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Fiscal reforms, output fluctuations and the cyclical behavior of net transfers in China: Evidence from province-level panel data

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Abstract

The paper investigates the cyclical properties of interregional net transfers and their components in China over the 1952-2001 period. The findings indicate that net fiscal transfers are countercyclical and smooth idiosyncratic shocks to provincial income, but these properties differ across time and across regions. Countercyclical net transfers are determined by strongly provincial revenue and weakly procyclical expenditure. The stabilization effect is stronger in rich provinces than in poor provinces. The acyclicality of net transfers declined rapidly since the introduction of fiscal decentralization in the 1970s, and the fiscal reform of 1994 did not reverse this trend.

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1. Introduction

Since the introduction of economic reforms in the late 1970s, China has been transformed from a backward command economy into a dynamic market-oriented economy. This paper focuses on the fiscal dimension of the transition and examines the role of interregional transfers in smoothing fluctuations of regional output. The issue of fiscal transfers is of particular relevance to China mainly because the transition has been uneven both across time and across provinces as illustrated in Table 1. The regional income disparities were extremely large in the 1970s, and declined on average over the following decades. However, whereas the disparities decreased consistently over the 1980s, they were again on the rise throughout the 1990s. Even more importantly, the volatility of regional output has increased since the 1970s, creating a greater need for fiscal transfers that can cushion shocks to provincial income and minimize the risk of disintegration and social unrest in China.

Another reason for the importance of fiscal transfers is the low capital mobility across China's provinces. In general, market forces ensure that capital flows from richer to poorer regions helping the latter to grow faster and thus reducing the regional income gap. Moreover, capital markets smooth cyclical fluctuations of regional output by providing insurance against income shocks. In the United States, capital markets absorbs around 40% of shocks to state income as compared to only 14% smoothed via taxes and transfers (Asdrubali et al., 1996). In China, the fragmented and underdeveloped financial markets that emerged in the 1990s cannot yet provide a buffer against regional income fluctuations. Interregional transfers have therefore the potential to compensate for weak capital markets during the transitional period.

Two aspects of interregional transfers in China are particularly controversial. The first concerns the capability and willingness of the central government to smooth provincial income via fiscal transfers. The second aspect addresses the impact of fiscal decentralization on the ability of the central government to provide fiscal transfers. One view holds that the central government is able to minimize regional asymmetry. The increasing regional income disparities in the 1990s are blamed on the behavior of provincial governments in the course of economic reforms. As they gained more fiscal autonomy over the 1980s, regional authorities used loopholes and abused many provisions of the new fiscal system to increase their revenue leading to a strong decline in the central government's revenue (Ma, 1997). The consequence was that both transfers from rich provinces to the center and from the center to poor provinces decreased thereby contributing to the growing income gap across regions.

Another view makes the central government and its unbalanced regional development strategy responsible for the increasing income disparity between regions in China. Since the early stages of economic reforms, the center favored the idea that coastal provinces should develop first, and then help in the development of interior regions. For this purpose, the central government granted preferential treatment to coastal regions with respect to foreign investment and taxation. These policies resulted in a rapid income convergence among coastal regions that were allowed to integrate with the outside world, but the consequence was a widening income gap between coastal and interior regions (Jian, Sachs, and Warner, 1996). Moreover, the decrease in fiscal transfers from the coast to the interior was partly based on the concern of the center that heavier taxes in the richer regions would discourage growth and revenue collection. During the reform period, some interior provinces received more transfers from the center than others based on political rather than economic considerations

thus preventing income convergence among interior regions (Raiser, 1996). Consequently, the decline in the fiscal power of the center as a result of fiscal decentralization is viewed favorably since it minimizes the impact of ineffective transfers.

The controversy surrounding the role of interregional fiscal transfers in China calls for a systematic investigation in the nature of these transfers. Accordingly, the key objective of this paper is to examine their cyclical properties. Countercyclical transfers provide insurance against income shocks and smooth the fluctuations of provincial output, whereas procyclical transfers amplify the effects of shocks on provincial income. A better understanding of the cyclical behavior of fiscal transfers could help to evaluate and optimize the stabilizing effect of the central government's fiscal policy.

Interregional transfers involve transfers from the center to the provinces and remittances from the provinces to the center. Provincial governments in China have formally an extremely limited array of opportunities to save or borrow due to strict fiscal controls imposed by the central government. Net transfers, defined as transfers less remittances, are the main factor that helps balance provincial budgets. In order to determine the driving force behind the cyclical behavior of net transfers, it is, therefore, necessary to explore the response of provincial revenue and expenditure to fluctuations in output. The empirical analysis of the cyclical properties of revenue and expenditure also provides valuable insights into the impact of central control on provincial budgets via revenue assignment and the stipulation of expenditure levels. In addition, the analysis is carried out for tax revenue and capital spending to find their share in the cyclical movements of revenue and expenditure, respectively. Furthermore, the paper examines provincial extra-budgetary funds that gained particular importance during the 1980s and their impact on the fluctuations of provincial revenue.

The paper applies panel data econometrics to estimate regression coefficients which capture the response of net transfers to provincial income shocks. A distinction is made between aggregate shocks common to all provinces and idiosyncratic shocks specific to a province. The cyclical response of net transfers to both types of shocks is examined by adopting the methodology developed by Sørensen, Wu and Yosha (2001). The analysis is also carried out for two subsamples (rich and poor provinces), and differences in the extent of stabilization delivered by net transfers are discussed in the light of large disparities in regional per capita income.

Previous studies tend to focus on the reform period of the 1980s, although fiscal decentralization was initiated as early as 1958 and the fiscal reforms of the 1970s created the preconditions for the systemic changes of the following decade. In contrast, this paper relies on a comprehensive province-level data set that covers almost the entire period since the founding of the People's Republic of China (1952-2001). This approach has two advantages. First, longer sample periods including several decades yield more meaningful results with respect to cyclical patterns than periods of only few years. Second, the cyclical behavior of net transfers in different periods of China's history was shaped by various degrees of fiscal decentralization. Accordingly, the sample period is split into several subperiods, and comparisons between them reveal how changes in central policies affect the comovement of net transfers and regional output. In particular, the data set makes it possible to assess the fiscal reform of 1994 and its impact on the cyclical movements of net transfers and provincial budgets, an issue that has not been investigated empirically in previous work.

The rest of the paper is organized as follows. The next section gives an overview of fiscal relations between the center and the provinces in China. Section 3 addresses data and

measurement issues. Section 4 describes the estimated equations and presents the empirical findings. Section 5 concludes the paper.

2. Central-provincial fiscal relations in China

Despite numerous reforms, the fiscal system in China has retained certain formal features over the entire 1952-2001 period.[1] The central government has the highest budgetary authority. Although the central and provincial governments formulate their own budgets, the consolidated national budget must be approved by the central government which gives it control over fiscal policy. Accordingly, the center can achieve its policy objectives by regulating provincial revenue and expenditure through various means. On the revenue side, the center has jurisdiction over all tax bases and tax rates, and the power to decide which taxes should be assigned as revenue sources to provincial governments. In addition, it has the authority to determine the way in which revenues from certain taxes are shared between the center and the provinces. On the expenditure side, the center stipulates the level of spending on some major items in the provincial budget and sets limits on total expenditure for each province. It can also impose restrictions on the provincial spending of extra-budgetary funds and transfer expenditure responsibilities to provincial governments.

Provincial governments in China have little formal control over their revenue and expenditure, and are merely responsible for collecting revenue and remitting it to the central

[1] This section draws extensively on the description of China's fiscal system and its evolution in Donnithorne (1973) and Lardy (1975) for the 1950s and 1960s, in Oksenberg (1991) for the 1970s and early 1980s, in Wong et al. (1995) and Bahl (1999) for the 1980s and 1990s, and in Xiang (1999) for the entire 1949-1999 period.

government which in turn provides fiscal transfers. In practice, however, the central government faces a dilemma. On the one hand, it needs effective control over fiscal resources to be able to stabilize regional output. On the other hand, centralized fiscal management limits regional autonomy and has an adverse effect on the incentive of provinces to collect revenue. Attempts to resolve this conflict have dominated all fiscal reforms over the 1952-2001 period. When the central government wanted to foster rapid economic growth relying on regional initiative, it implemented fiscal decentralization by giving provinces more control over their budgets. In contrast, fiscal management was generally centralized when the revenue basis of the central government was eroded or when regional autonomy was perceived as threat to national unity.

The 1952-2001 period can be divided into several subperiods characterized by different levels of fiscal decentralization. In 1950, soon after the founding of the People's Republic of China, the central government imposed a system of total fiscal centralization. Provinces were required to remit all their revenues to the center and all their expenditures were approved by the center on an item-by-item basis. Between 1951 and 1957, the economic system in China was gradually transformed into a Soviet-style planned economy. During this period, fiscal revenue was divided into three categories. Fixed central revenue was collected in the provinces and remitted to the center, including mainly profits from state enterprises owned by the center, customs duty, and revenue from central taxes. Fixed provincial revenue was collected and retained by the provinces, and came mainly from profits of provincially-owned state enterprises as well as from taxes designated by the center as provincial revenue. The third category represented revenue which was shared between the center and the provinces. In the case of a budget deficit, the revenue-sharing rates were adjusted so as to balance the

provincial budget.

Between 1958 and 1960, the central government transferred broad fiscal powers to the provinces as the Maoist economic strategy which emphasized rapid economic growth ("Great Leap Forward") prevailed over the Soviet model of centralized planning. Provincial revenue was now expanded to include not only provincial taxes but also a portion of resources that were previously under the exclusive control of the center. Most centrally-owned state enterprises were transferred to provincial management, their profits along with the revenue from central taxes and provincial budget surpluses were now pooled together and shared at a rate set annually by the center. In addition, the center assigned the majority of expenditure categories to the provinces with the exception of national defence and some major infrastructure projects.

As the "Great Leap Forward" ended in 1961, the center regained ownership of some state enterprises and imposed total fiscal centralization during the chaos of the "Cultural Revolution" in the late 1960s. The 1970s were characterized by new attempts of the central government to enhance fiscal effort in the provinces. However, the process of fiscal decentralization during this period was marked by diverse, experimental and short-lived fiscal regimes (Oksenberg and Tong, 1991). In 1971 most revenue and expenditure categories were transferred again to the provinces. In turn, they remitted a fixed amount of revenue to the center or received a lump-sum subsidy from the center, depending on their budgetary projections. Provinces were allowed to keep revenue in excess of the target, but were also responsible for deficits exceeding the subsidy. The serious erosion of central revenue that followed prevented the center from effective implementation of redistribution and stabilization policies. In response, the center retained most of the above-target revenue in 1974-75 and replaced the

lump-sum regime in 1976 with the old system of pooling all revenue together and sharing it at an annually adjusted rate. One of the key features of fiscal decentralization in the 1970s was that the central government no longer stipulated provincial expenditures item by item, but imposed instead an overall spending ceiling which gave provinces discretion over the structure of their expenditure.

Between 1977-79 selected provinces were allowed to experiment with different fiscal regimes, and their successful experiences were incorporated in a new wave of fiscal reforms introduced in 1980. Over the 1980-1993 period, when the economy underwent deep structural changes, the fiscal authority of provincial governments increased rapidly. The mandatory targets for provincial expenditure levels stipulated by the center were replaced with reference targets. Revenue was again divided into fixed central, fixed provincial, and shared categories. However, instead of the previously uniform fiscal regime, several different revenue-sharing arrangements were implemented simultaneously to account for the various budgetary conditions across provinces. For instance, poor regions with budget deficits were allowed to keep all their revenues from provincial and shared taxes, and received a fixed subsidy from the center to close the budgetary gap. Other provinces with a budget surplus were able to retain a fixed percentage of their revenue from shared taxes, but had to remit the rest to the center. In principle, these fiscal arrangements were fixed for several years which was supposed to give provinces more certainty about future revenue. But in reality they were revised repeatedly as a result of intensive lobbying efforts by provinces. The fiscal authority of the center was further undermined by attempts of provincial governments to keep as much revenue as possible in their locality. This was achieved by offering unauthorized tax concessions and exemptions to local enterprises, and allowed provinces to control the effective tax rates and

tax bases, although these were under the jurisdiction of the center (Ma, 1997). Moreover, provinces channelled revenue from local fees, surcharges and other sources not sanctioned by the center into extra-budgetary accounts that were not subject to central control.

The revenue of the central government eroded rapidly as a result of the increasing fiscal decentralization in the 1980s, and that, in turn, affected seriously its ability to provide transfers. The center responded by random adjustments of the revenue-sharing arrangements which did not change the situation fundamentally except that they had an adverse effect on the tax mobilization in the provinces. In 1994, the central government implemented a comprehensive reform of the fiscal system in an effort to recentralize fiscal resources. The various fiscal arrangements were phased out gradually in favor of a uniform regime. Provinces were now allowed to retain the revenue from the income tax of local enterprises thus eliminating incentives to grant unauthorized tax concessions. The revenue from a uniform value-added tax became the single major item shared between the center and each province. The share of the center was set at 75% , but provinces were guaranteed that their total revenues would not fall below the 1993 level in nominal terms for a transition period which was still in effect in 2001. For this purpose, the central government established a system of compensation payments, and tax revenues were transferred back to the provinces as needed. The 1994 reform increased the revenue base of the central government over the following years and provided it again with more control over the fiscal system, but the impact of the reform on interregional transfers has not yet been examined empirically.

3. Data and measurement issues

The empirical analysis is based on annual data for the 29 Chinese provinces in the period 1952-2001. Two additional provinces (Hainan and Chongqing) were treated as parts of the provinces from which they were separated (Guangdong and Sichuan, respectively). The main source for provincial data for the period 1952-1998 is the *Comprehensive Statistical Data and Materials on 50 Years of New China* (1999). For the years 1998-2001 data was collected from various issues of the *Finance Yearbook of China* and the *Statistical Yearbook of China*. In the few cases where the aforementioned sources could not provide consistent series, data was obtained from provincial statistical yearbooks.

All variables used in the empirical analysis are measured in per capita terms and are expressed in 1985 constant prices by deflating them with the general consumer price index. There are several issues with the definition and measurement of the variables by Chinese statistical authorities that need to be addressed. In contrast to international practice, subsidies to state enterprises in China are treated as negative revenue rather than expenditure, however due to a lack of data for the sample period no attempt has been made to adjust the official figures. The resulting understatement of revenue and expenditure has no impact on the cyclical behavior of net transfers, but could lead to an underestimation of the cyclical response of revenue and expenditure.

Furthermore, tax revenue by province is reported in the data sources as a category of provincial revenue. However, tax revenue is calculated on a collection basis, and thus represents the amount of taxes collected in the province rather than taxes assigned as provincial revenue. The consequence is that tax revenue defined in this way may exceed provincial

revenue, and is likely to overstate the cyclical response of provincial taxes.

On the balance sheet of provincial governments, revenue is defined as the amount of taxes, fees and enterprise profits collected and retained by the province. Revenue collected in the province and remitted to the center as well as transfers from the center are excluded. The provincial budget is always balanced once remittances to the center are added to expenditure and transfers are added to revenue. These definitions allow net transfers to be calculated as the difference between provincial expenditure and revenue, a measure also used by Raiser (1996) and Knight and Li (1999). If total revenue exceeds total expenditure, the difference represents a net remittance to the center. If, on the other hand, total expenditure is bigger than revenue, then the province receives a net transfer from the center.

The literature on China usually makes the distinction between coastal and interior provinces. In general, coastal provinces have experienced rapid economic growth and have achieved high per capita income levels because they were allowed to use their favorable location to develop dynamic export industries and to attract foreign direct investment. In contrast, interior regions have not been well integrated into the world economy and remain relatively poor. Although the majority of coastal provinces have been in fact the wealthiest, the purely geographic division results in some anomalies, such as counting the rich region of Beijing as interior and the poor province of Guangxi as coastal. Instead, provinces here are classified as rich or poor according to their average real per capita GDP over the 1952-2001 period.

4. Estimation results

4.1. Net transfers

To capture the cyclical properties of net transfers empirically, it is necessary to estimate the response of net transfers to changes in provincial output. The corresponding regression equation is given by:

$$\Delta NT_{it} = \alpha_t + \gamma_i + \beta \Delta GDP_{it} + \varepsilon_{it} \tag{1}$$

NT_{it} denotes net fiscal transfers between the central government and province i in year t. In particular, net transfers, calculated as provincial expenditure less revenue, are positive when a province receives more from the center than it remits which is the case when provincial expenditure exceeds revenue. GDP_{it} stands for the GDP of province i in year t. Both variables are expressed in real per capita terms and are used in first-difference form to ensure their stationarity.

Sørensen, Wu and Yosha (2001) who examine the cyclical behavior of budget surpluses of U.S. state and local governments show that in order to estimate the reaction of regional budgets to idiosyncratic shocks to regional output, it is important to control for factors leading to income variations that are common to all regions. This is done by including time-fixed effects denoted by α_t in the model. These dummy variables for every year of the sample period capture all aggregate changes over time caused, for instance, by variations of China's GDP or by the fiscal and monetary policy of the central government. The model is estimated with and without time-fixed effects to demonstrate the different implications

of the central government's fiscal policy during nationwide and province-specific downturns. The region-fixed effects denoted by γ_i represent dummy variables for each province and control for any cross-sectional variation that is constant over the sample period, such as the relative size of a province. The regression coefficient β measures the change of net transfers in response to a change in provincial GDP. A positive β signals that net transfers from the center to provinces are procyclical, whereas a negative β suggests that the center provides countercyclical interregional net transfers that smooth provincial income fluctuations.

The estimation results, presented in the first column of Table 2, indicate that net transfers in China are statistically significantly countercyclical. Over the 1952-2001 period, for every decrease in provincial income by 100 yuan, net transfers from the center to provinces increase on average by 6 yuan. When time-fixed effects are not included, net transfers become procyclical, a sign that they react differently to aggregate shocks. These results imply that net transfers provide stabilization of regional output fluctuations during province-specific downturns, however during nation-wide slumps the center is less generous in offering financial resources to the regions.

The variables expressed in first differences were defined so far as the level of the variable in year $t+1$ less its level in year t. To examine the dynamic response of net transfers in the years following the idiosyncratic shock to provincial income, it is necessary to manipulate this differencing frequency. In particular, to find out the net response of net transfers over the period of 2 years after an income shock, net transfers as well as income are expressed as the difference between their level in year $t+2$ and year t. The results from increasing the differencing frequency gradually from 1 to 5 years are reported in Table 2. The estimate of the coefficient β declines by half from the 1-year to the 3-year differencing frequency and

is not significantly different from zero in the fourth year, suggesting that the stabilization provided by net transfers decreases rapidly after the shock to provincial income. When time-fixed effects are not included, the response of net transfers increases in magnitude over the periods following the shock and reaches its maximum only 9 years later. It can be concluded that net transfers in China react extremely slowly to aggregate shocks.

The cyclical behavior of net transfers is also examined for different subperiods. It is evident from the first column of Table 3 that net transfers retained their countercyclical pattern in every period. The initial fiscal decentralization between 1958-60 seems to have witnessed an increase in the acyclicality of net transfers.[2] During this period, the profits of state enterprises owned previously by the center were assigned to provincial governments and boosted their revenue. The resulting budget surpluses were shared with the center leading to remittances from the regions in a period of rapid economic growth. During the 1960s provinces received on average 38 yuan in net transfers for every 100 yuan decrease in their output. This share fell to 23 yuan in the 1970s and 5 yuan in the 1980s.

The steady decline in the magnitude of countercyclical net transfers is probably associated with the simultaneous increase in fiscal decentralization. In the 1960s, the disastrous economic consequences of the "Great Leap Forward" and the chaos of the "Cultural Revolution" prompted the central government to impose fiscal centralization and total control over provincial budgets. This boosted the fiscal power of the center and provided it with the levers and resources necessary to stabilize provincial income. The decentralization experiments of the 1970s, and to a much greater extent the system of fiscal contracts in the

[2]Due to the extremely brief period between 1958 and 1960, the cyclical behavior of net transfers is examined by comparing the estimated coefficients for the periods 1952-1957 and 1952-1960.

1980s, weakened the fiscal position of the center and decreased its ability to smooth cyclical movements of provincial income via net transfers.

After 1994, net transfers were not significantly correlated with changes in provincial output. This is surprising, since the rational of the 1994 fiscal reform was to restore the fiscal power of central government after years of excessive decentralization, so that it can again provide regional stabilization. In addition, the value-added tax became the major revenue category shared between the center and the provinces after 1994. Value-added taxes react relatively quickly to changes in economic activity and should, therefore, have a smoothing effect. One reason for the low sensitivity of net transfers could be the guarantee by the center for the years after 1994 that provincial revenue will not decrease below its 1993 level. The transfers invoked by this transitional arrangement might have offset the stabilizing effect of taxes. Another reason could be related to problems in the tax administration. After 1994, the center established tax offices in every province that were supposed to collect central and shared taxes under the direct control of the central government. This enormous structural reorganization might have created longer tax collection lags implying that the response of taxes to an income shock showed up only years later.

Given the large regional income disparity in China, it is of great interest to test whether net transfers exhibit different cyclical patterns for rich and poor provinces. To address this issue, slope dummies are introduced in the panel regression as follows:

$$\Delta NT_{it} = \alpha_t + \gamma_i + \beta_1 D_i \Delta GDP_{it} + \beta_2 (1 - D_i) \Delta GDP_{it} + \varepsilon_{it} \tag{2}$$

D_i is a dummy variable which is 1 if province i is rich and 0 otherwise. The results

presented in the second and third columns of Table 3 reveal key differences between the two groups. The net transfers for both rich and poor provinces are countercyclical, however their regression coefficients differ strongly in magnitude. Over the 1952-2001 period, rich provinces received 9 yuan from the central government in response to a 100 yuan decrease in their per capita GDP, whereas poor provinces received only 1 yuan, an estimate which was not even statistically significant. The fiscal policy of the central government appears to have benefited the wealthy regions by smoothing shocks to their output, but has failed to stabilize the output fluctuations in poor provinces.

The net transfers for rich provinces are significantly countercyclical in every period, and follow the overall pattern of the entire sample with a peak in the 1960s and a gradual decline in magnitude over the following decades. Net transfers to poor provinces do not deviate from this pattern as well, except in the period after 1994 when they exhibit strong and significant procyclical movements. This is most likely related to the provisions of the 1994 fiscal reform that required provinces to remit 75% of their revenue from value-added taxes to the center. This measure worsened the deficit position of poor regions relative to rich provinces, because the former were used to keep their tax revenue for decades. The transfers by the center to close these budget deficits and to secure the previously guaranteed revenue level of 1993 might have crowded out the smoothing offered by value-added taxes. This is supported by evidence presented in the next section indicating that after 1994 the expenditure in poor provinces reacted much stronger to regional output fluctuations than revenue.

Another possible reason for the strong positive correlation between net transfers and output in backward regions is related to the attempts of the center in the late 1990s to speed up the economic development of poor interior provinces, especially those in Western China,

with the aim to lessen the regional income gap but also to appease separatist movements by ethnic and religious minorities. Since the transfers were designed as an equalizing rather than stabilizing mechanism, it is possible that poor regions received these additional funds from the center during a province-specific upturn, thus contributing to the procyclical behavior of net transfers.

4.2. Provincial revenue and expenditure

Since net transfers depend on the size of the provincial budget deficit or surplus, the fluctuations of revenue and expenditure determine the cyclical behavior of net transfers. This section examines the response of revenue and expenditure to cyclical movements of provincial output by estimating the following regressions:

$$\Delta REV_{it} = \alpha_t + \gamma_i + \beta \Delta GDP_{it} + \varepsilon_{it} \tag{3}$$

and

$$\Delta EXP_{it} = \alpha_t + \gamma_i + \beta \Delta GDP_{it} + \varepsilon_{it} \tag{4}$$

REV_{it} is defined as budgetary revenue of province i in year t. It represents revenue left in the province after remittances to the center and excludes transfers from the center. EXP_{it} stands for provincial expenditure. All specifications of the model including first differences, time-fixed effects and region-fixed effects are the same as for Eq. (1).

The results from estimating Eq. (3) and (4) are summarized in Table 4. It is evident that over the 1952-2001 period provincial revenue and expenditure are both procyclical with revenue exhibiting a stronger procyclical response to output changes than expenditure.

This result holds regardless of whether aggregate output shocks are controlled for, however the procyclical response of revenue becomes weaker and the response of expenditure stronger when time-fixed effects are not included. Furthermore, there is a major difference in the dynamic reaction of revenue and expenditure. When time-fixed effects are included, the response of expenditure becomes gradually stronger and peaks at the 4-year differencing frequency, whereas the response of revenue peaks at the 2-year frequency and declines continuously thereafter. This pattern is responsible for the countercyclical reaction of net transfers in the years following the output shock. As the responses of revenue and expenditure get closer in magnitude at the 4-year frequency, the smoothing effect of net transfers almost vanishes. When time-fixed effects are not included, the responses of both revenue and expenditure become weaker over time, but the decline of revenue is much larger. At the 5-year frequency expenditure reacts stronger than revenue resulting in a reversal from countercyclical to procyclical net transfers.

As can be seen in Table 5, when examined by period revenue raised for each additional 100 yuan of income decreases continuously since its peak of 54.1 yuan in the 1960s. In the 1970s, an increase in GDP of 100 yuan results in additional revenue of 35.4 yuan. A decade later, this share is down to 9.4 yuan, but increases to 14.3 yuan in the 1990s. Provincial expenditure follows a similar pattern and is also higher during upturns, however in contrast to revenue the magnitude of its procyclicality is weaker except for the period after 1994. The combination of strongly procyclical revenue and relatively weakly procyclical expenditure determines the countercyclical behavior of net transfers.

Table 5 displays also the results for rich and poor provinces estimated from panel regression (3) and (4) by including slope dummies as in Eq. (2). Over the 1952-2001 period, for

every 100 yuan of additional revenue, rich regions were able to collect 15.5 yuan in local revenue and were spending 6.2 yuan. Poor provinces were equally able to collect 15.2 yuan, but were spending 13.9 yuan. For rich provinces, the additional 9 yuan raised in excess of their own revenue were turned over to the central government. In comparison, poor provinces remitted only 1.4 yuan. These numbers match their corresponding net transfers in Table 3. Revenue and expenditure of the two groups of provinces exhibit similar patterns over the subperiods. The procyclicality of expenditure for poor provinces is stronger in magnitude than for rich provinces in every period. On the other hand, rich provinces were able to collect more revenue from each 100 yuan of additional output in the 1960s and 1970s, but were outperformed by poor provinces in the 1980s and 1990s.

The major goal of fiscal decentralization in the 1970s and 1980s was to encourage regional governments to collect more revenue. The results suggest, however, that provincial revenue responded increasingly less vigorously to output fluctuations. One possible reason is that by focusing only on budgetary revenue the funds collected in the provinces and channelled in extra-budgetary accounts are neglected, leading to an understatement of the cyclical response of total revenue. Extra-budgetary revenue gained rapidly in importance in the 1980s, and may have also been sensitive to the movements of provincial output. To test this, the cyclical responses of extra-budgetary revenue and expenditure are estimated using Eq. (3) and (4). The sample period is reduced to 1986-1992, since data by province are not available for the first half of the 1980s, and extra-budgetary revenue and expenditure decreased substantially in the wake of the 1994 fiscal reform.

The estimates shown in Table 6 indicate that extra-budgetary revenue is, in fact, significantly procyclical with respect to province-specific output fluctuations. This means that at

the height of fiscal decentralization in the late 1980s and early 1990s budgetary revenue's procyclical movements became weaker because provinces were collecting more revenue outside of the official budget during regional upturns. The consequence is that extra-budgetary revenue amplified the volatility of total revenue and would have required more net transfers to achieve the same amount of smoothing. Extra-budgetary expenditure is also procyclical, but significantly so only with respect to output fluctuations caused by aggregate shocks which might be associated with the controls imposed by the central government for all provinces. If time-fixed effects are not included, the cyclical responses of budgetary revenue and expenditure remain unchanged, but their extra-budgetary counterparts react stronger. It is likely that during nation-wide upturns, the center imposes less restrictions on the collection and usage of extra-budgetary funds, and provincial governments take this opportunity to increase their revenue and expenditure outside of the official budget.

Extra-budgetary funds provide only a partial explanation of why the procyclicality of provincial revenue does not decline in magnitude by as much as budgetary revenue suggests. An additional reason could be the fact that profits of state enterprises owned by the provincial government were a large source of revenue in the 1960s. As the enterprise autonomy widened in the 1980s, direct governmental control over profits was gradually reduced and replaced with taxes which represented only a fraction of profits. It is, therefore, the transition towards a market economy that may have brought the additional revenue collected for every increase in regional income to levels more appropriate for a decentralized market-oriented economy. The next section looks into the cyclical response of taxes and provides supportive evidence for this argument.

Another factor that might have led to the ever weaker reaction of revenue is the random

intervention of the central government during the process of fiscal decentralization which dampened revenue mobilization efforts in the regions. For instance, fiscal contracts were supposed to provide steady flows of revenue to provinces as well as planning security for several years but were changed frequently instead. During the 1980s, provinces were also required to turn over random amounts of loans to the central government which were never repaid (Wong et al., 1995). Moreover, the higher marginal tax rates faced by many rich provinces served as further deterrent to revenue-raising efforts (Knight and Li, 1999).

Besides its role in determining the cyclical behavior of interregional transfers, expenditure has the potential to smooth per capita income within a given province, if during region-specific downturns the spending on public goods and social welfare increases. In other words, provincial expenditure offers insurance against regional income fluctuations if it varies countercyclically. The results in Table 5 show, however, that provincial expenditure is procyclical. The spending levels at the regional level, especially for social welfare, have always been strictly controlled by the central government. One goal of the fiscal policy of the center is to harmonize spending on public services within and between regions. A possible explanation for the procyclicality of provincial expenditure is that during upturns the central government stipulates higher levels of spending to ensure equal access to public goods and social benefits at the county level within a province. In addition, interregional equalization is achieved, if during upturns poor provinces are required by the center to spend more than rich provinces. The coefficients in the last two columns of Table 5 indicate that this was, in fact, the case. The procyclical response of provincial expenditure for poor regions is much stronger than for rich regions, and remains comparatively constant in every period. Moreover, the amount of spending for each increase in income is less volatile than revenue for

both groups of provinces in almost every period. This means that the expenditure controls imposed by the central government were also successful in absorbing shocks to provincial revenue. Therefore, it is not surprising that the weakest procyclical response of provincial expenditure for both groups of provinces was in the period of fiscal decentralization in the 1980s, when spending controls were relaxed as the fiscal power of the central government declined. After 1994, the magnitude of expenditure's procyclical movements in poor provinces reached its highest level ever as the backward regions received development subsidies and guaranteed transfers to secure their revenue levels. Combined with a relatively weak cyclical response of revenue, this resulted in the strongly procyclical variation of net transfers for poor provinces over the 1994-2001 period, as indicated in the previous section.

Another possible reason for the procyclicality of provincial expenditure is that capital spending, the largest item on the expenditure side of provincial budgets, is higher during province-specific upturns. This is an important issue because if capital spending is regarded as investment, it smooths provincial income if it varies procyclically, and is thus likely to overstate the procyclicality of expenditure. The next section returns to this question and demonstrates that capital spending is in fact procyclical, but explains only around one third of the cyclical response of expenditure.

4.3. Tax Revenue and Capital Spending

The empirical analysis so far determined that the countercyclical behavior of net transfers is the result of procyclical revenue and expenditure with the former dominating the latter in magnitude. To understand the driving force underlying the positive correlation of revenue

and expenditure with output fluctuations, it is important to examine the cyclical behavior of their major components. The two largest categories of provincial revenue and expenditure are taxes and capital construction, respectively. In contrast to the interprovincial nature of net transfers, the properties of provincial taxes and capital spending provide insights into how income shocks are smoothed within a province. Since the central government assigns taxes, sets tax rates and stipulates expenditure levels in the provincial budgets, the cyclical behavior of taxes and capital spending allows also to evaluate the regional fiscal policy conducted by the center.

4.4. Tax revenue

In order to provide cushion against income shocks, taxes need to be procyclical so that disposable income is high during downturns and low during upturns. The procyclical behavior of taxes depends on the degree of their sensitivity to income fluctuations. For instance, personal income tax and enterprise income tax react quicker to changes in income than indirect taxes such as the value-added tax. However, direct taxes came into existence only after the introduction of market reforms in the 1980s, whereas indirect taxes have been the major source of provincial revenue since the 1950s.

Personal income tax was introduced in China in 1980, but became effective only in 1986 (Li, 1991). It is however still a relatively small part of total provincial revenue accounting for around 10% in 2001 (Ministry of Finance, 2002). Moreover, the revenue from personal income tax was not shared with the central government and accrued completely to the provincial government until 1999. It, therefore, provided income smoothing within the province but

not across provinces.

Prior to the 1980s, state enterprises were controlled and managed by the government. Profits were directly remitted to the government budget and losses were covered by subsidies from the budget. In an attempt to improve the efficiency of state enterprises, the full profit remittance was substituted with an enterprise income tax during the 1980s. The revenue from this tax accounted for around 12% of total provincial revenue in the 1990s (Ministry of Finance, 2002). State enterprises were also subject to an indirect tax, the "industrial and commercial tax", which was imposed in the 1950s. This tax was a convenient way to secure prompt and regular flows of profits into the government budget, and was also used to control prices and profit levels through modifying tax rates. In the early 1980s, the "industrial and commercial tax" was replaced by three indirect taxes (product tax, value-added tax and business tax). In the 1990s, the revenue from the value-added tax and the business tax represented on average above 50% of provincial revenue (Ministry of Finance, 2002).

To analyze the cyclical response of taxes to provincial output, the data is fitted to Eq. (1) with taxes as the dependent variable. The results for the entire sample as well as for the subsamples are presented in the first three columns of Table 7. It is evident that taxes are significantly procyclical across all subperiods and groups of provinces. The difference between rich and poor provinces appears to be minimal, mainly because indirect taxes are much more important than income taxes in China. Over the 1952-2001 period, for every increase in provincial income by 100 yuan, tax revenue increased on average by 9.4 yuan which represents about two thirds of the increase in total provincial revenue. In the 1960s, however, budgetary revenue increased by 54 yuan as opposed to only 13 yuan for tax revenue. The difference is accounted for by direct profit remittances from state enterprises which were

the largest source of budgetary revenue. Although the procyclical response of taxes declined in the 1970s and 1980s, the proportion of its contribution to the procyclical behavior of provincial revenue increased as enterprises switched from profit remittance to tax payments. In the 1980s, tax revenue accounted for 70% of the comovement between provincial revenue and output.

After 1994, the share of taxes in the cyclical response of budgetary revenue reaches levels close to 100% . Besides the increasingly important role of enterprise taxes, the stronger procyclical response of taxes as compared to previous periods might be an indicator for the growing influence of personal income taxes and value-added taxes. The results, however, should be interpreted with caution. As explained in Section 3, taxes are calculated on collection basis, and thus exhibit a stronger procyclical response than revenue, especially in the 1990s. Nevertheless, it is clear that the centrally administrative system with its total control over economic activity has given way to a market-oriented system where economic policy relies increasingly on taxes.

4.5. Capital spending

Capital construction expenditure includes the spending of the provincial government on building new roads, schools, hospitals, industrial plants and residential facilities as well as on purchasing the necessary equipment. Another category, enterprise innovation expenditure, includes spending on renewal and replacement of existing assets of state enterprises, but due to a lack of consistent time series for all provinces over the sample period, this category is not included in the analysis.

The results from running the regression in Eq. (1) with capital expenditure as dependent variable are presented in the last three columns of Table 7. Capital spending is procyclical and explains around 30% of the procyclical response of budgetary expenditure for the 1952-2001 period. This share is 20% for rich provinces, and declined from 60% in the 1970s to around 13% in the 1990s. Capital spending plays a much more important role in poor provinces, where it is responsible for about half of expenditure's procyclical fluctuations in most of the subperiods.

Capital spending is regarded as consumption when it involves, for instance, the construction of public housing or a new office building for the provincial party committee. If, on the other hand, capital spending goes to infrastructure projects and the construction of state enterprises, it counts as investment. The difference matters, because in order to smooth regional per capita income within a province, spending on consumption must vary countercyclically, whereas investment must behave procyclically. The results in Table 7 indicate that capital spending is procyclical, but it is impossible to know the proportions of consumption and investment. Nevertheless, it can be concluded that capital spending in China provides a certain amount of insurance against regional income fluctuations. This could result in an overstatement of the procyclical reaction of provincial expenditure which in Section 4.2 was implicitly assumed to consist of spending on public goods and social welfare, and was thus regarded as consumption. However, since capital spending explains only a third of the cyclical behavior of expenditure for all provinces, it has no serious consequences for the conclusion that regional expenditure varies procyclically.

5. Concluding remarks

Interregional net transfers have the potential to smooth provincial income and to compensate for missing interregional insurance markets. The paper finds that over the 1952-2001 period net transfers in China are countercyclical and absorb idiosyncratic shocks to provincial income. However, the extent of smoothing differs across provinces and across periods. Rich provinces were overall the greater beneficiaries of regional stabilization. They were better insured against fluctuations of their income than poor province, because a large fraction of each increase in locally collected revenue was remitted to the center.

The paper also offers new insights into the controversy on the impact of fiscal decentralization. The results indicate that during periods of fiscal decentralization interregional transfers provide a much smaller amount of income smoothing. By using a long sample period, the paper shows that the acyclicality of net transfers began declining not with the start of market reforms in the 1980s, but already in the 1970s when the first decentralization measures were implemented. In the period after 1994, interregional transfers not only did not compensate for the weak capital markets but ceased to offer any buffer against provincial income shocks, although the fiscal power of the center had been restored. This suggests that as the transition towards a market economy intensifies, the central government has not yet been able to design net transfers that could replace its fading fiscal controls over provincial budgets and provide effective smoothing of regional income.

A topic for further research could be to compare the cyclical patterns of net transfers in China with those of other large economies with vast regional income disparities, most notably Russia and India. Differences in their approach to fiscal decentralization could offer

valuable insights into the impact of various institutional arrangements and fiscal mechanisms on regional stabilization, which in turn could help improve the insurance properties of net transfers in other transitional economies.

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Table 1: Coefficients of variation in provincial per capita output (in percent)

Period	Variation across regions	Variation across time
1952-59	90.0	20.6
1960-69	76.5	18.7
1970-79	91.7	14.4
1980-90	73.3	20.2
1991-2001	67.2	24.1

Note: The coefficient of variation is calculated as the ratio of the standard deviation of provincial per capita GDP to the unweighted average thereof. The reported coefficients of variation are averages over the given periods.

Table 2: Cyclical patterns of net transfers by the central government in China, 1952-2001, for various differencing intervals

Interval	1 year	2 years	3 years	4 years
With time-fixed effects:				
1952-2001	-0.059	-0.062	-0.034	-0.009
	(-6.76)	(-7.61)	(-4.44)	(-1.20)
Without time-fixed effects:				
1952-2001	0.030	0.042	0.048	0.053
	(4.68)	(8.47)	(13.15)	(17.18)

Note: The reported coefficients are the estimates of β from panel regression (1). t-statistics in parenthesis. The columns report the estimates for the 1-, 2-, 3- and 4-year differencing frequencies.

Table 3: Cyclical patterns of net transfers for different subperiods and groups of provinces

Provinces	All	Rich	Poor
1952-2001	-0.059	-0.090	-0.014
	(-6.76)	(-7.77)	(-1.06)
1952-57	-0.025	-0.046	-0.003
	(-2.03)	(-2.37)	(-0.13)
1952-60	-0.104	-0.150	-0.036
	(-2.43)	(-2.76)	(-0.49)
1961-69	-0.378	-0.427	-0.308
	(-21.49)	(-17.69)	(-18.67)
1970-79	-0.229	-0.311	-0.094
	(-6.92)	(-7.09)	(-1.92)
1980-93	-0.048	-0.037	-0.057
	(-4.41)	(-2.11)	(-3.98)
1994-2001	0.006	-0.018	0.069
	(0.32)	(-0.68)	(2.35)

Note: The coefficients reported in the first column are the estimates of β from panel regression (1) with time-fixed effects. The coefficients in the second and third columns are the estimates from panel regression (2) of β_1 and β_2, respectively. t-values in parenthesis.

Table 4: Cyclical patterns of provincial revenue and expenditure for various differencing intervals

Interval	1 year	2 years	3 years	4 years	5 years
Budgetary Revenue:					
With time-fixed effects:					
1952-2001	0.156	0.153	0.126	0.102	0.081
	(17.08)	(16.58)	(14.61)	(12.78)	(10.70)
Without time-fixed effects:					
1952-2001	0.126	0.111	0.083	0.057	0.037
	(17.19)	(17.03)	(14.58)	(11.83)	(9.20)
Budgetary Expenditure:					
With time-fixed effects:					
1952-2001	0.103	0.104	0.112	0.118	0.118
	(17.00)	(19.78)	(23.07)	(26.06)	(27.57)
Without time-fixed effects:					
1952-2001	0.140	0.139	0.131	0.119	0.106
	(23.51)	(25.92)	(26.61)	(26.10)	(25.11)

Note: The reported coefficients are the estimates of β from panel regressions (3) and (4). The columns report the estimates for the 1-, 2-, 3-, 4- and 5-year differencing frequencies. t-values in parenthesis.

Table 5: Cyclical patterns of revenue and expenditure for different groups of provinces

Category	Revenue			Expenditure		
Provinces	All	Rich	Poor	All	Rich	Poor
1952-2001	0.156	0.155	0.152	0.103	0.062	0.139
	(16.91)	(11.74)	(11.93)	(16.84)	(7.26)	(17.26)
1952-1957	0.056	0.059	0.055	0.026	-0.005	0.053
	(6.60)	(4.17)	(5.06)	(3.07)	(-0.42)	(5.07)
1952-1960	0.100	0.096	0.187	0.054	0.033	0.121
	(3.18)	(2.14)	(4.89)	(3.32)	(1.68)	(4.18)
1961-1969	0.541	0.580	0.461	0.126	0.116	0.149
	(36.08)	(24.53)	(27.96)	(16.85)	(13.15)	(10.20)
1970-1979	0.354	0.416	0.225	0.106	0.081	0.135
	(11.60)	(10.35)	(4.83)	(7.49)	(4.23)	(6.45)
1980-1993	0.094	0.069	0.106	0.032	0.021	0.044
	(8.53)	(3.75)	(7.36)	(3.09)	(1.49)	(2.94)
1994-2001	0.143	0.125	0.196	0.152	0.108	0.283
	(9.05)	(6.13)	(7.52)	(10.16)	(5.04)	(11.17)

Note: The reported coefficients are the estimates of β from panel regressions (3) and (4). Time-fixed effects included. t-values in parenthesis.

Table 6: Cyclical patterns of budgetary, extra-budgetary and total revenue and expenditure, 1986-1992

Interval	With TF	No TF
Budgetary Revenue	0.099	0.103
	(6.92)	(7.40)
Extra-Budgetary Revenue	0.029	0.054
	(3.74)	(12.18)
Total Revenue	0.129	0.154
	(12.69)	(8.04)
Budgetary Expenditure	0.015	0.019
	(1.42)	(3.01)
Extra-Budgetary Expenditure	0.009	0.035
	(0.94)	(5.97)
Total Expenditure	0.019	0.054
	(1.59)	(5.55)

Note: The reported coefficients are the estimates of β from panel regressions (3) and (4). t-values in parenthesis.

Table 7: Cyclical patterns of provincial tax revenue and construction spending for different groups of provinces

Category	Tax Revenue			Construction Spending		
Provinces	All	Rich	Poor	All	Rich	Poor
1952-2001	0.094	0.095	0.092	0.031	0.012	0.054
	(19.56)	(13.22)	(14.24)	(9.11)	(2.70)	(10.87)
1952-1960	0.095	0.105	0.102	0.028	-0.002	0.081
	(5.89)	(4.38)	(4.82)	(1.68)	(-0.10)	(3.11)
1961-1969	0.134	0.133	0.132	0.068	0.062	0.082
	(37.45)	(22.43)	(31.56)	(14.76)	(11.36)	(8.31)
1970-1979	0.098	0.111	0.075	0.060	0.049	0.072
	(12.82)	(9.84)	(7.55)	(5.58)	(3.52)	(4.27)
1980-1993	0.065	0.067	0.060	0.011	0.004	0.023
	(9.92)	(7.67)	(6.27)	(2.30)	(0.68)	(2.90)
1994-2001	0.144	0.135	0.151	0.038	0.016	0.096
	(7.90)	(5.59)	(5.32)	(5.71)	(2.09)	(8.07)

Note: The reported coefficients for all provinces reported in the first and fourth columns are the estimates of β from panel regressions (1) with taxes and capital spending as dependent variables, respectively. Similarly, the coefficients for the subsamples are estimates from panel regression (2). t-values in parenthesis.