

# PERFORMANCE OF FINANCIAL RESOURCES IN CHINA'S PROVINCES

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**Abstract** This paper examines the economic performance of financial resources in China's provinces for the period 1985–98. The empirical results indicate that different financial resources have different impacts on the economic growth. The growth of national bank loans and self-raised funds are important to the growth of provincial output. When a division is made between inner and coastal regions, diversion of financial resources has a significant impact on the economic growth of the coastal provinces, but not on the economic growth of interior provinces.

**Keywords** Investment, growth, post-reform China, financial sources.

**JEL classifications** C22, O16, O47, P30.

## 1. INTRODUCTION

Various factors that contributed to China's remarkable economic growth since the early 1980s have been identified (Fan *et al.* 1999; Lin 2000; Wang 2000). China's total factor productivity in her post-reform period, for example, has risen to an average of no less than 3 per cent per year (Borensztein and Ostry 1996; Chow and Li 2002). While economic reforms in the 1980s (rural reform, price reform and fiscal reform) focused on the re-introduction of economics, the key reforms of the 1990s (1993 Austerity Plan, 1995 bank reform and 1997 state-owned enterprises reform) emphasized economic efficiency (Li 2001). The state was responsible for all sorts of investments before 1978, but as a result of a series of financial liberalization policies since the early 1980s, new sources of fixed assets of investment were generated.

Despite the high growth rates at the national level, regional disparity in economic growth has been widening, leading to an official policy in the mid-1990s that encouraged investments to go inland, and the number of special economic zones has been expanded to allow freer flow of investment funds among various regions. In 1978, the intention of economic reform was to use the special economic zones along the coastal region to act as an experiment for the functioning of the market economy. As a result, the coastal regions absorbed most investments, and income of coastal regions grew while the economic performance of the interior regions remained

stagnant. The extent of marketization and liberalization is seen to be weaker in the interior regions, resulting in a much less attractive environment for investment.

This paper first examines the importance of different financial resources in China's post-reform economic growth. Second, due to differences in the economic characteristics between the interior and coastal provinces, we examine the impacts of different financial resources on regional economic growth. China's components of financial sources of investment are discussed in section 2. Section 3 summarizes the differences of economic conditions and financial resources between the interior and coastal provinces. We discuss the regression models in section 4, present the empirical results in section 5, and conclude the paper in the last section.

## 2. THE FOUR SOURCES OF TOTAL INVESTMENT IN FIXED ASSETS

China's financial liberalization has proceeded along with other aspects of liberalization (Li and Liu 2001). Before 1978, investment funding came solely from the Ministry of Finance via various fiscal items or through the various state banks that acted as 'accounting agents' in all monetary transactions (Pohl 1995). Similarly, the foreign sector was insignificant, trade was minimal and foreign investment was absent. Capital markets did not exist in the pre-reform years.

New forms of investment have been generated since economic reform. The Chinese official statistical yearbooks show that financial resources are considered as total investments in fixed assets (TIEA), which are divided into four major components: state budget appropriation, national bank loans, self-raised funds and foreign investment. By definition, state budget appropriation (SA) refers to the appropriation in the budget of the central and local governments earmarked for capital construction and innovation projects and the transfer funds to banks as loan issues for capital construction projects. National bank domestic loans (DL) are funds borrowed by enterprises and institutions from domestic bank and non-bank financial institutions and include various types of loans issued by banks. Self-raised funds and others (SRF) are grouped under one category. Self-raised funds are funds received by construction enterprises from institutions and local governments. Utilized foreign investment (FI) refers to foreign funds in fixed assets, foreign funds borrowed and managed by government, and by individual units and foreign funds in joint ventures.

Summarized statistics of the four sources of finance at the national level are shown in Table 1. In nominal terms, total investment in fixed assets by source has increased drastically, with an average annual nominal growth rate of 23.1 per cent between 1981 and 1998, while the period that experienced the highest average nominal annual growth rate was 1991–95 with 36.3 per cent. In percentage shares, state appropriation (SA) has declined drastically from 28.1 per cent in 1981 to only 4.2 per cent in 1998, with an average share of 11 per cent. Part of the drop in state appropriation (SA) has been captured by domestic bank loans (DL) that

Table 1 Total investment in fixed assets: national aggregates, by source

|      | 1981                    | 1990  | 1998   | 1981–85                           | 1986–90 | 1991–95 | 1996–98 | 1981–98 |
|------|-------------------------|-------|--------|-----------------------------------|---------|---------|---------|---------|
|      | <i>RMB100 million</i>   |       |        | <i>Average (RMB100 million)</i>   |         |         |         |         |
| TIFA | 961                     | 4,517 | 28,717 | 1,600                             | 4,099   | 13,020  | 25,778  | 9,469   |
| SA   | 270                     | 393   | 1,197  | 344                               | 429     | 472     | 840     | 486     |
| DL   | 122                     | 885   | 5,543  | 249                               | 831     | 2,959   | 4,966   | 1,950   |
| SRF  | 533                     | 2,954 | 19,360 | 942                               | 2,605   | 8,427   | 17,290  | 6,208   |
| FI   | 36                      | 285   | 2,617  | 65                                | 234     | 1,161   | 2,683   | 853     |
|      | <i>Percentage share</i> |       |        | <i>Average percentage share</i>   |         |         |         |         |
| SA   | 28.1                    | 8.7   | 4.2    | 22.7                              | 10.8    | 4.2     | 3.2     | 11.0    |
| DL   | 12.7                    | 19.6  | 19.3   | 14.7                              | 20.4    | 23.5    | 19.3    | 19.5    |
| SRF  | 55.5                    | 65.4  | 67.4   | 58.4                              | 63.2    | 64.4    | 67.0    | 62.9    |
| FI   | 3.8                     | 6.3   | 9.1    | 4.2                               | 5.6     | 8.0     | 10.5    | 6.7     |
|      | <i>Growth rate</i>      |       |        | <i>Average annual growth rate</i> |         |         |         |         |
| TIFA | 2.8                     | 2.4   | 13.6   | 27.8                              | 12.8    | 36.3    | 11.9    | 23.1    |
| SA   | 3.5                     | 7.4   | 71.9   | 11.5                              | −0.04   | 10.8    | 28.0    | 10.8    |
| DL   | 44.4                    | 16.1  | 15.9   | 47.2                              | 13.5    | 38.2    | 9.8     | 28.0    |
| SRF  | 34.1                    | −1.2  | 13.2   | 30.5                              | 14.8    | 36.6    | 13.0    | 24.6    |
| FI   | 66.4                    | −2.2  | −2.5   | 28.0                              | 27.5    | 55.6    | 5.0     | 31.9    |

Source: China Statistical Yearbook 2000, Beijing.

Notes: TIFA = total investment in fixed assets; SA = state appropriation; DL = national bank domestic loans; SRF = self-raised funds and others; FI = utilized foreign investment. National TIFA figures before 1981 covered only TIFA of state-owned enterprises.

experienced a considerable percentage share increase from 12.7 per cent in 1981 to 19.3 per cent in 1998, with an average share of 19.5 per cent. Self-raised funds and others (SRF) showed the largest increase, and its percentage share reached 67.4 per cent in 1998, with an average share of 62.9 per cent between 1981 and 1998. Utilized foreign investment (FI) experienced the higher average growth rate of 31.9 per cent in the 1981–98 period, but its absolute value is still low and has the smallest average share of 6.7 per cent, even though its average percentage share exceeded that of state appropriation (SA) since the 1991–95 period.

The picture at the national level (see, for example, Li and Liu 2001) is that state appropriation has declined in importance, self-raised funds are becoming the dominant source of resources while domestic bank loans in part have replaced the size of state appropriation. Foreign investment has caught up fast, as its percentage share has exceeded that of state appropriation since the 1990s.

### 3. ECONOMIC DISPARITY BETWEEN THE INTERIOR AND COASTAL PROVINCES

Because of the historical background and the distribution of natural resources, economic development in China has been characterized by imbalanced regional growth. Typically, the economic conditions and growth in the inner regions are lower than those in the coastal regions. This imbalance was deepened during the economic reform period, as various aspects of economic reforms in the 1980s and 1990s favored economic progress in the coastal regions. For example, the open-door policy established the special economic zones along the coast practiced marketization and attracted foreign investments. Economic liberalization encouraged new forms of economic entities, such as township and village enterprises, joint ownership, foreign ownership and ownership by overseas Chinese. The reform of state-owned enterprises further encouraged the free market, and business establishments tend to concentrate in the more business-oriented regions along the coastal provinces. All these changes have a greater impact on the coastal than on the interior provinces. Furthermore, the coastal regions are more developed in infrastructure, and are geographically closer to such regional business centers as Hong Kong and Seoul. The consequence is the fast capital accumulation through investment and economic growth in the coastal regions.

Table 2 summarizes the GDP (100 million renminbi) performance of the thirty provinces in China in the reform period. In 1985, the average GDP for coastal provinces (381.5) is about 1.8 times of the average of interior provinces (215.72). Despite the huge increase of GDP in all provinces over the years, the difference increased to 2.2 times (4,015.47 to 1,847.21) in 1998. This disparity is also evidenced by the difference in the growth rates. Between 1986 and 1998, the average growth rate for the coastal provinces is 17.86 per cent while the average for interior provinces is 16 per cent. In terms of growth rates, one also observes that the interior regions also experienced large growth, as their average annual growth rates were in two digits in most cases. The major difference rests on their initial low income levels. With the exception of Hainan and Tianjin in the coastal regions, incomes in the coastal regions are much higher than the interior provinces in 1985. Ningxia, Qinghai and Tibet are the poorest interior provinces. Their weak income base, despite similar percentage growth rates, led to a bigger income gap in 1998. To catch up, their percentage growth rates have to be higher than the coastal regions.

Total investments for each province in the reform period are summarized in Table 3. The last column in Table 3 shows that the average growth of investment for the coastal provinces is 24.6 per cent while the average of the interior provinces is 20.3 per cent in the 1986–98 period. With the exception of Shanghai, Fujian and Guangxi, where complete data are not available, there are five coastal provinces that experienced a growth rate higher than 25 per cent. By contrast, there is only one interior province (Jiangxi) that had achieved such a growth rate.

Table 2 GDP of the thirty provinces

| Province        | GDP (RMB100 million) |          |          |          |          | Average annual growth rate (%) |         |         |         |
|-----------------|----------------------|----------|----------|----------|----------|--------------------------------|---------|---------|---------|
|                 | 1985                 | 1990     | 1995     | 1996     | 1998     | 1986–90                        | 1991–95 | 1996–98 | 1986–98 |
| <b>Coastal</b>  |                      |          |          |          |          |                                |         |         |         |
| Beijing         | 257.12               | 500.82   | 1,394.89 | 1,615.73 | 2,011.30 | 13.33                          | 20.49   | 12.20   | 15.82   |
| Fujian          | 201.65               | 528.64   | 2,176.67 | 2,628.49 | 3,385.51 | 19.28                          | 28.30   | 14.72   | 21.70   |
| Guangdong       | 577.38               | 1,559.03 | 5,733.91 | 6,519.14 | 7,919.12 | 19.87                          | 26.05   | 10.76   | 20.14   |
| Guangxi         | 180.97               | 449.06   | 1,497.56 | 1,697.90 | 1,903.04 | 18.18                          | 24.09   | 7.99    | 18.10   |
| Hainan          | 43.26                | 102.49   | 364.17   | 389.53   | 438.92   | 17.25                          | 25.36   | 6.22    | 17.82   |
| Hebei           | 396.75               | 896.33   | 2,853.02 | 3,468.24 | 4,271.79 | 16.30                          | 23.16   | 13.46   | 18.28   |
| Jiangsu         | 651.82               | 1,416.50 | 5,155.25 | 6,004.21 | 7,199.95 | 15.52                          | 25.84   | 11.14   | 18.48   |
| Liaoning        | 518.59               | 1,061.91 | 2,793.37 | 3,157.69 | 3,881.73 | 14.33                          | 19.34   | 10.97   | 15.48   |
| Shandong        | 680.46               | 1,511.19 | 5,002.34 | 5,960.42 | 7,162.20 | 15.96                          | 23.94   | 11.96   | 18.11   |
| Shanghai        | 466.75               | 756.45   | 2,462.57 | 2,902.20 | 3,688.20 | 9.66                           | 23.61   | 13.46   | 15.90   |
| Tianjin         | 175.71               | 310.95   | 917.65   | 1,099.47 | 1,336.38 | 11.42                          | 21.64   | 12.53   | 15.61   |
| Zhejiang        | 427.50               | 897.99   | 3,524.79 | 4,146.06 | 4,987.50 | 14.84                          | 27.35   | 11.57   | 18.90   |
| Average         | 381.50               | 832.61   | 2,823.02 | 3,299.09 | 4,015.47 | 15.49                          | 24.10   | 11.42   | 17.86   |
| SD              | 207.59               | 481.53   | 1,736.68 | 2,019.08 | 2,435.76 | 3.04                           | 2.69    | 2.35    | 1.92    |
| <b>Interior</b> |                      |          |          |          |          |                                |         |         |         |
| Anhui           | 331.24               | 658.02   | 2,003.58 | 2,339.25 | 2,805.50 | 13.73                          | 22.27   | 11.22   | 16.43   |
| Gansu           | 123.39               | 242.80   | 553.35   | 714.18   | 869.75   | 13.54                          | 16.48   | 15.07   | 15.02   |
| Guizhou         | 123.92               | 260.14   | 610.71   | 713.70   | 841.88   | 14.83                          | 17.07   | 10.70   | 14.74   |
| Heilongjiang    | 355.04               | 715.23   | 2,014.53 | 2,402.58 | 2,832.80 | 14.01                          | 20.71   | 11.36   | 15.98   |
| Henan           | 451.74               | 934.65   | 3,002.74 | 3,683.41 | 4,356.60 | 14.54                          | 23.34   | 12.41   | 17.43   |
| Hubei           | 396.26               | 824.38   | 2,391.42 | 2,970.20 | 3,704.21 | 14.65                          | 21.30   | 14.59   | 17.19   |
| Hunan           | 349.95               | 744.44   | 2,195.70 | 2,647.16 | 3,211.40 | 15.10                          | 21.63   | 12.67   | 17.05   |
| In. Mongolia    | 163.83               | 319.31   | 832.88   | 984.78   | 1,192.29 | 13.35                          | 19.17   | 11.96   | 15.27   |
| Jiangxi         | 207.89               | 428.62   | 1,205.11 | 1,517.26 | 1,851.98 | 14.47                          | 20.68   | 14.32   | 16.82   |
| Jilin           | 200.44               | 425.28   | 1,139.40 | 1,352.06 | 1,571.22 | 15.04                          | 19.71   | 10.71   | 15.84   |
| Ningxia         | 30.27                | 64.84    | 169.75   | 193.62   | 227.46   | 15.24                          | 19.25   | 9.75    | 15.51   |
| Qinghai         | 33.01                | 69.94    | 165.31   | 183.57   | 220.16   | 15.02                          | 17.20   | 9.55    | 14.60   |
| Shaanxi         | 180.87               | 374.05   | 1,000.03 | 1,175.38 | 1,381.53 | 14.53                          | 19.67   | 10.77   | 15.64   |
| Shanxi          | 218.99               | 429.27   | 1,092.48 | 1,308.01 | 1,601.07 | 13.46                          | 18.68   | 12.74   | 15.30   |
| Sichuan         | 421.15               | 890.95   | 2,504.95 | 2,985.15 | 3,580.26 | 14.99                          | 20.67   | 11.91   | 16.46   |
| Tibet           | 17.76                | 27.70    | 55.98    | 64.76    | 91.18    | 8.89                           | 14.07   | 16.26   | 12.58   |
| Xinjiang        | 112.24               | 274.01   | 825.11   | 912.15   | 1,116.67 | 17.85                          | 22.05   | 10.09   | 17.67   |
| Yunnan          | 164.96               | 451.67   | 1,206.68 | 1,491.62 | 1,793.90 | 20.14                          | 19.65   | 13.22   | 18.36   |
| Average         | 215.72               | 451.96   | 1,276.10 | 1,535.49 | 1,847.21 | 14.63                          | 19.64   | 12.18   | 15.99   |
| SD              | 137.77               | 284.41   | 878.01   | 1,069.84 | 1,286.57 | 2.17                           | 2.32    | 1.91    | 1.36    |

Source: Various provincial statistical yearbooks.

Note: SD = Standard deviation.

Dividing the whole sample into three subsamples, the highest growth of investment appears in the 1991–95 period. Also, the biggest gap of the average growths of investment between the coastal provinces (39.5 per cent) and the interior provinces (28.9 per cent) is observed in this subsample. In particular, the growth rates of coastal provinces reached as high as 50.1 per cent (Zhejiang), while the largest in the interior provinces was 35 per cent (Anhui). The relatively high

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growth of investment in the coastal provinces, however, was reversed in the 1996–98 period. The average growth of investment for the interior provinces (22.6 per cent) is greater than the average of the coastal provinces (15 per cent). There are two possible reasons for such changes: first, the unusual high average growth of investment with 40 per cent per year for five consecutive years indicated a picture of economic overheating; second, the Asian financial crisis between 1997 and 1999 discouraged the incoming of new investments. The regional disparity of

Table 3 Total investment in fixed assets of provinces, by source

| Province        | RMB100 million |       |         |         |         | Average annual growth rate (%) |         |         |         |
|-----------------|----------------|-------|---------|---------|---------|--------------------------------|---------|---------|---------|
|                 | 1985           | 1990  | 1995    | 1996    | 1998    | 1986–90                        | 1991–95 | 1996–98 | 1986–98 |
| <b>Coastal</b>  |                |       |         |         |         |                                |         |         |         |
| Beijing         | 77.8           | 136.2 | 466.9   | 503.5   | 669.4   | 13.3                           | 31.6    | 12.8    | 20.2    |
| Fujian          | —              | —     | —       | 507.6   | —       | —                              | —       | —       | —       |
| Guangdong       | —              | 381.5 | 2,327.2 | 2,327.6 | 2,668.1 | —                              | 47.0    | 4.9     | 31.2    |
| Guangxi         | —              | —     | 241.7   | 263.5   | —       | —                              | —       | —       | —       |
| Hainan          | 15.3           | 35.6  | 198.1   | 141.4   | 181.9   | 19.4                           | 46.3    | –0.6    | 25.1    |
| Hebei           | 110.7          | 172.2 | 939.3   | 631.1   | 1,651.2 | 11.3                           | 40.0    | 37.5    | 28.4    |
| Jiangsu         | 191.9          | 356.3 | 1,680.2 | 971.2   | 2,535.5 | 14.4                           | 37.7    | 33.2    | 27.7    |
| Liaoning        | 142.2          | 262.9 | 882.1   | 646.1   | 1,052.6 | 13.7                           | 28.9    | 10.4    | 18.8    |
| Shandong        | 100.4          | 185.4 | 876.8   | 822.8   | 1,192.5 | 13.7                           | 37.7    | 11.6    | 22.4    |
| Shanghai        | —              | —     | 1,577.1 | 1,899.0 | 1,920.2 | —                              | —       | 7.2     | —       |
| Tianjin         | 58.2           | 73.2  | 334.1   | 337.4   | 455.1   | 4.6                            | 36.0    | 11.3    | 18.2    |
| Zhejiang        | 102.2          | 187.0 | 1,357.9 | 889.6   | 1,847.9 | 13.5                           | 50.1    | 21.7    | 29.5    |
| Average         | 99.8           | 198.9 | 989.2   | 828.4   | 1,417.4 | 13.0                           | 39.5    | 15.0    | 24.6    |
| SD              | 53.1           | 117.1 | 682.8   | 655.8   | 850.0   | 4.1                            | 7.1     | 12.2    | 4.9     |
| <b>Interior</b> |                |       |         |         |         |                                |         |         |         |
| Anhui           | 80.7           | 123.0 | 530.4   | 613.0   | 722.0   | 9.9                            | 35.0    | 10.9    | 19.8    |
| Gansu           | 33.9           | 59.3  | 194.7   | 168.4   | 331.0   | 12.8                           | 27.2    | 22.9    | 20.6    |
| Guizhou         | 33.1           | 51.5  | 173.7   | 193.6   | 289.3   | 9.5                            | 27.8    | 18.7    | 18.7    |
| Heilongjiang    | 111.8          | 162.9 | 487.5   | 399.4   | 810.6   | 8.0                            | 24.7    | 23.0    | 17.9    |
| Henan           | 127.0          | 206.1 | 805.0   | 627.9   | 1,288.2 | 10.8                           | 31.5    | 24.0    | 21.8    |
| Hubei           | 92.9           | 144.4 | 826.5   | 688.9   | 1,231.1 | 10.8                           | 42.6    | 18.1    | 24.7    |
| Hunan           | 8.5            | 124.2 | 524.1   | 373.9   | 838.9   | 9.3                            | 33.6    | 25.8    | 22.5    |
| In. Mongolia    | 52.4           | 70.8  | 273.1   | 185.6   | —       | 7.2                            | 32.1    | —       | —       |
| Jiangxi         | 25.1           | 43.5  | 165.5   | 199.9   | 459.5   | 11.9                           | 30.0    | 46.1    | 26.8    |
| Jilin           | 62.2           | 93.5  | 341.9   | 296.5   | 420.8   | 9.4                            | 30.9    | 10.9    | 18.0    |
| Ningxia         | 13.6           | 22.0  | 70.1    | 60.3    | 106.9   | 10.9                           | 26.5    | 17.8    | 18.5    |
| Qinghai         | —              | 22.3  | 55.6    | 77.7    | 16.4    | —                              | 21.1    | 28.9    | 18.1    |
| Shaanxi         | 58.0           | 103.7 | 270.7   | 243.7   | 462.2   | 12.7                           | 23.0    | 22.1    | 18.8    |
| Shanxi          | 91.7           | 123.4 | 295.6   | 255.9   | 534.9   | 6.2                            | 19.9    | 25.5    | 15.9    |
| Xinjiang        | 44.5           | 88.8  | 333.3   | 286.2   | 414.7   | 15.2                           | 30.9    | 19.1    | 22.2    |
| Yunnan          | 46.3           | 75.7  | 380.6   | 447.4   | 664.4   | 10.6                           | 39.6    | 20.4    | 24.0    |
| Average         | 56.3           | 91.4  | 326.8   | 295.3   | 525.7   | 10.3                           | 28.9    | 22.6    | 20.3    |
| SD              | 35.5           | 51.2  | 198.5   | 170.3   | 325.7   | 2.4                            | 5.4     | 8.5     | 2.9     |

Sources: *China Regional Economy: A Profile of 17 Years of Reform and Opening Up*, State Statistical Bureau; *China Statistical Yearbook, 1986–1999*; *China Statistical Yearbook on Investment in Fixed Assets 1997*; and *Comprehensive Statistical Data and Materials on 50 Years of New China*, China Statistical Press, October 1999.

Notes: Data for Sichuan in 1993–95 and 1997–98 are incomplete. Data for Tibet are available for 1995–97 only. SD is standard deviation.

the economic conditions in both output and investment became wider and worsened in the mid-1990s. As a result, the central government began to pay attention to the importance of the interior regions. Since 1999, the development of the interior regions, especially with the aim to divert investment to the interior provinces, had received high priority in the state policy.

Economic reforms have further implications on the allocation of different financial resources among provinces. Marketization in the inner regions has been slow and weak, and the interior provinces are unattractive to non-state and foreign funds, and since many large state-owned enterprises are located in the inner regions, the major financial resource for the interior provinces would still be the traditional state appropriation, which is entirely controlled by the central authority. With new economic entities mostly spreading in coastal provinces, it can perhaps be argued that domestic loans and self-raised funds would have produced a greater impact on the coastal than on the interior regions. Overseas Chinese and foreign investments would also have influenced investment of the coastal regions far more than interior regions.

Table 4 shows the percentage shares of four financial sources for coastal and interior provinces, and Table 5 shows the growth of these four financial sources. In these tables and the regression analysis in the later section, data from twenty-five provinces are used since the data for five provinces (Shanghai, Fujian, Guangxi, Sichuan and Tibet) are not available until the mid-1990s. One general observation from Table 4 is that the average percentage share of SA has declined in all provinces, while FI showed an opposite trend. The percentage share of FI has increased in most provinces over the whole sample period. The exceptions are Beijing and some interior provinces. On average, the FI for interior provinces has slightly declined during the 1996–98 period. The average percentage share of DL has steadily increased until the last sample period 1996–98. Among the four sources, SRF has the largest percentage share, and its differences between the coastal and interior provinces are small in the whole sample period. Comparing with the interior provinces, the coastal provinces have higher percentage shares in FI, but is offset by the lower percentage shares in SA and DL.

Table 5 shows the growth of four sources of fixed asset investment in different provinces. For the coastal provinces, the average annual growth rates are highest in the period of 1991–95 for FI, DL and SRF. The highest growth period for SA is in 1996–98 with an average of 29 per cent. The average growths of SA in 1996, 1997 and 1998 are –6 per cent, 22 per cent and 43 per cent, respectively. This implies that Asian financial crisis between 1997 and 1999 has more impact on DL, SRF and FI than on SA. For interior provinces, the highest average annual growth rate appears in the 1991–95 period for DL and SRF, and in 1996–98 for SA. For FI, the highest growth is in 1986–90, possibly because of low investment level in the pre-1986 years. To compare the growth of the four different financial resources, DL, SRF and FI grew much faster than SA in all periods, except

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Table 4 Four sources of total investment in fixed assets, percentage shares

| Province        | State appropriation |             |             |             | Domestic loans |             |             |             | Self-raised funds |             |             |             | Foreign investment |             |             |             |
|-----------------|---------------------|-------------|-------------|-------------|----------------|-------------|-------------|-------------|-------------------|-------------|-------------|-------------|--------------------|-------------|-------------|-------------|
|                 | 1986<br>-90         | 1991<br>-95 | 1996<br>-98 | 1986<br>-98 | 1986<br>-90    | 1991<br>-95 | 1996<br>-98 | 1986<br>-98 | 1986<br>-90       | 1991<br>-95 | 1996<br>-98 | 1986<br>-98 | 1986<br>-90        | 1991<br>-95 | 1996<br>-98 | 1986<br>-98 |
| <b>Coastal</b>  |                     |             |             |             |                |             |             |             |                   |             |             |             |                    |             |             |             |
| Beijing         | 30                  | 16          | 14          | 22          | 15             | 17          | 15          | 16          | 45                | 57          | 62          | 53          | 11                 | 10          | 9           | 10          |
| Guangdong       | —                   | 2           | 1           | 2*          | —              | 19          | 14          | 17*         | —                 | 63          | 67          | 64*         | —                  | 17          | 18          | 17*         |
| Hainan          | 13                  | 4           | 4           | 8           | 19             | 25          | 16          | 20          | 61                | 57          | 59          | 59          | 7                  | 15          | 22          | 13          |
| Hebei           | 11                  | 4           | 2           | 7           | 23             | 21          | 16          | 20          | 64                | 71          | 74          | 69          | 3                  | 4           | 8           | 4           |
| Jiangsu         | 6                   | 2           | 2           | 4           | 17             | 21          | 15          | 18          | 72                | 69          | 67          | 69          | 6                  | 9           | 16          | 9           |
| Liaoning        | 11                  | 3           | 3           | 7           | 21             | 23          | 20          | 21          | 62                | 64          | 66          | 64          | 6                  | 10          | 11          | 8           |
| Shandong        | 12                  | 4           | 3           | 7           | 21             | 25          | 21          | 22          | 54                | 63          | 64          | 59          | 13                 | 9           | 12          | 11          |
| Tianjin         | 11                  | 4           | 2           | 8           | 21             | 27          | 22          | 24          | 54                | 49          | 54          | 52          | 14                 | 20          | 21          | 17          |
| Zhejiang        | 4                   | 2           | 2           | 3           | 16             | 21          | 18          | 18          | 78                | 74          | 73          | 75          | 2                  | 4           | 8           | 4           |
| Average         | 12                  | 5           | 4           | 8           | 19             | 22          | 17          | 20          | 61                | 63          | 65          | 63          | 8                  | 11          | 14          | 10          |
| SD              | 8                   | 4           | 4           | 6           | 3              | 3           | 3           | 3           | 11                | 8           | 6           | 8           | 4                  | 5           | 6           | 4           |
| <b>Interior</b> |                     |             |             |             |                |             |             |             |                   |             |             |             |                    |             |             |             |
| Anhui           | 11                  | 6           | 4           | 8           | 20             | 27          | 21          | 23          | 68                | 64          | 69          | 67          | 1                  | 3           | 7           | 3           |
| Gansu           | 20                  | 9           | 6           | 13          | 21             | 27          | 29          | 25          | 58                | 61          | 69          | 60          | 1                  | 3           | 5           | 3           |
| Guizhou         | 14                  | 6           | 4           | 9           | 25             | 28          | 26          | 26          | 60                | 62          | 65          | 62          | 2                  | 4           | 4           | 3           |
| Heilongjiang    | 12                  | 5           | 2           | 8           | 15             | 20          | 22          | 17          | 66                | 70          | 71          | 68          | 8                  | 6           | 5           | 7           |
| Henan           | 9                   | 5           | 5           | 7           | 11             | 23          | 20          | 17          | 77                | 66          | 66          | 71          | 3                  | 6           | 9           | 17          |
| Hubei           | 9                   | 8           | 8           | 9           | 18             | 25          | 20          | 21          | 71                | 61          | 67          | 66          | 2                  | 7           | 6           | 4           |
| Hunan           | 8                   | 4           | 3           | 6           | 20             | 23          | 18          | 20          | 69                | 68          | 73          | 70          | 3                  | 4           | 5           | 4           |
| In. Mongolia    | 21                  | 9           | —           | 15          | 17             | 23          | 23          | 31          | 59                | 58          | —           | 59          | 4                  | 11          | —           | 6           |
| Jiangxi         | 19                  | 6           | 5           | 12          | 34             | 36          | 23          | 32          | 46                | 50          | 68          | 52          | 1                  | 8           | 5           | 5           |
| Jilin           | 12                  | 5           | 3           | 8           | 20             | 25          | 22          | 22          | 65                | 61          | 64          | 64          | 3                  | 9           | 12          | 7           |
| Ningxia         | 18                  | 10          | 5           | 13          | 25             | 32          | 31          | 28          | 55                | 57          | 61          | 56          | 3                  | 3           | 2           | 3           |
| Qinghai         | 21*                 | 9           | 4           | 12#         | 30*            | 36          | 36          | 34#         | 42*               | 52          | 57          | 50#         | 7*                 | 3           | 3           | 4#          |
| Shaanxi         | 18                  | 9           | 8           | 13          | 23             | 30          | 29          | 27          | 56                | 56          | 58          | 57          | 3                  | 6           | 5           | 4           |
| Shanxi          | 19                  | 7           | 3           | 11          | 31             | 30          | 29          | 30          | 50                | 60          | 63          | 56          | 1                  | 3           | 5           | 2           |
| Xinjiang        | 17                  | 5           | 6           | 11          | 23             | 20          | 20          | 31          | 55                | 61          | 69          | 60          | 6                  | 14          | 5           | 8           |
| Yunnan          | 13                  | 6           | 6           | 10          | 22             | 25          | 21          | 23          | 63                | 66          | 69          | 64          | 3                  | 3           | 3           | 3           |
| Average         | 15                  | 7           | 5           | 10          | 22             | 27          | 24          | 25          | 61                | 61          | 66          | 62          | 3                  | 6           | 5           | 5           |
| SD              | 4                   | 2           | 2           | 3           | 6              | 5           | 5           | 5           | 8                 | 5           | 5           | 6           | 2                  | 3           | 2           | 4           |

Source: Same as Table 3.

Notes: \* = 1987–90; # = 1987–98.

1996–98. The impact of the growth of different financial sources on the economic growth will be further discussed in the regression analysis.

## 4. ESTIMATION MODELS

Traditionally, the Cobb–Douglas production function has often been employed empirically to study the impact of factors of production (typically labor, technology and stock of physical capital) on output. Studies show that measurements of the stock of physical capital in China have to be constructed artificially from secondary data sources (Chow 1993; Chow and Li 2002; Jefferson 1989; Jefferson *et al.* 1992, 1994). Alternatively, the annual figures on investment in fixed assets can be considered as the investment flow that adds to the permanent capital stock. The

Table 5 Four sources of total investment in fixed assets, growth rates

|                 | State appropriation |      |      |      | Domestic loans |      |      |      | Self-raised funds |      |      |      | Foreign investment |      |      |      |
|-----------------|---------------------|------|------|------|----------------|------|------|------|-------------------|------|------|------|--------------------|------|------|------|
|                 | 1986                | 1991 | 1996 | 1986 | 1986           | 1991 | 1996 | 1986 | 1986              | 1991 | 1996 | 1986 | 1986               | 1991 | 1996 | 1986 |
|                 | -90                 | -95  | -98  | -98  | -90            | -95  | -98  | -98  | -90               | -95  | -98  | -98  | -90                | -95  | -98  | -98  |
| <b>Coastal</b>  |                     |      |      |      |                |      |      |      |                   |      |      |      |                    |      |      |      |
| Beijing         | 4                   | 14   | 11   | 10   | 21             | 27   | 19   | 23   | 41                | 50   | -2   | 35   | 17                 | 40   | 14   | 25   |
| Guangdong       | -                   | 13   | 32   | 20*  | -              | 45   | 6    | 30*  | -                 | 47   | 7    | 32*  | -                  | 59   | -4   | 35*  |
| Hainan          | 8                   | 4    | 62   | 19   | 15             | 53   | -6   | 25   | 21                | 44   | 6    | 27   | 66                 | 98   | -16  | 59   |
| Hebei           | -2                  | 10   | 27   | 10   | 21             | 36   | 30   | 29   | 11                | 44   | 48   | 32   | 69                 | 78   | 13   | 60   |
| Jiangsu         | -2                  | 16   | 30   | 12   | 9              | 50   | 13   | 26   | 17                | 34   | 37   | 28   | 53                 | 74   | 47   | 60   |
| Liaoning        | -2                  | 7    | 21   | 7    | 17             | 28   | 3    | 18   | 13                | 30   | 14   | 20   | 104                | 53   | 66   | 65   |
| Shandong        | 1                   | 19   | 8    | 10   | 19             | 41   | 10   | 25   | 15                | 38   | 15   | 24   | 18                 | 56   | 1    | 29   |
| Tianjin         | -4                  | 17   | 40   | 16   | 10             | 43   | 11   | 23   | 52                | 45   | 4    | 38   | 5                  | 37   | 15   | 20   |
| Zhejiang        | -3                  | 23   | 33   | 16   | 9              | 58   | 20   | 30   | 15                | 49   | 31   | 32   | 89                 | 87   | 16   | 72   |
| Average         | 0                   | 14   | 29   | 13   | 15             | 42   | 12   | 25   | 23                | 42   | 18   | 30   | 53                 | 65   | 17   | 49   |
| SD              | 4                   | 6    | 16   | 4    | 5              | 11   | 11   | 4    | 15                | 7    | 17   | 6    | 36                 | 21   | 25   | 21   |
| <b>Interior</b> |                     |      |      |      |                |      |      |      |                   |      |      |      |                    |      |      |      |
| Anhui           | -1                  | 15   | 14   | 9    | 16             | 45   | 2    | 24   | 11                | 32   | 16   | 20   | 57                 | 98   | 11   | 62   |
| Gansu           | 0                   | 1    | 70   | 17   | 25             | 35   | 8    | 25   | 15                | 28   | 32   | 24   | 60                 | 63   | -6   | 46   |
| Guizhou         | 4                   | -1   | 48   | 13   | 14             | 35   | 15   | 22   | 9                 | 29   | 20   | 19   | 856                | 37   | 16   | 347  |
| Heilongjiang    | -1                  | 2    | 24   | 6    | 23             | 29   | 17   | 24   | 9                 | 27   | 32   | 21   | 8                  | 25   | -12  | 10   |
| Henan           | -2                  | 21   | 36   | 15   | 20             | 49   | 8    | 29   | 12                | 26   | 37   | 23   | 6                  | 100  | -6   | 39   |
| Hubei           | 2                   | 54   | 16   | 25   | 16             | 56   | 8    | 30   | 11                | 37   | 32   | 26   | 106                | 88   | -26  | 69   |
| Hunan           | -6                  | 22   | 25   | 12   | 20             | 33   | 11   | 23   | 8                 | 35   | 34   | 24   | 120                | 39   | 1    | 61   |
| In. Mongolia    | 0                   | 7    | -    | -1   | 22             | 39   | -    | 28   | 6                 | 36   | -    | 16   | 84                 | 42   | -    | 50   |
| Jiangxi         | 5                   | 22   | 29   | 17   | 17             | 22   | 37   | 24   | 16                | 37   | 57   | 34   | 56                 | 143  | 33   | 84   |
| Jilin           | -1                  | -3   | 74   | 15   | 19             | 34   | 14   | 24   | 8                 | 30   | 15   | 18   | 271                | 70   | -23  | 126  |
| Ningxia         | 7                   | 2    | 31   | 10   | 21             | 34   | 10   | 24   | 14                | 30   | 23   | 23   | 54                 | 58   | 22   | 48   |
| Qinghai         | 29*                 | -8   | 32   | 13#  | -3*            | 41   | 19   | 23#  | 3*                | 25   | 35   | 23#  | 135*               | 82   | 207  | 130# |
| Shaanxi         | 3                   | 9    | 29   | 11   | 24             | 25   | 22   | 24   | 12                | 23   | 24   | 20   | 192                | 73   | 17   | 71   |
| Shanxi          | -6                  | -3   | 29   | 3    | 6              | 16   | 29   | 15   | 11                | 25   | 22   | 19   | 217                | 34   | 67   | 112  |
| Xinjiang        | -1                  | 2    | 70   | 17   | 40             | 29   | 15   | 30   | 13                | 40   | 25   | 26   | 66                 | 71   | -15  | 49   |
| Yunnan          | 6                   | 14   | 35   | 16   | 9              | 41   | 22   | 24   | 12                | 43   | 22   | 26   | 20                 | 94   | -18  | 40   |
| Average         | 1                   | 10   | 37   | 12   | 19             | 35   | 16   | 25   | 11                | 31   | 28   | 23   | 139                | 70   | 18   | 81   |
| SD              | 4                   | 15   | 19   | 6    | 8              | 10   | 9    | 4    | 3                 | 6    | 11   | 4    | 211                | 31   | 58   | 79   |

Source: Same as Table 3.

Notes: \* = 1987-90; # = 1987-98.

flow concept has the advantage of using the actual annual data and avoids the need to construct the stock of capital variable.

The reliability of Chinese data has been subjected to debate (Chow and Li 2002). In the absence of a better alternative, official Chinese data provide the most comprehensive picture on the Chinese economy. Two arguments can be used to support the use of Chinese data. One is the systematic error that may cancel out the negative impact of each other. It has been argued that recent figures of Chinese output have been inflated partly due to political pressure. On the contrary, income data may be biased downward because some township and village enterprises may have underestimated their output, as well as the absence of output from the underground economy. These opposing biases cancel out to some

extent. The other argument is the focus on trend analysis and the result will not be seriously biased in levels of the variables as long as the biases are consistent.

We construct two economic relationships to represent the impact of investment on output growth. The first function mainly shows the relationship between the growth of output ( $Q$ ) and the growth of total fixed asset investment (TIFA). This function measures the overall productivity of financial investment. Next, we disaggregate the total investment figures into the growths of four sources of financial investment: state budget appropriation (SA), national bank loans (DL), foreign investment (FI), and self-raised funds and others (SRF). These four sources will be used as the independent variables in the second function. The two relationships are shown below:

$$(1) \quad \dot{Q}_t = f(\dot{L}abor_t, \dot{TIFA}_t)$$

$$(2) \quad \dot{Q}_t = f(\dot{L}abor_t, \dot{SA}_t, \dot{DL}_t, \dot{SRF}_t, \dot{FI}_t)$$

$\dot{Q}$  is the growth rate of output or GDP, and  $\dot{SA}$ ,  $\dot{DL}$ ,  $\dot{SRF}$  and  $\dot{FI}$  are the growth rates of SA, DL, SRF and FI, respectively. The growth of labor,  $\dot{L}abor$ , is incorporated into the regressions to represent the contribution of labor to the economic growth. The regression models of (1) and (2) with time-series national aggregate data are useful for understanding the importance of financial sources at national level (Li and Liu 2001). However, these models with time-series data alone cannot capture the importance of financial sources in the provincial level.

With different economic growth paths between coastal and interior provinces, the panel data can be used for the empirical study to show the differences in the relationship between provincial output growth and the growth of different financial sources. In addition, the use of provincial data significantly expands the number of sample data. The results from a large sample can provide robust statistical conclusions. One major econometric problem in using panel data is the assumption of absence of serial correlation over time. This issue is resolved by using the growth instead of the level of the series in the regression. When the growth rates are used in the panel data regression, the problem of serial correlation can be reduced significantly.

The regression models with data values for different provinces and different time periods can be written as:

$$(3) \quad \dot{Q}_{it} = a_0 + a_1 \dot{L}abor_{it} + a_2 \dot{TIFA}_{it} + \varepsilon_{it}$$

$$(4) \quad \dot{Q}_{it} = b_0 + b_1 \dot{L}abor_{it} + b_2 \dot{SA}_{it} + b_3 \dot{DL}_{it} + b_4 \dot{SRF}_{it} + b_5 \dot{FI}_{it} + \varepsilon_{it}$$

The subscript  $it$  represents the data value for province  $i$  at time  $t$ . For example,  $Q_{it}$  represents the growth of output (GDP) for province  $i$  at time  $t$ . When panel data are used, we can consider *fixed effects* and *random effects* in the regression. Using

equation (3) as an example, province fixed effect  $c_i$  and time fixed effect  $d_t$  can be added to the regression and the models are:

$$(5) \quad \dot{Q}_{it} = a_0 + c_i + a_1 \dot{L}abor_{it} + a_2 \dot{TIFA}_{it} + \varepsilon_{it}$$

$$(6) \quad \dot{Q}_{it} = a_0 + d_t + a_1 \dot{L}abor_{it} + a_2 \dot{TIFA}_{it} + \varepsilon_{it}$$

$$(7) \quad \dot{Q}_{it} = a_0 + c_i + d_t + a_1 \dot{L}abor_{it} + a_2 \dot{TIFA}_{it} + \varepsilon_{it}$$

Equation (5) considers the province fixed effect. The estimates of  $c_i$  represent the mean differences across different provinces. Equation (6) includes the time fixed effect, and the estimates of  $d_t$  represent the mean differences in different time periods. Equation (7) considers both provincial and time-specific fixed effects. The fixed effect is similar to the inclusion of a dummy variable. For example, the estimates of  $c_1$  and  $c_2$  are the mean growth of Beijing and Tianjin (in addition to  $a_0$ ), respectively. Since there are twenty-five provinces, we need twenty-four dummy variables when the constant is included in the regression. For time-specific fixed effect,  $d_t$  is the mean for time  $t$ , where  $t = 1$  for 1986,  $t = 2$  for 1987 and so on. We have a total of twelve dummy variables for time.

With the consideration of the random effects in the panel data, equation (3) can be rewritten as:

$$(8) \quad \dot{Q}_{it} = a_0 + a_1 \dot{L}abor_{it} + a_2 \dot{TIFA}_{it} + u_i + v_t + \varepsilon_{it}$$

Two random errors  $u_i$  and  $v_t$  are added to equation (3). The random error  $u_i$  is the randomness related to province  $i$  but not related to time, and the random error  $v_t$  is the randomness related to time but not related to provinces. Individual random error, either  $u_i$  or  $v_t$ , can be added to equation (3), but we expect the random effects are less important since there are limited numbers of provinces and time periods. We therefore only consider the analysis with both random errors,  $u_i$  and  $v_t$ , as in equation (8), which is known as an error components model. Three kinds of randomness,  $u_i$ ,  $v_t$  and  $\varepsilon_{it}$ , are integrated in the regression and the variances of these random errors are estimated.

Similar modification on equation (3), as shown in equations (5) to (8), are applied to equation (4), so that fixed effects and random effects are included in the regression with four financial resources as independent variables. The regression results from these models can show the importance of the four finance resources to the provincial economic growth.

## 5. EMPIRICAL RESULTS

In the panel study, we first consider the regression of equations (5) to (8) with the annual data of the twenty-five provinces between 1985 and 1998 such that each

variable has 286 data values. Table 6 shows the regression results with the growth of aggregate investment, TIFA, as the independent variable, while Table 7 shows the regressions with four financial sources as the independent variables. The dependent variable in these regressions is the annual output growth for each province in different years. In the estimation of models with fixed effects, the joint hypothesis of the  $F$ -test on the fixed effects is shown in the last column and the estimated coefficients for the fixed effects are omitted from the tables. Based on the value of  $R^2$ , the models with time fixed effect and with both province and time fixed effects are much better than the other two models. The  $F$ -test also shows that time fixed effects are significant. Therefore, our discussion focuses on the second and third models.

In Table 6, the  $t$ -statistics for the growth of labor and TIFA show that the growth of labor has no significant impact on output growth, but the growth of TIFA has a positive and significant impact on the output growth. We conclude that the growth of total investment in fixed assets is important to explain the output growth. When the four different financial sources of TIFA are used in the regression, as shown in Table 7, both the growth of self-raised funds and domestic loans has positive and significant coefficients in the second and third models. The estimated coefficients of self-raised funds are higher than the coefficients of domestic loans, suggesting that self-raised funds are definitely the best performer in promoting growth in the reform period.

We can conclude that the growth of domestic loans and self-raised funds are more important than the growth of state appropriation and foreign investment as a source of domestic funds. In the case of the growth of state appropriation, its

Table 6 Output growth and total investment in fixed assets (TIFA): all provinces

|                    | <i>Independent variables</i> |              |             | $R^2$ | $F$ -test |
|--------------------|------------------------------|--------------|-------------|-------|-----------|
|                    | <i>Constant</i>              | <i>Labor</i> | <i>TIFA</i> |       |           |
| Fixed effects      | 0.133*                       | 0.049        | 0.227*      | 0.282 | 0.42      |
| Provinces          | (7.38)                       | (0.65)       | (9.95)      |       | (0.99)    |
| Fixed effects      | 0.048*                       | -0.048       | 0.138*      | 0.735 | 46.47*    |
| Time               | (5.79)                       | (-1.05)      | (6.92)      |       | (0.00)    |
| Fixed effects      | 0.059*                       | -0.047       | 0.120*      | 0.765 | 17.14*    |
| Provinces and time | (4.53)                       | (-1.02)      | (6.02)      |       | (0.00)    |
| Random effects     | 0.144*                       | -0.045       | 0.136*      | 0.135 | -         |
|                    | (9.50)                       | (-1.00)      | (6.99)      |       |           |

Notes: The numbers in parentheses under the estimated coefficients are  $t$ -statistics. The numbers in the parentheses under the  $F$ -statistics are  $p$ -values of the test. The asterisk represents the significance at 5% level.

Table 7 Output growth and four sources of TIFA: all provinces

|                    | <i>Independent variables</i> |              |           |           |            |           |                      | <i>F-test</i> |
|--------------------|------------------------------|--------------|-----------|-----------|------------|-----------|----------------------|---------------|
|                    | <i>Constant</i>              | <i>Labor</i> | <i>SA</i> | <i>DL</i> | <i>SRF</i> | <i>FI</i> | <i>R<sup>2</sup></i> |               |
| Fixed effects      | 0.165*                       | 0.049        | -0.041*   | 0.020     | 0.056*     | 0.024*    | 0.169                | 0.51          |
| Provinces          | (7.86)                       | (0.58)       | (-2.94)   | (1.28)    | (3.27)     | (3.73)    |                      | (0.97)        |
| Fixed effects      | 0.054*                       | -0.068       | 0.017*    | 0.028*    | 0.038*     | 0.004     | 0.726                | 53.44*        |
| Time               | (5.85)                       | (-1.38)      | (1.87)    | (2.49)    | (3.30)     | (1.15)    |                      | (0.00)        |
| Fixed effects      | 0.067*                       | -0.063       | 0.013     | 0.025*    | 0.033*     | 0.004     | 0.755                | 19.22*        |
| Provinces and time | (4.55)                       | (-1.29)      | (1.42)    | (2.25)    | (2.80)     | (1.17)    |                      | (0.00)        |
| Random effects     | 0.153*                       | -0.064       | 0.015*    | 0.027*    | 0.038*     | 0.005     | 0.091                | —             |
|                    | (8.86)                       | (-1.31)      | (1.65)    | (2.45)    | (3.28)     | (1.27)    |                      |               |

Notes: Same as Table 6.

estimated coefficient is positive and significant in the second model for provincial fixed effects, but is not significant for the third model with both fixed effects. Since the use of state appropriation is less efficient, it is reasonable to conclude that the growth of state appropriation is less influential on economic growth. The estimated coefficient of foreign investment is not significant either in the second or the third model. This indicates that foreign investment does not have a significant impact on economic growth. These conclusions are derived from the regressions with all provinces. However, it is possible that foreign investment may have a significant impact on coastal provinces since the coastal provinces are more attractive to foreign investment than the interior provinces.

When the four sources of TIFA are used in the regression for nine coastal provinces, Table 8 shows some different results from those in Table 7. In the first four rows with four basic models, the values of  $R^2$  also indicate that the second and third models are much better than the remaining two. In these two better-performed models, only the growth of foreign investment gives a positive and significant coefficient. Hence, it shows that foreign investment is important to the economic growth of coastal provinces. A puzzle that results from these two models is that both coefficients of DL and SRF are no longer significant as in the regression with all provinces. This result may be caused by the multicollinearity. Therefore, each individual financial source of TIFA is used for the third model with both fixed effects and the results are in the last four rows of Table 8. The results show that each individual coefficient of the growth of domestic loans, self-raised funds and foreign investment is positive and significant. This shows that we cannot rule out the importance of domestic loans and self-raised funds for the economic growth of coastal provinces. In terms of magnitude of the estimated coefficients, the coefficient of domestic loans is the largest, while the coefficient of self-raised funds comes second, and the foreign investment the smallest.

Table 8 Output growth and four sources of TIFA: coastal provinces

|                    | <i>Independent variables</i> |              |           |           |            |           |                       |                |
|--------------------|------------------------------|--------------|-----------|-----------|------------|-----------|-----------------------|----------------|
|                    | <i>Constant</i>              | <i>Labor</i> | <i>SA</i> | <i>DL</i> | <i>SRF</i> | <i>FI</i> | <i>R</i> <sup>2</sup> | <i>F</i> -test |
| Fixed effects      | 0.147*                       | 0.390        | −0.023    | 0.023     | 0.034      | 0.063*    | 0.277                 | 0.36           |
| Provinces          | (6.85)                       | (1.28)       | (−0.85)   | (0.83)    | (1.22)     | (3.81)    |                       | (0.94)         |
| Fixed effects      | 0.072*                       | 0.267        | 0.018     | 0.027     | 0.022      | 0.020*    | 0.780                 | 18.62*         |
| Time               | (3.97)                       | (1.29)       | (0.97)    | (1.26)    | (1.07)     | (1.87)    |                       | (0.00)         |
| Fixed effects      | 0.075*                       | 0.180        | 0.015     | 0.029     | 0.019      | 0.018     | 0.797                 | 11.49*         |
| Provinces and time | (3.47)                       | (0.82)       | (0.82)    | (1.25)    | (0.94)     | (1.61)    |                       | (0.00)         |
| Random effects     | 0.152*                       | 0.291        | 0.014     | 0.026     | 0.023      | 0.023*    | 0.146                 | —              |
|                    | (8.04)                       | (1.43)       | (0.80)    | (1.24)    | (1.17)     | (2.16)    |                       |                |
| Fixed effects      | 0.078*                       | 0.214        | 0.023     |           |            |           | 0.777                 | 14.58*         |
| Provinces and time | (3.68)                       | (0.99)       | (1.21)    |           |            |           |                       | (0.00)         |
| Fixed effects      | 0.076*                       | 0.150        |           | 0.045*    |            |           | 0.784                 | 14.46*         |
| Provinces and time | (3.93)                       | (0.69)       |           | (2.14)    |            |           |                       | (0.00)         |
| Fixed effects      | 0.085*                       | 0.214        |           |           | 0.039*     |           | 0.783                 | 13.23*         |
| Provinces and time | (4.55)                       | (1.01)       |           |           | (2.00)     |           |                       | (0.00)         |
| Fixed effects      | 0.094*                       | 0.315        |           |           |            | 0.026*    | 0.787                 | 11.71*         |
| Provinces and time | (5.09)                       | (1.50)       |           |           |            | (2.41)    |                       | (0.00)         |

Notes: Same as Table 6.

In the case of the sixteen interior provinces, Table 9 shows that the growth of self-raised funds is significant at 10 per cent level in the second regression. Even when individual sources of TIFA are considered for the regression with both provincial and time fixed effects, it is only the growth of self-raised funds that is significant at 10 per cent level. In contrast to the coastal provinces, both domestic loans and foreign investments are not important to the economic growth of interior provinces. Therefore, we can conclude that the use of different financial sources of TIFA within the interior provinces is not as productive as in the coastal provinces. To compare the four different financial resources, it may be that SRF is more important than the rest of the three resources for interior provinces.

## 6. CONCLUSION

A major impact of economic reform in China is the generation of different forms of financial sources of investments. Among the four sources of total investment in fixed assets, state appropriation, domestic loans, self-raised funds and foreign investment, it is generally believed that foreign investment is the most efficient financial resource, whereas state appropriation is the most inefficient one. This conclusion is especially true for the believer of the free market economy. This paper uses provincial data between 1985 and 1998 to study the relationship

Table 9 Output growth and four sources of TIFA: interior provinces

|                    | <i>Independent variables</i> |              |           |           |            |           |                      | <i>F-test</i> |
|--------------------|------------------------------|--------------|-----------|-----------|------------|-----------|----------------------|---------------|
|                    | <i>Constant</i>              | <i>Labor</i> | <i>SA</i> | <i>DL</i> | <i>SRF</i> | <i>FI</i> | <i>R<sup>2</sup></i> |               |
| Fixed effects      | 0.171*                       | 0.020        | -0.046*   | 0.014     | 0.050*     | 0.015*    | 0.126                | 0.45          |
| Provinces          | (8.45)                       | (0.24)       | (-2.87)   | (0.74)    | (2.26)     | (2.29)    |                      | (0.96)        |
| Fixed effects      | 0.058*                       | -0.078       | 0.013     | 0.013     | 0.020      | 0.002     | 0.749                | 40.12*        |
| Time               | (5.59)                       | (-1.66)      | (1.28)    | (0.97)    | (1.36)     | (0.51)    |                      | (0.00)        |
| Fixed effects      | 0.077*                       | -0.071       | 0.008     | 0.007     | 0.017      | 0.002     | 0.776                | 19.03*        |
| Provinces and time | (5.31)                       | (-1.52)      | (0.79)    | (0.57)    | (1.11)     | (0.60)    |                      | (0.00)        |
| Random effects     | 0.156*                       | -0.075       | 0.010     | 0.012     | 0.021      | 0.002     | 0.041                | -             |
|                    | (9.35)                       | (-1.59)      | (1.05)    | (0.93)    | (1.40)     | (0.63)    |                      |               |
| Fixed effects      | 0.079*                       | -0.077*      | 0.009     |           |            |           | 0.771                | 21.13*        |
| Provinces and time | (5.91)                       | (-1.74)      | (0.91)    |           |            |           |                      | (0.00)        |
| Fixed effects      | 0.082*                       | -0.081*      |           | 0.009     |            |           | 0.771                | 21.35*        |
| Provinces and time | (6.40)                       | (-1.79)      |           | (0.72)    |            |           |                      | (0.00)        |
| Fixed effects      | 0.082*                       | -0.060       |           |           | 0.021      |           | 0.774                | 21.15*        |
| Provinces and time | (6.07)                       | (-1.34)      |           |           | (1.43)     |           |                      | (0.00)        |
| Fixed effects      | 0.084*                       | -0.074*      |           |           |            | 0.003     | 0.771                | 20.71*        |
| Provinces and time | (6.66)                       | (-1.68)      |           |           |            | (0.75)    |                      | (0.00)        |

Notes: Same as Table 6.

between the output growth and these four financial resources. When all provinces are grouped together for the regression analysis, the growth of both domestic loans and self-raised funds has positive impacts on the output growth. Also, the impact of self-raised funds is greater than the impact of domestic loans. When only coastal provinces are considered in the regression, three financial resources are important to the growth of coastal provinces. In the order of importance, these three resources are: domestic loans, self-raised funds and foreign investment. When only interior provinces are considered, only self-raised funds may be important to the economic growth of interior provinces.

The overall results show that state appropriation is not important to economic growth and prove that state appropriation is not efficient. Two conclusions can be derived for the rest of the three financial resources. First, the foreign investment is important only to the coastal regions in the sample period. Second, the use of domestic loans is more important to the coastal regions and the use of self-raised funds is more important to the inner regions. The first conclusion is more related to the geographic constraint and government policy. Geographically, the coastal regions are more easily accessible than the interior regions for foreign investors. Politically, when the government started the open-door policy, the special economic zones were chosen on the coastal regions. In these areas, the government can provide better investment environments with transportation and communication infrastructures. Naturally, the next step of government policy is to

encourage foreign investors to go to the inner regions. The question is whether the inner regions can provide attractive investment environments.

The second conclusion on the use of domestic loans and self-raised funds has several important policy implications. In modern enterprises, the most important financial source is from capital markets. The results indicate that the enterprises in the coastal regions came to use the funds from the capital markets, such as bank loans. This implies that the capital markets started to function in the coastal regions. For policy considerations, government needs to focus on the capital markets, such as the bank reforms and market-oriented interest rate frameworks (see, for example, EAAU 1999; Li 1994, 1997). For the inner regions, the results indicate that available financial resources are limited. Hence, the enterprises still rely on the self-raised funds. In the long run, the inner regions will follow a similar pattern of the coastal regions. The domestic loans will gradually become an important financial resource for inner regions.

In this study, the importance of stock markets cannot be identified since the financial source from stock markets is computed as a part of self-raised funds. There is no doubt that the stock market will be a major financial source, as in the USA. Therefore, both domestic loans and self-raised funds will become two major financial resources. Government's financial reforms should continue to focus on these two financial resources.

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