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Investment Climate in China: province estimates

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Abstract: This paper uses a large firm-level survey to assess differences in performance across regions. A panel data analysis is conducted to explain both productivity and profitability across firms in terms of firm and industry characteristics. Regional dummies are included to pick up additional location-specific impacts and the size of these dummies is used to rank provinces. Province performance is then examined in terms of geography, infrastructure, the policy environment and aspects of the investment climate with the conclusion that the latter plays a major part in explaining provincial differences in performance.

JEL classification: 012, 018, R11
Keywords : Asia, China, enterprises, productivity, profitability, regional development.

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Introduction.

One of the key policy questions that has emerged in China in recent years has been regional disparities in economic performance. Regional policy has followed different stages from the early *Reform and Opening Up* policy that focussed on the coastal provinces and Beijing, to the *Develop the West* policy that addressed the problems of the poorer western provinces. More recently in 2002 the government announced the *Revitalise the North East policy* that focuses on the three provinces of North East China, Heilongjiang, Jilin and Liaoning,. Regional disparities are highlighted in the 'One China: Four World's' classification that groups the country into four distinct income categories ranging from cities with an average income per capita of a middle-income country to the the poor provinces of west and central China where average incomes are closer to those of a low income country (Hu 2004). These various regions also have considerably different levels of institutional development.

Recent theorizing on economic growth has focussed on the role of governance and institutions in influencing performance. Using a broad definition of governance as 'the traditions and institutions by which authority in a country is exercised' empirical testing of its role has focused on three 'governance clusters' with various indicators in each cluster (Kaufmann et al 2005). These focus on respectively

- the political processes by which governments are selected, monitored and replaced

- the capacity of governments to formulate and implement policy

- the respect of citizens and the state for national institutions, the rule of law, control of corruption and so forth.

These three clusters correspond broadly to the aspects of governance raised most frequently in popular discussions – democracy, government effectiveness and the rule of law and corruption.

China's recent experience poses a paradox given its relatively poor showing by most empirical indicators of governance and institutional development. For example, Keefer (2007) uses a cross country model to explain economic growth that includes a governance variable. For China actual growth is as much as five percentage points higher than predicted given its governance score and other characteristics.[1]

In policy terms the apparent significance of governance for economic performance has provided the rationale for a focus on the 'investment climate' in different provinces and cities across China as a potentially important determinant of regional performance, with investment climate defined as set of location-specific incentives to production and accumulation (World Bank 2005). The investment climate and governance are not identical concepts although they overlap principally in the areas of second and third governance clusters specified above in relation to government effectiveness, the rule and law and control of corruption. The investment climate also

[1] In this analysis it is market size that appears to be the key factor in offsetting poor governance (Keefer 2007: 217)

is normally defined to include a physical infrastructure dimension, which is not usually captured in measures of government effectiveness.

Reforming the investment climate in different parts of China is now an important aspect of regional policy. Measurement of the investment climate can be carried out in different ways. This paper contributes to this debate by drawing on a unique database for large enterprises that allows an in-depth analysis of enterprise performance across provinces and thus allows an inference on investment climate from these results.

The second section of the paper discusses selectively the literature on regional performance in China, highlighting recent contributions on the investment climate. The third section provides empirical estimates of province-specific effects in enterprise performance. The fourth section compares these with data on the regions to since what might explain these location-specific effects. Finally we draw some brief conclusions.

What explains regional growth in China?

There is a lengthy (English language) technical literature examining the factors that have caused the growth experience of the different provinces. Here to summarize we put forward some broadly agreed stylized facts, with some of the evidence to support them.[2]

Much of the empirical work has been conducted within the framework of a neoclassical growth model that tests whether there has been income convergence across provinces; in other words whether there is evidence of catch-up with poorer provinces growing faster than richer provinces. The precise results vary between time periods and the form of specification adopted with at least some studies finding evidence of convergence of income from the early reform in the late 1970's until the early 1990's saw a convergence of incomes, in particular as the relatively poorer eastern coastal provinces grew rapidly. In the more recent period since the early 1990's with the 'Opening Up' of trade and foreign investment there has been clear divergence.[3]

Of more direct policy relevance are the control variables that are added in such analyses to explain growth. The key cause of the striking trend towards divergence in the 1990's noted above has been the rapid growth of the coastal provinces in the eastern region. Two possible factors to account for this are the policy environment, based around the Special Economic Zones and other related incentives for foreign direct investment (FDI) and the favoured geography of the coastal provinces with easy access to the coast and thus international trading networks. One can also add easy access to the growth centres for overseas Chinese in Hong Kong, and Taiwan as a further benefit. The main attempt to disentangle these two effects finds both to have

[2] For a recent survey on regional development that also draws on a new database for empirical analysis on convergence, see Song (2007).

[3] These results refer to 'absolute' convergence, with no qualification for other controlling factors. For other measures that reflect the same trend like the Gini coefficient and the Theil index, see Cai et al (2002). Tests for 'conditional convergence' range from support over a long period in Cai et al (2002) to only 'hints at' in Demurger et al (2002:457) and weak support in Jones et al (2003) for shorter periods.

been important in explaining the growth of the coastal region with geographical factors, having a slower acting but slightly more important impact up to 1998. (Demurger et al, 2002). In this analysis policy is capture by a crude scoring index determined by the type of zone in a province and the main geographical variable is the proportion of the population of a province living within 100 kms of the coast or a navigable river.

Ownership of enterprises in a province also appears to have had an important impact on growth. The share of 'foreign invested enterprises' in economic activity in a province appears to have had a positive growth effect either directly through its impact on efficiency or indirectly through externalities. Conversely the share of state owned enterprises (SOEs) in provincial activity appears to exert a negative effect, which may be in part due to their own inefficiencies, but in part also to the requirement over much of the period covered for banks to channel funds to SOEs at the expense of new forms of non-state enterprise. FDI inflows are partly driven by the incentive system on offer to foreign investors and hence are correlated with the policy index referred to above.[4]

An important aspect of the investment climate that impacts on provincial growth has been shown to be the quality of provincial infrastructure, particularly roads and telecommunications. Infrastructure activities link provinces with the external sector and are a means of overcoming geographic barriers like distance to a port. In addition they link provinces with each other and thus stimulate inter-province trade. Good infrastructure can also be added as an incentive to higher FDI inflows. Low levels of inter-provincial trade can also be due to internal trade barriers and there is evidence that these still remain significant.[5] Remaining barriers to inter-provincial trade are often mentioned in policy discussions on provincial growth. The most detailed examination of this question finds that whilst provinces in China have opened substantially to international trade the reverse has taken place for inter-provincial trade for 1987-97.[6]

A few recent studies have focussed specifically on the investment climate in different parts of the country. Fung et al (2005) use a cross sectional regression model to explain FDI inflows across provinces. They control for various province characteristics (like income, wage and education levels) and then focus on the comparative importance of both 'hard' and 'soft' infrastructure as part of the overall investment climate. The former refers to various infrastructure facilities in a province (proxied by rail kilometers and kilometers of high quality roads) and the latter to a range of factors such as degree of government regulation, enforcement of legal rights, access to finance and corruption. The soft side of institutions is represented by a

[4] Positive effects of FDI on growth are reported in Chen and Fleisher (1996) and Demurger (2001) at the provincial level, in Jones et al (2003) at the city level and in Mody and Wang (1997) for coastal provinces. Demurger et al (2002) report a negative impact of SOE share on growth. Their FDI variable is correlated with their policy index and is generally insignificant for this reason.

[5] Demurger (2001) finds a composite transport density variable and a variable reflecting telephone access to be significant in explaining provincial growth. The impact of the transport variable is non-linear and diminishes with increases in the variable. Earlier work by Mody and Wang (1997) for industry data across the coastal provinces finds a similar result with a road variable significant but with diminishing impact. In their analysis the telecommunications variable has positive increasing returns.

[6] See Poncet (2003), who suggests that overall the tariff equivalent of internal barriers to trade was as high as 51% in 1997 and that this had risen from 37% in 1987 and 41% in 1992.

reform variable that is proxied simply by the share of SOEs in manufacturing output in each province. The results suggest the reform variable has a significantly larger impact on FDI from four countries - the US, Japan, Hong Kong and Taiwan - than does physical infrastructure. Hence weak reform (as measured by a high SOE share in manufacturing) is associated negatively with FDI inflows for these important investing economies. Of the countries studied the only exception is Korea where the physical side of infrastructure is more significant.

This approach to the soft institutional side of the investment climate is crude. A considerably more detailed analysis across provinces is given in World Bank (2006). This analyses the results of a large survey of 12,000 firms across 100 cities in China (roughly looking at 100 firms per city). Data are collected on firm performance and aspects of the investment climate at the district level in terms of both the hard and soft infrastructure distinction. A range of different investment climate measures per city are constructed based on a combination of firms' responses and external sources. For example an index of 'government efficiency' is constructed based on four indicators obtained from firms- their effective tax burden (collected taxes over value-added), share of entertainment and travel expenses in sales (used as proxy for corruption), customs efficiency (days needed for goods to pass customs) and time cost in days per year dealing with government bureaucracy (in relation to tax administration, public security, environmental protection and labour and social protection).[7] Indicators of firm performance (total factor productivity growth in each firm or percentage of firms with foreign ownership) are explained in a regression model that includes a set of investment climate variables, as well as controls for firm and industry characteristics. An estimate of the quality of the investment climate across the 100 cities is found by identifying the gap between actual performance and what would be achieved in the hypothetical situation that for each individual investment climate variable the city concerned achieved the investment climate standards of the city at the 90^{th} percentile level. A ranking of cities can be obtained from the size of the predicted gains, with the larger the predicted gain the poorer the investment climate. The position of provinces can be derived from the data for cities within each province with considerable variation found across provinces by the two performance measures.

Finally Wang et al (2007) have produced a 'marketization index' for each province based on an aggregation of scores under four headings – the size of the role of the government, the development of the non-state sector, the degree of control over markets and inter-regional trade, and the development of financial markets and the existing legal framework. Ownership plays a major role in their index with the degree of private, particularly foreign, ownership of enterprises interpreted as a key indicator. A similar approach is used by Qunhui (2004).

In summary, the consensus is that what matters for relative rates of provincial growth are openness to foreign investment and trade, ownership and by implication competition, the constraints imposed by provincial geography and various aspects of the investment climate covering both hard and soft infrastructure. In this paper we use very detailed firm level data to quantify differences in performance across provinces.

[7] The variables are standardized with a zero mean. They are added to form the index and by implication have equal weight. It should be noted that although this index is discussed in the text it is not used in the regressions for firm performance, where the components of the index are entered individually as independent variables; see World Bank (2006) table B-1.

By controlling for as many firm and sector specific factors as possible we aim to isolate the impact of the investment climate though province dummy variables. We then contrast our results with other explanations of regional performance.

Methodology

In this paper we draw on annual survey data from the National Bureau of Statistics, Beijing on large and medium scale industrial enterprises 1995 -2002. This database in principle should be comprehensive although changes in definition and misrecording means that some observations have to be omitted and the coverage of the medium and large-scale sector is not fully comprehensive. However this is a large sample and in 2002 the last year for which we have information the sample of enterprises accounted for over 40% of the national industrial value-added. Xiao and Weiss (2007) is the first effort to use this enterprise data to cast light on questions of regional policy. Full results of the analysis and further information on the data are given there.

Here the key issue we wish to address is how far the performance gap at the enterprise level across the country can be explained by firm and sector specific factors and how far it is due to the investment climate and operating environment, which create a location disadvantage in some parts of the country. We use two simple performance indicators value-added per employee (VA/L), as a measure of productivity, and 'imputed profits' to total assets (IP/TA), as a measure of returns on investment.[8] Imputed profits are calculated as value added minus the sum of wages, financial charges and depreciation. We prefer this to enterprises' own accounting profits from their published accounts as the frequent changes in accounting practices can distort the underlying picture.

We employ a fixed effects panel data regression model to the enterprise data over 1995-2002 to isolate the different effects on performance, based on the characteristics of the enterprise itself, the characteristics of the sector in which it operates, time factors and a series of dummy variables including province specific dummies. As our regression results are based on a very large and representative data set with over 44,000 firms the conclusion here should be much more robust and systematic than that drawn from casual observation or limited case studies. Clearly various factors can explain province dummies and below we discuss how our results to relate to other data on regional performance.

Generically the model can be written as

$$P_{irjt} = \alpha_0 + \alpha_1 X_{it} + \alpha_2 Y_{jt} + \alpha_3 Z + \nu_{it} \qquad (1)$$

where P is a performance indicator (productivity or profitability) for firm i in region r and sector j at time t

[8] Although our productivity indicator is a measure of single factor productivity, since we include change in the capital-labour ratio in our model implicitly our sector dummies pick up total factor productivity effects.

X is a vector of firm-specific factors for firm i (relating to scale of production and factor intensity)

Y is a vector of sector-specific factors for sector j (relating to concentration and ownership)

Z is a vector of dummy variables (relating to provinces, sectors, years and interaction terms) including a dummy for region r (Z_r) which is the variable of interest.

α_0 is a constant, ν is an error term and t indicates annual observation.

Different versions of (1) are applied in Xiao and Weiss (2007). Key variables used are set out below:

Dependent variables

(VA/L): value–added per worker:
(IP/TA): imputed profit to total assets:

Independent variables

- ln(L): size of the firm (as measured by number of workers);
- ln(Kp/L): intensity of production fixed capital (total capital assets per worker)
- ln(Kf/L): intensity of non-production fixed capital (welfare capital per worker)
- Ind3Concentration: Herfindal index for industry concentration at 3-digit industry level calculated for the sample
- FIE_ind2MKT_Share: market share of foreign invested enterprises at 2 digit industry level in the sample
- $D^{ind2:}$ Sector dummies at 2 digit industry level
- (D^{ind2})* ln(Kp/L): Interaction terms between sector dummies and capital intensity
- D^{type}: Ownership dummies for SOEs, private, collective, mixed, foreign and Hong Kong,/Taiwan, ownership.
- D^{year}: Annual dummies 1995 to 2002
- D^{place2} : province specific dummies

The main purpose of the model is to identify the performance gap between enterprises in various provinces after controlling for other factors that are not specific to location effects. In other words, the regression coefficient for a province dummy (D^{place2}) indicates the performance gap for enterprises in that province that is specifically due to the location effects after controlling for enterprise scale and factor intensity, sector competition, ownership and other unmeasurable sector characteristics and time. General macro economic effects are captured through the time dummies.

Scale can have an ambiguous impact on performance depending on the effect of economies of scale. Regarding factor intensity higher production capital per worker can be expected to have a positive impact on labour productivity. Social obligations of enterprises or 'welfare capital' per worker may raise productivity but may also lower profitability and there is the possibility of a negative impact on the profit measure.

Sector concentration is taken as a proxy for the degree of competition so that high concentration implies low competition; it is hypothesized that competition has a positive impact on productivity but it may have a negative impact on profitability. Similarly the foreign ownership share in a sector is expected to have a positive impact on productivity both through competition and potential technological spillovers. Its impact on profitability is more ambiguous. The reference points with which the dummies are compared are SOEs for ownership, 1996 for years, textiles (sector 17) for sectors and Shandong for the other provinces.

Results

The aim is to derive a ranking of the performance gap across all provinces that is specific to location effects in each province, in another words taking away the systematic impact from factors like scale, technology, ownership, competition and sector characteristics that are captured by the control variables. The coefficients on the province dummies give the criteria for ranking. As noted above, the reference province is Shandong, so that all provinces are ranked relative to Shandong.

The results are shown in table 1. Table 2 groups the provincial dummies by region with a ranking by province. Negative coefficients indicate lower performance than in Shandong. The results are shown both by province and by regional groupings of provinces. As might be expected there is substantial variation across provinces and a clear tendency for provinces in the south east region to have higher dummies and therefore relatively stronger performance than in the rest of the country.[9] Here we find the north east and north west regions performing particularly poorly, especially in relation to productivity. For example, for the three north-east provinces productivity and profitability are always below Shandong controlling for all other factors. All three provinces have labour productivity roughly half that of Shandong. By profitability Liaoning is 8.1 percentage points below, whilst Jilin and Heilongjiang are roughly 6.9 percentage points below. In terms of national ranking out of all provinces the three north-east provinces have three out of the bottom four places by the productivity dummy. By the profitability dummy the ranking out of 28 provinces is 21 for Heilongjiang, 22 for Jilin, and 27 for Liaoning. Similarly for the north west region three of the provinces Shanxi, Shaanxi and Gansu have labour productivity almost 50% below that of Shandong controlling for other factors. On average, profitability is over seven percentage points below that of Shandong for the region as a whole. These two regions are the part of the country where SOE presence is still relatively high.[10] However our analysis, which controls for structural features, including ownership, shows that there are other factors at work. Even allowing for a lower than average role for non-state or foreign –owned firms in different sectors performance is still poor in the north east and north west.

[9] The regional ranking is broadly in line with the results of World Bank (2006) although the latter does not report individual rankings by province. The exception is that the north east provinces appear relatively more disadvantaged in our analysis.

[10] Both regions had a share of industrial sales taken by SOEs of over 70% in 2004 (China Statistical Yearbook, National Statistical Bureau, 2005).

In other words, in these regions even if the provinces concerned were up to the national level in terms of ownership and competition, and had the same production structure as the national average they would still have substantially lower productivity and profitability due to their location-specific disadvantages. However, insofar as locational disadvantage already impacts on right hand side variables like degree of concentration or foreign ownership, this approach of focusing on the coefficients on regional dummies will understate the overall disadvantage experienced by a particular province.

Table 1 Regression with Provincial Dummies

Dependent Variable	ln(VA/L)	IP/TA
Constant	1.30122	0.0792
	[28.06]***	[12.52]***
ln(L)	-0.06414	0.00106
	[15.31]***	[1.85]*
ln(Kp/L)	0.28366	-0.00522
	[32.05]***	[4.31]***
ln(Kf/L)	0.04745	-0.00391
	[28.46]***	[16.73]***
Ind3Concentration	-1.29496	-0.21125
	[6.33]***	[7.47]***
FIE_ind2MKT_Share	0.37894	0.08807
	[6.76]***	[11.40]***
type=Private	0.51903	0.07867
	[26.19]***	[27.85]***
type=Collective	0.31659	0.04914
	[29.14]***	[32.49]***
type=Mixed	0.34478	0.04058
	[39.52]***	[33.21]***
type=Foreign	0.72508	0.0458
	[32.52]***	[14.95]***
type=HK-Taiwan	0.54359	0.03645
	[24.25]***	[11.82]***
year=1995	-0.00226	-0.00319
	[0.33]	[3.36]***
year=1997	-0.03276	-0.00619
	[4.87]***	[6.64]***
year=1998	-0.04339	-0.01303
	[6.19]***	[13.36]***
year=1999	0.05104	-0.00378

	[7.06]***	[3.72]***
year=2000	0.13891	0.00407
	[18.66]***	[3.88]***
year=2001	0.19513	0.01089
	[25.14]***	[9.96]***
year=2002	0.28492	0.01723
	[35.55]***	[15.26]***
place2=[11]Beijing	-0.0271	-0.06695
	[0.80]	[14.68]***
place2=[12]Tianjin	-0.23176	-0.07855
	[7.67]***	[19.46]***
place2=[13]Hebei	-0.20426	-0.02735
	[8.08]***	[8.01]***
place2=[14]Shanxi	-0.46416	-0.05086
	[11.52]***	[9.34]***
place2=[15]InnerMongolia	-0.27733	-0.04053
	[6.59]***	[7.18]***
place2=[21]Liaoning	-0.49673	-0.08176
	[20.79]***	[25.81]***
place2=[22]Jilin	-0.5118	-0.06894
	[15.65]***	[15.89]***
place2=[23]Heilongjiang	-0.47932	-0.068
	[15.86]***	[16.92]***
place2=[31]Shanghai	0.2587	-0.05346
	[11.21]***	[17.18]***
place2=[32]Jiangshu	0.19219	-0.00182
	[10.05]***	[0.70]
place2=[33]Zhejiang	0.18485	-0.02981
	[7.96]***	[9.47]***
place2=[34]Anhui	-0.16732	-0.02996
	[5.90]***	[7.82]***
place2=[35]Fujian	0.18056	-0.01617
	[5.56]***	[3.67]***
place2=[36]Jiangxi	-0.40699	-0.05666
	[10.80]***	[11.11]***
place2=[41]Henan	-0.28665	-0.02571
	[10.64]***	[7.05]***
place2=[42]Hubei	-0.11085	-0.02191
	[4.38]***	[6.38]***
place2=[43]Hunan	-0.3693	-0.06432
	[12.75]***	[16.51]***
place2=[44]Guangdong	0.1918	-0.04078
	[9.39]***	[14.73]***
place2=[45]Guangxi	-0.12351	-0.04492
	[3.94]***	[10.62]***
place2=[46]Hainan	-0.20228	-0.0663
	[2.98]***	[7.26]***
place2=[50]Sichuan+Chongqing	-0.19127	-0.05423
	[8.10]***	[17.13]***
place2=[52]Guizhou	-0.31665	-0.06961

	[5.89]***	[9.73]***
place2=[53]Yunnan	-0.14561	-0.06559
	[4.09]***	[13.64]***
place2=[54]Tibet+Qinghai+Ningxia	-0.23178	-0.06755
	[4.44]***	[9.79]***
place2=[61]Shaanxi	-0.45675	-0.07193
	[12.70]***	[15.02]***
place2=[62]Ganshu	-0.48836	-0.07733
	[8.92]***	[10.48]***
place2=[65]Xinjiang	-0.2995	-0.08955
	[5.84]***	[13.10]***
Observations	161622	169687
Number of Firm	43541	44552

1. Absolute value of z statistics in brackets.
2. * significant at 10%; ** significant at 5%; *** significant at 1%.
3. Coefficients for ind2 and the interaction terms between ind2 and ln(Kp/L) are not reported here.
4. The base for comparing the coefficients of various dummies is type=SOE, year=96, ind2=17, place2=[37]Shandong.

Table 2 Province Dummies

Regions/province	Productivity dummy	Ranking	Profitability dummy	Ranking
South East				
Jiangsu	0.1922	2	-0.0018	2
Shanghai	0.2587	1	-0.0535	11
Zhejiang	0.1849	4	-0.0298	6
Fujian	0.1806	5	-0.0162	3
Guandong	0.1918	3	-0.0408	8
Average	0.2016	3	-0.0284	6
Bohai				
Shandong	0	6	0	1
Beijing	-0.0271	7	-0.0669	17
Tianjin	-0.2318	14	-0.0786	24
Hebei	-0.2043	13	-0.0274	5
Average	-0.1158	10	-0.0432	12
Central				
Anhui	-0.0418	8	-0.0299	7
Henan	-0.2866	16	-0.0257	4
Hunan	-0.3693	19	-0.0643	14
Jiangxi	-0.4069	20	-0.0566	13
Average	-0.2762	16	-0.0442	10
North East				
Heilongjiang	-0.4793	23	-0.0680	19
Jilin	-0.5118	26	-0.0689	20
Lioaning	-0.4967	25	-0.0817	25
Average	-0.4959	25	-0.0729	21

South West				
Yunnan	-0.1456	10	-0.0655	15
Guizhoi	-0.3166	18	-0.0696	21
Guangxi	-0.1235	9	-0.0449	9
Sichuan	-0.1913	11	-0.0542	12
Hainan	-0.2023	12	-0.0663	16
Average	-0.1959	12	-0.0601	15
North West				
Shanxi	-0.4642	22	-0.0508	10
Shaanxi	-0.4568	21	-0.0719	22
Qinghai	-0.2318	15	-0.0676	18
Gansu	-0.4884	24	-0.0773	23
Xinjiang	-0.2995	17	-0.0896	26
Average	-0.3881	20	-0.0714	20

What explains location disadvantage?

The provincial dummies from table 2 give a summary measure of provincial location effects after controlling for measurable variables at the enterprise level and for measurable and unmeasurable effects at the sector level. However it is clearly desirable to try to go behind these dummies to understand what is driving the process of locational disadvantage. We do not have adequate data to replace provincial dummies by accurate continuous variables in these regressions, but we can compare the values of the dummies with proxies for locational effects in the wider literature cited in the earlier section.

Demurger et al (2002) provide the most ambitious attempt to disaggregate provincial effects by replacing provincial dummies with two continuous variables, one based on geography (the proportion of the population within 100 kms from the coast) and the other on policy (using a scoring system based on the type of Special Zones in a province). Demurger et al (2002) only provide an average value for the geography variable averaged across regions of the country. This does show that the north east and north west do have a low value by the geographic variable relative to most of the rest of the country (apart from the south west). Further testing of this is not possible, however in their own analysis of provincial GDP growth Demurger at al (2002: table 9) report only a modest impact on north-east growth from geographic effects.

It is possible to test for the impact of the Demurger et al (2002) policy variable on our dummies. Their variable is based on a score averaged over the long period 1978-98 (Demurger et al 2002: table 4). Most provinces had introduced some form of special zones by the mid-1990's with little change over the period 1990-1998. As our data refer to 1995-2002 we take the single year score for the policy variable for the year 1995, although for most provinces the score is constant during the 1990's. When the province dummies are regressed on this policy variable no significant relationship emerges and the adjusted R2 is close to zero (see table 3).

Of the other factors affecting provincial growth that have been examined in the literature we also test for a relation between our provincial dummies and simple

measures of barriers to inter-provincial trade and infrastructure. Data from Poncet (2003 Appendix B table 2) on inter-provincial trade flows in total province absorption are used as a proxy for internal barriers to trade, on the crude assumption that the higher is the ratio of intra-province expenditure to expenditure on goods from elsewhere in the country the higher are internal trade barriers. There is no relation however between this measure and our provincial dummies, again with an adjusted R2 of close to zero (see table 3).

We try two alternative measures of infrastructure - telephones per capita and road density (road length/area). There is no relationship between the provincial dummies and the latter variable by province. Where we do find some relation is in a regression of the provincial dummies on telephones per capita. The dummies are positively and significantly related to the former (so regional disadvantage falls with more telephone communications) (see table 3). Good communications are normally seen as an important part of the business environment so the first positive relation is not unexpected. It should be borne in mind that in her analysis of the impact of infrastructure on provincial GDP growth, Demurger (2001) finds that her telecommunications variable had a positive effect on provincial growth relative to the national average in all three of the north-east provinces. On the other hand, her transport variable had a negative effect in two out of the three. In both cases infrastructure variables are not the dominant explanation of relative provincial growth in the north east.

Table 3 Correlation coefficients for regression of provincial dummies on explanatory variables.

explanatory variable	adjusted R2	coefficient
policy variable Demurger et al (2003)	0.05	0.99
intra provincial trade/inter provincial trade Poncet (2003)	-0.03	0.02
telephone (lines) per capita	0.20	0.003**
road density	0.02	0.02

** Significant at 5% level

A rank correlation analysis between ranking by our provincial dummies and ranking by the marketization index of Wang et al (2007) provides a relatively high correlation for productivity (0.69) and a lower one for profitability (0.53). There is total agreement on the top five provinces by productivity. However at the bottom end of the scale it is the north-west than comes out weakest by the marketization index rather than the north-east by our dummies.

Evidence of distinctive problems in the north east and north west relative to the rest of the country is provided by aspects of the soft infrastructure side of the investment climate quantified in World Bank (2006). The north west region is the place where the largest average number of days spent dealing with government officials is reported by firms (78 days). The average is lower in the north east but there the highest national figure (86 days) is reported for high value firms (World Bank 2006 table II-6). The

proxy used to elicit information on corruption (the share of travel and entertainment costs in sales) is higher in these two provinces than elsewhere, although the margin is not great (World Bank 2006 table II-8). Perhaps most revealing in terms of the potential for the private sector are the results that these two provinces have the lowest share of small private firms reporting access to bank loans and the northwest has the highest share of small firms (10%) reporting the expectation of having to make informal payments to access such loans (World Bank 2006 table II-17). Finally in terms of investor confidence in the future protection of their property rights nationally this was lowest in the north west, followed by the north east (World Bank 2006 table II-17).

Conclusions

Our analysis has offered limited help in opening the 'black box' of the provincial dummies. The better known measures on geography and policy do not seem important explanations. Also the basic data on intra and inter-provincial trade flows shed little light. As might be expected infrastructure appears to matter, but different measures give conflicting results. However our results appear broadly in line what is now emerging from detailed firm level surveys on investment climate. Excessive regulation, informal payments, lack of perceived protection of property rights and access to finance are all critical aspects of the investment climate that will create location specific effects where there is significant national variation in standards.[11] The strength of our results is that they are based on a very detailed database of enterprises across the country. By controlling for enterprise characteristics, macro effects and structural features, including ownership and competition, we can say with some confidence that the relatively weak performance found in the north east and north west is not caused by high SOE shares in economic activity alone, but by features of the investment climate within the regions. Hence ownership change per se is not an adequate policy response to any perceived lag in regional performance.

[11] Recent theoretical work on fiscal decentralization provides reasons why poorer regions may be especially prone to arbitrary charges imposed by local officials (Tsui and Wang (2007).

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