0.174)	(0.168)	(0.206)	(0.150)
Constant	-4.153***	-3.567***	-5.225***	
	(0.625)	(0.590)	(0.737)	
Sector FE	Yes	Yes	Yes	Yes
Observations	552	552	552	552

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Philippines

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	0.888***	-0.00392	0.930***	0.680***
	(0.239)	(0.238)	(0.251)	(0.211)
Ln (Employees)	0.118	0.343***	0.451***	0.341***
	(0.0987)	(0.0992)	(0.111)	(0.0888)
Ln (Firm Age)	0.135	0.0316	-0.186	0.0147
	(0.145)	(0.141)	(0.163)	(0.128)
Constant	-1.707***	-1.336**	-2.904***	
	(0.596)	(0.583)	(0.663)	
Sector FE	Yes	Yes	Yes	Yes
Observations	562	562	562	562

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Thailand

VARIABLES	(1) Product	(2) Process	(3) R&D	(4) Innovation Index
Business Group	1.292***	0.838**	1.798***	1.344***
	(0.390)	(0.334)	(0.417)	(0.296)
Ln (Employees)	-0.0968	0.148	0.447**	0.124
	(0.152)	(0.117)	(0.181)	(0.109)
Ln (Firm Age)	-0.202	-0.135	0.696	-0.176
	(0.304)	(0.247)	(0.454)	(0.229)
Constant	-1.076	-1.634*	-7.160***	
	(1.026)	(0.836)	(1.620)	
Sector FE	Yes	Yes	Yes	Yes
Observations	463	463	463	463

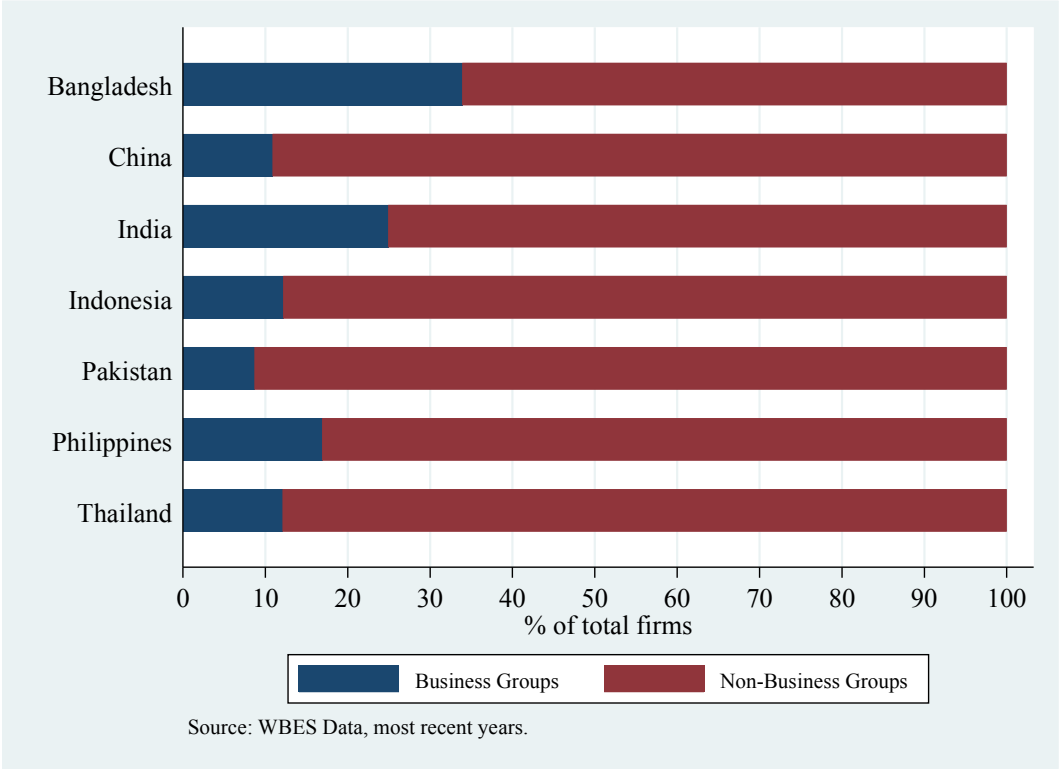
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Exports as % total sales

VARIABLES	(1) Bangladesh	(2) China	(3) India	(4) Indonesia	(5) Pakistan	(6) Philippines	(7) Thailand
Business Group	5.104	4.751	10.41***	30.39***	-7.237	10.96	22.60**
	(5.780)	(6.009)	(3.076)	(10.00)	(15.07)	(11.68)	(9.034)
Ln (Employees)	28.13***	11.15***	22.05***	23.28***	20.49***	20.99***	23.21***
	(2.228)	(1.831)	(1.343)	(3.411)	(3.296)	(4.826)	(3.197)
Ln (Firm Age)	-8.706**	-4.731	6.836***	27.92***	10.50	4.720	15.99**
	(4.068)	(3.705)	(1.874)	(7.425)	(7.575)	(7.288)	(6.781)
Constant	-123.7***	-95.60***	-183.9***	-257.9***	-188.9***	-168.2***	-171.2***
	(16.65)	(14.25)	(10.15)	(30.93)	(27.69)	(31.63)	(25.38)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	817	1,308	5,042	682	552	562	463

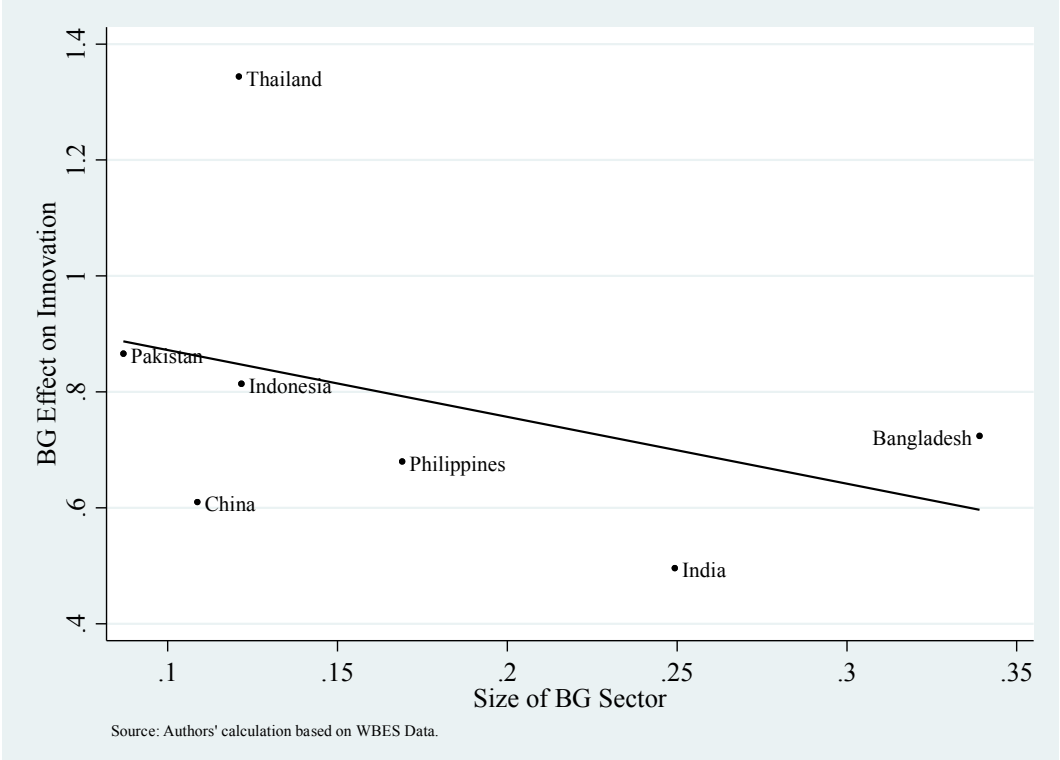
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Distribution of BGs in the sample by country



Source: WBES Data, most recent years.

Figure 2: BG Effect on Innovation and Size of BG



Source: Authors' calculation based on WBES Data.

Figure 3a: Bangladesh

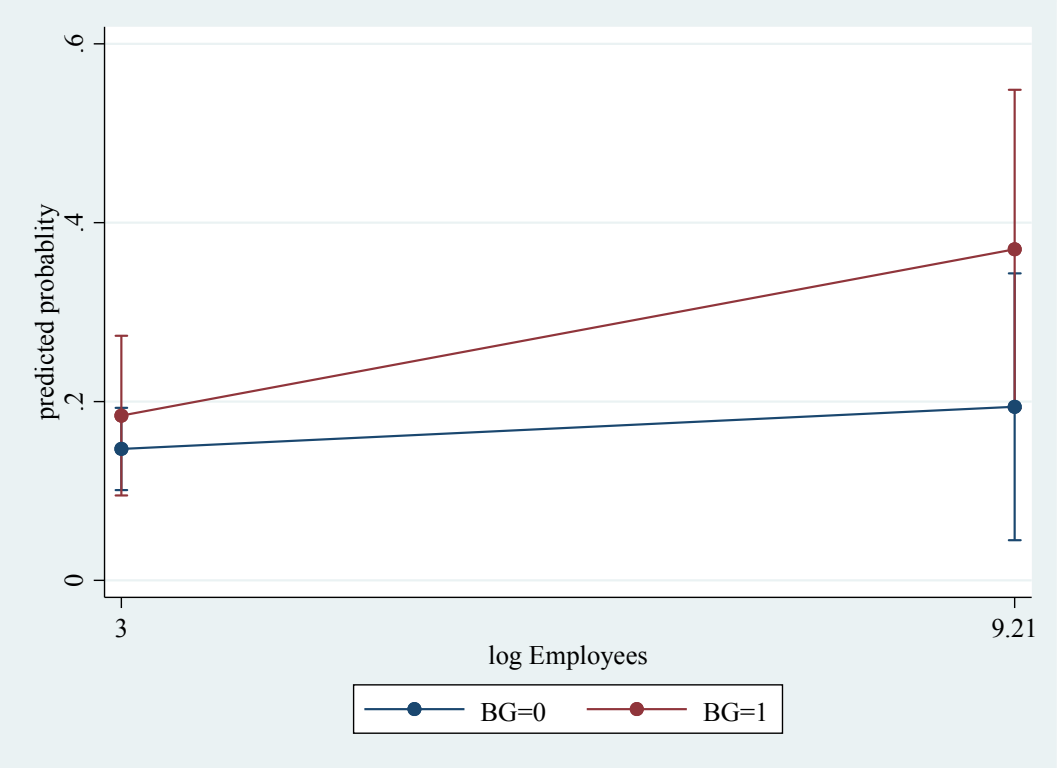


Figure 3b: China

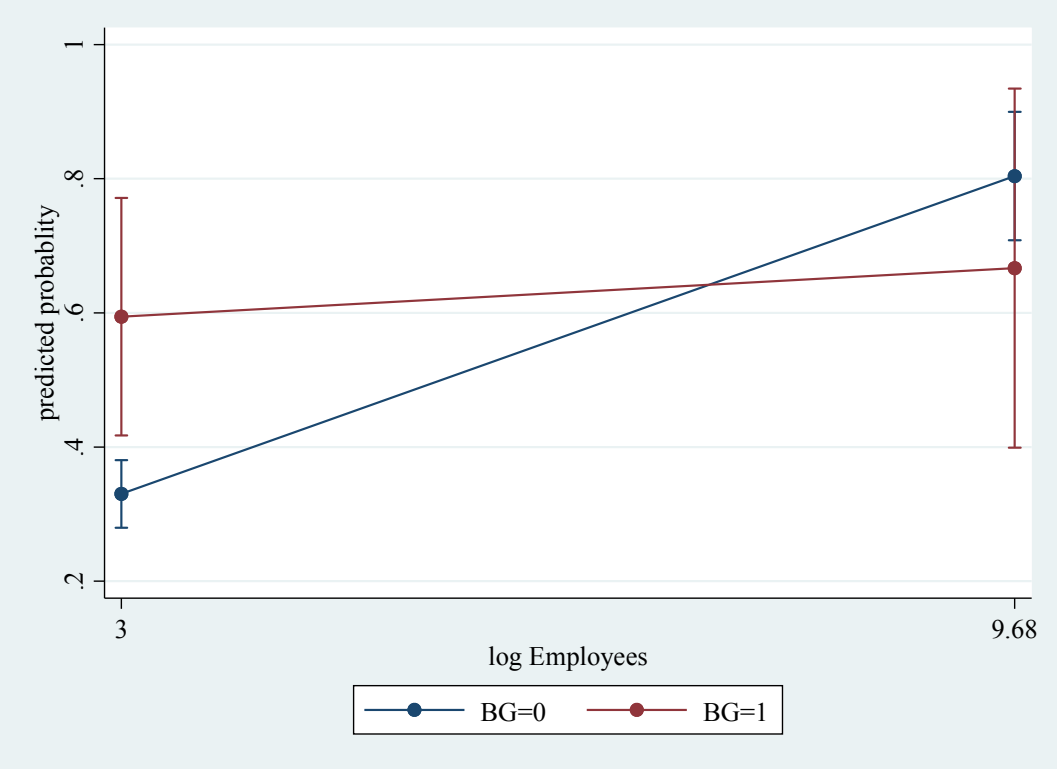


Figure 3c: India

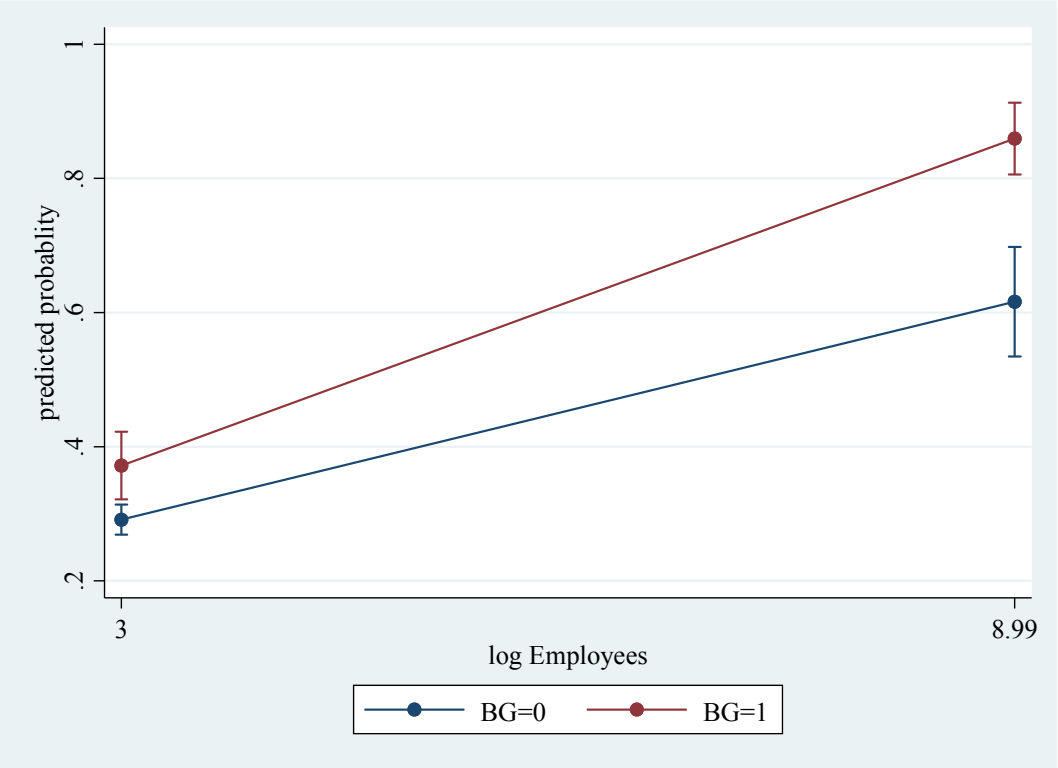


Figure 3d: Indonesia

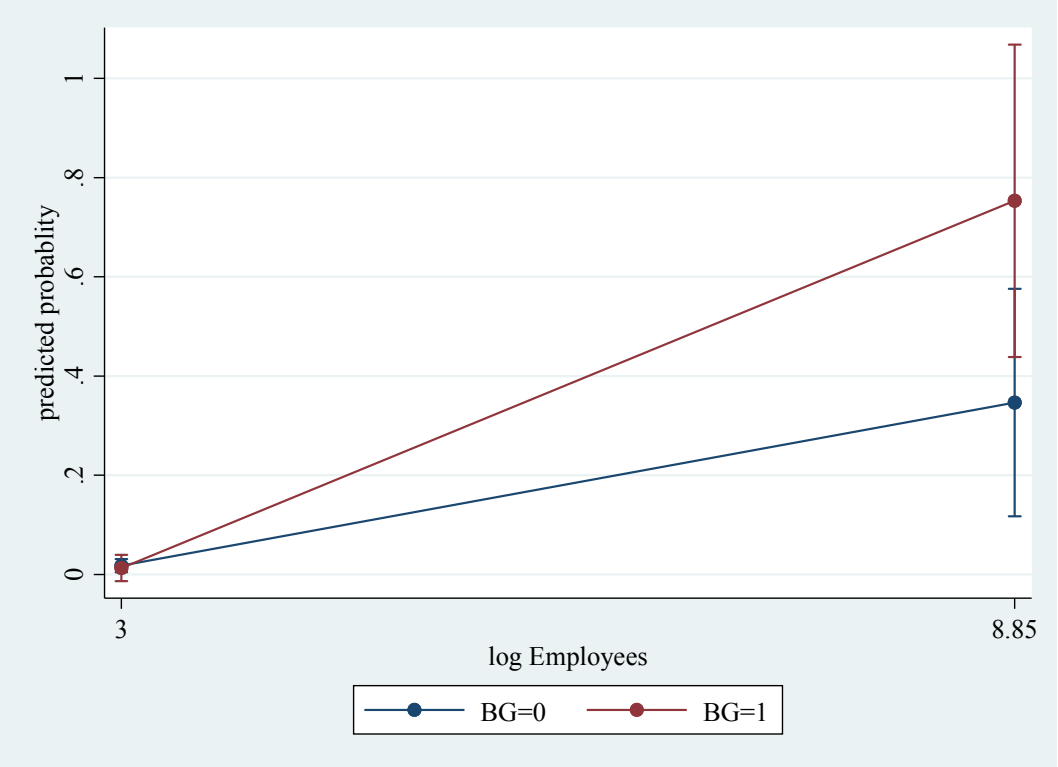


Figure 3e: Pakistan

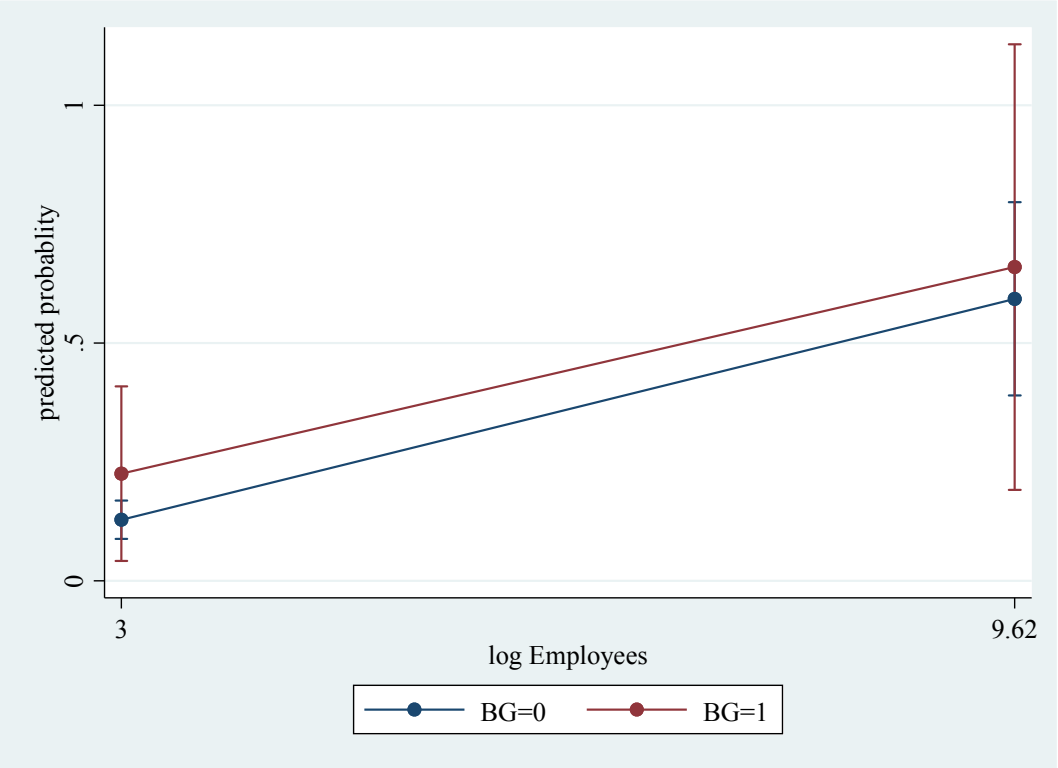


Figure 3f: Philippines

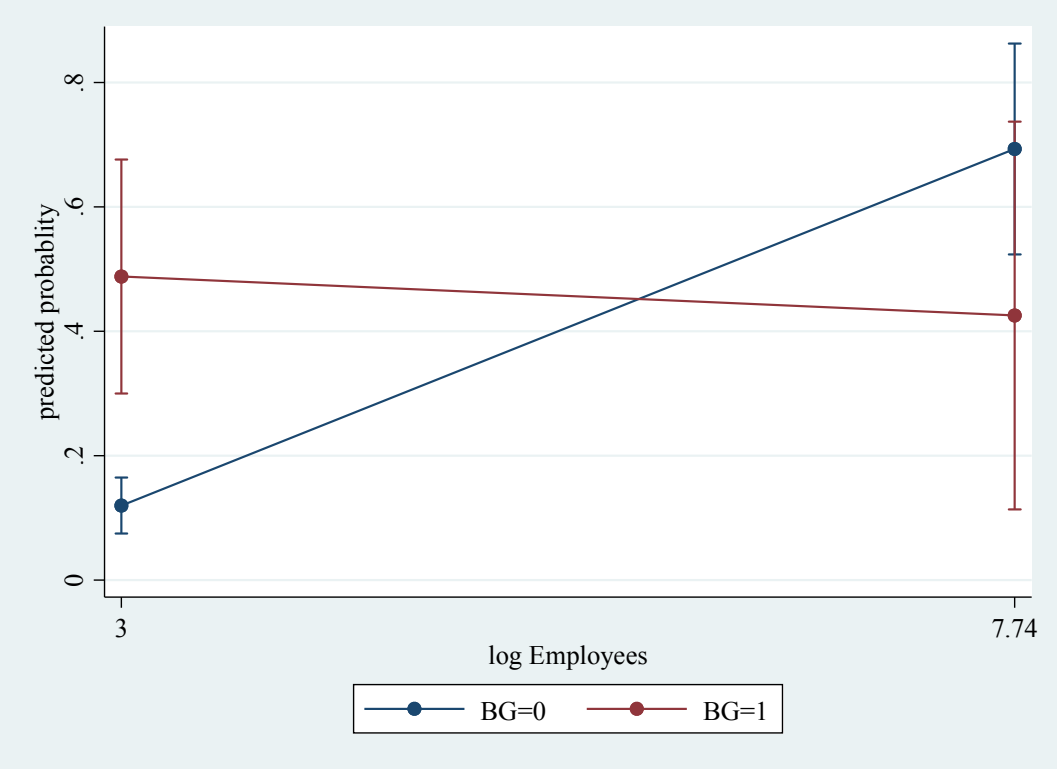


Figure 3g: Thailand

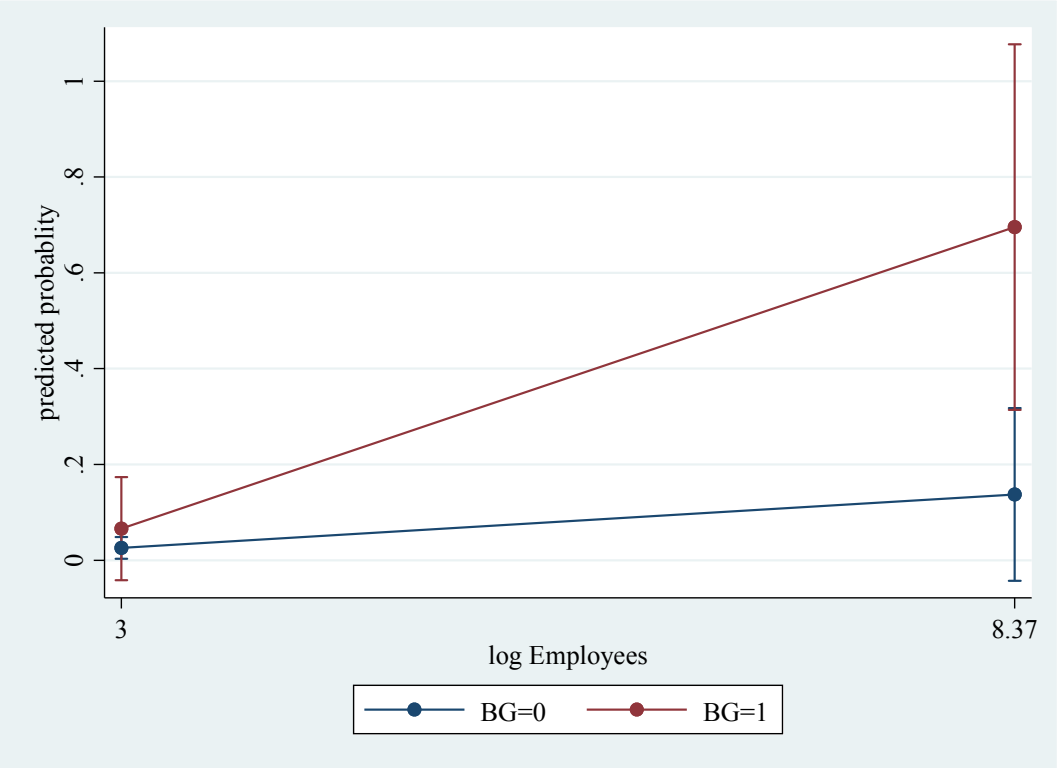


Figure 4: GDP per capita and R&D Expenditure (Controlling for size of the economy) (2015-2019 Average)

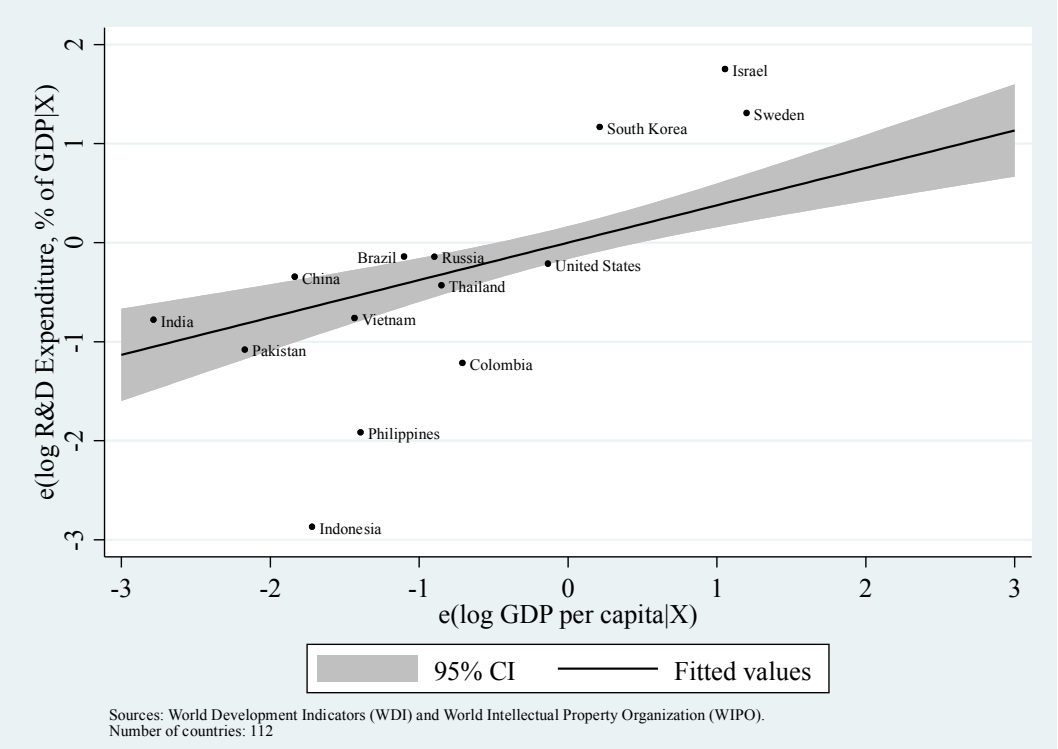
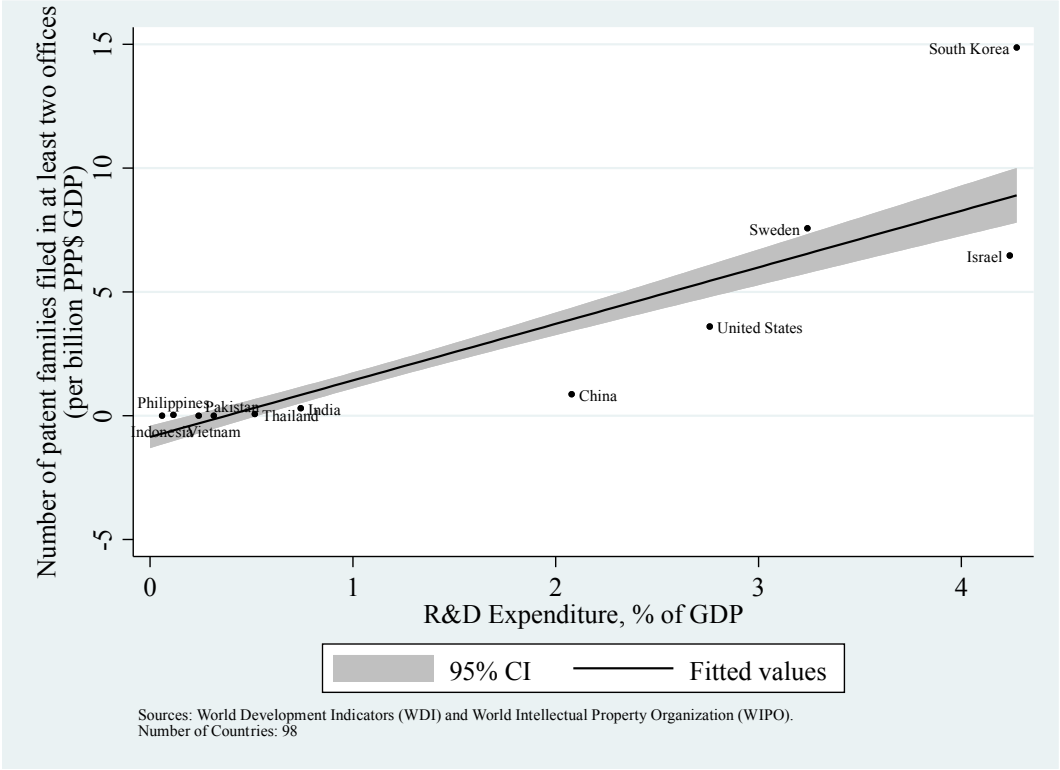
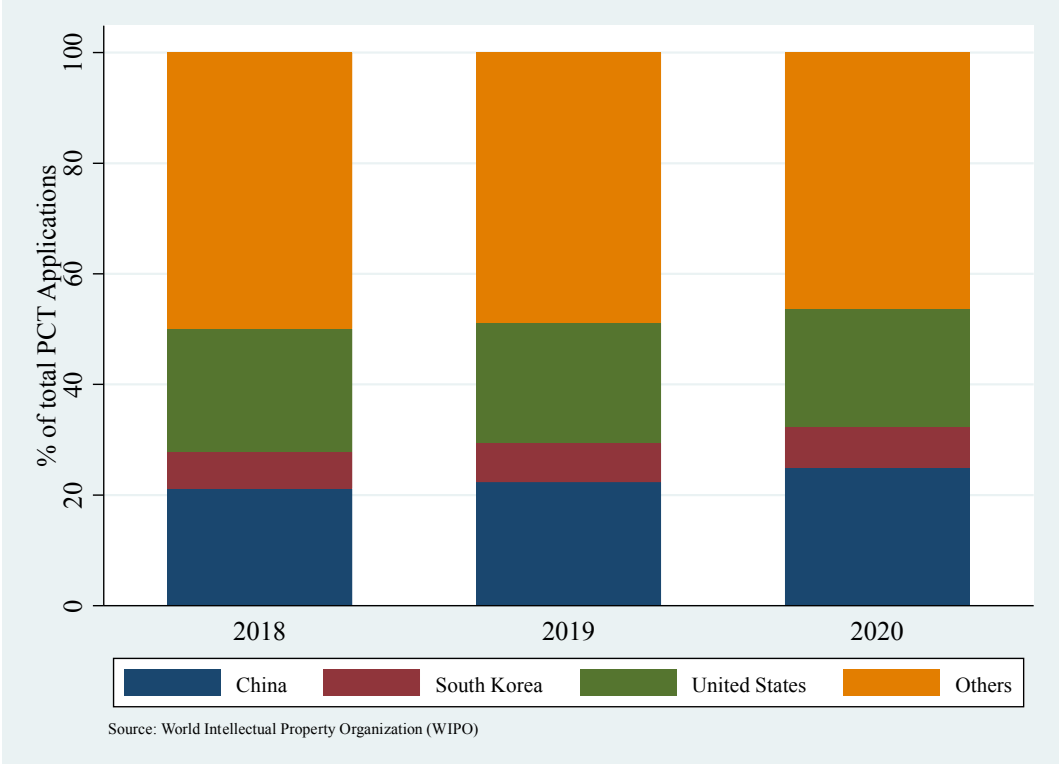


Figure 5: R&D Expenditure and High Quality Patents Filed (2016-2018 Average)



Sources: World Development Indicators (WDI) and World Intellectual Property Organization (WIPO).
Number of Countries: 98

Figure 6: PCT Applications, 2018-2020



Source: World Intellectual Property Organization (WIPO)