

Evaluating the Welfare Change of Economic Reform in China: A Consumption Based Approach*

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(First Version: Comments are Welcome)

Abstract

This paper employs the consumption based model to conduct welfare analysis and policy evaluation for economic reform initiated in 1979 using the national and provincial consumption data. We find that (1) the welfare gain from eliminating consumption volatility at provincial level is higher than that at national level due to the market incompleteness at the provincial level; (2) the welfare cost of consumption volatility is higher for provinces in the eastern region where the consumption volatility is higher; (3) the welfare gain of extra 1% consumption gain is higher for provinces in western region where the consumption growth is lower. The policy evaluation shows that the economic reforms improve the welfare through both reducing the business cycle fluctuation and enhancing growth. In particular, the reforms reduce a large portion the welfare cost from business cycle fluctuation such that further gain in this margin is limited. Therefore, the government should focus on increasing economic growth in the current development plan.

Keywords: Welfare, Business cycle, Growth, Reform, Policy Evaluation, China.

JEL classifications: C68, E21, R13.

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1 Introduction

China has experienced a fast economic growth since 1980 and the living standard of people in mainland China have been improving dramatically. There are discussions on long-run growth (Maddison, 1998) and the income inequality due to the unbalanced growth between urban and rural and inland and coastal area (Kanbur and Zhang, 2005). However, existing literature do not provide a measure of welfare change due to the market reform. Observing that, starting from 1979, consumption exhibits quite different pattern due to the market reform, we use the method proposed in Lucas (1987) to evaluate the welfare change due to the market reform policy. We use the provincial level consumption data to calculate the welfare cost of business cycle and the welfare gain of 1% extra consumption growth in each province in China before and after the introduction of market reform.

The paper contributes to two strands of literatures. First, we contribute to the literature on evaluating the effects of market reform in 1979. Previous research focus on the effect on market reform on the output and show the impact of the reform on the output growth. Smyth and Inders (2004) and Li (2005) show that output exhibit structural change after different phase of market reform and alternate the increasing trend of the output series. However, they do not provide how much the society benefit from the consumption growth induced by the higher output growth. On the other hand, there are discussion on the process of market integration after reform. Poncet (2005) argues that economic reform in China do not achieve enough market integration to promote internal trade and enhance economic growth. Boyreau-Debray and Wei (2004) argue that Chinese provinces

which have reached only a middle range financial integration over transition period compare to OECD countries and there was an increase of regional risk sharing from the pre-reform era to the reform era. We provide a quantitative assessment to their argument and show that there is a substantial gain from improving the regional risk-sharing by the market reform policy. In summary, the literature have shown that economic reforms induce higher growth and mild level of integration, this paper provides a framework to assess these changes on the welfare of society. In the policy evaluation, our results also point out that policy on enhancing growth and stabilize consumption should based on the need in the provincial level rather than using an global policy for all provinces.

Second, it contributes to the literature on the welfare analysis of consumption volatility and growth initiated by Lucas (1987) using the data from United States. Lucas (1987) finds only a very small welfare improvement in removing aggregate consumption fluctuations of the size observed in U.S. data. The welfare improvement is equivalent to about one tenth of a percent of extra consumption at each date during the lifetime of an individual. The framework has been applied not only in U.S., but also to Africa in Robe and Pallage (2003), South America by Gomes and Nascimento (2004) and Europe by Salvato et al. (2005). These papers show that the welfare cost of business cycle in these countries is higher than in U.S. In contrast to Lucas(1987), Robe and Pallage (2003) show that eliminating business cycle will have higher welfare effect than the increasing 1% growth in Africa. However, there is no application in the transition economies such as China which under different institutional arrangement. This paper will shield the light on the tradeoff

of growth and volatility in the transitional countries compare to other countries. In terms of the aggregation level, the closest studies to ours is Jacob et al. (2005) which estimate the welfare of consumption volatility and growth for states in U.S. and draw the conclusion that welfare cost of business cycle is higher at the states level than the national level due to market incompleteness of each local economy. The consumption series at state level include the consumption smoothing effect achieved by the household in each of the state, but there is still consumption risk cannot be shared by the household. It can be due to the transaction cost of entering into insurance contract or transportation cost of trading with distant states are too expensive. Thus, consumption series at the state level involves more risk than the aggregate series in which state level idiosyncratic risk cannot be shared by the household is cancelled out at the national level. Comparing the average state level and the aggregate welfare cost can inform the welfare cost due to market incompleteness by the transaction or transportation costs. Our paper draw a similar conclusion for China as in Jacob et al. for U.S., but the magnitude for welfare cost is much higher in China than in U.S.

The paper is organized as follow. The next section outlines the model used in this study. In section 3, we discuss the data and calibration. In section 4, we report the empirical results on eliminating consumption fluctuation and enhancing 1% growth. Section 5 provides an framework for evaluating market reform in 1979. We conclude in section 6.

2 Model

We use consumption as our basis to evaluate the welfare change perceived by economic agent. Therefore, we assume consumption summarize the effects provided by different changes in the economy. The basic model used in this paper is proposed in Lucas (1987) where the representative agent in each province or the nation maximizes the utility over consumption for Infinite-horizon. Assume that individuals' preferences over consumption streams are represented by

$$U = E \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\gamma} - 1}{1-\gamma} \quad (1)$$

where β is a subjective discount factor and γ is the relative risk aversion coefficient.

In this economy, the consumption process is trend stationary as follow

$$\ln c_t = \alpha + t \ln(1 + g) - \frac{1}{2} \sigma^2 + \varepsilon_t \quad (2)$$

where g is the mean growth rate of real consumption per capita and $\varepsilon_t \sim N(0, \sigma^2)$ is the endowment shock. The measure of welfare change in this economy is the value of λ which equalize the consumption path in the data with aggregate fluctuation and its certainty equivalent

$$\sum_{t=0}^{\infty} \beta^t \frac{((1-\lambda)\bar{c}_t)^{1-\gamma} - 1}{1-\gamma} = E \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\gamma} - 1}{1-\gamma} \quad (3)$$

where c_t is the consumption level in the economy with aggregate fluctuations, and \bar{c}_t is the unconditional mean of c_t . The welfare cost of consumption volatility, λ , and welfare gain of extra 1% of growth, η , have a well-known closed form solutions as

$$\lambda = \exp\left(\frac{\gamma\sigma^2}{2}\right) - 1 \quad (4)$$

and

$$\eta = \left(\frac{1-\beta \exp(g(1-\gamma))}{1-\beta \exp((g+1\%)(1-\gamma))} \right)^{\frac{1}{1-\gamma}} - 1 \quad (5)$$

The expression show that the larger is the variability of shocks to consumption, the more an agent finds these shocks costly, so the more it is willing to pay to eliminate consumption fluctuations. The lower the current consumption growth, the more an agent finds the consumption growth valuable. Following Jacobs et al (2005), we change the specification of the consumption process to an autoregressive process for the growth factor of real per capita consumption

$$f_t = (1 - \alpha)(1 + g) + \alpha f_{t-1} + \varepsilon_t \quad (6)$$

where $f_t = c_t/c_{t-1}$ is the growth factor of real consumption per capita and $\varepsilon_t \sim N(0, \sigma^2)$ to be our robustness check. Using the CRRA utility with this consumption process, Dolmas (1998) shows the welfare implications of persistence in consumption series. With a CRRA preference and consumption growth rate follows an AR(1) process, we can show that the life-time utility can be written recursively as

$$\begin{aligned} V(c_t, f_t) &= c_t W(f_t) \\ &= c_t \left\{ 1 + \beta E_t [f_{t+1} W(f_{t+1})]^{1-\gamma} \right\}^{\frac{1}{1-\gamma}}, \end{aligned} \quad (7)$$

where $W(f_t)$ is a stationary Bellman equation. We then use the solution strategy in discussed in Jacobs et al (2005) to approximate $W(f_t)$ and define λ as:¹

$$\lambda = \frac{W_d}{\sum_f \pi(f) W(f)} - 1 \quad (8)$$

¹We first use Tauchen (1984) to obtain a finite states Markov-chain approximation to the consumption process and then we iterate W until converge. Details of the solution method can be found in Jacob et al. (2005).

where W_d is the life-time utility from consuming a consumption stream with deterministic growth rate at $(1 - \alpha)(1 + g)$, $\pi(f)$ is the unconditional probability of having growth rate f . To calculate the welfare from 1% extra growth, we solve life-time utility of the agent with a 1% extra trend growth rate process:

$$f_t = (1 - \alpha)(1 + g + 1\%) + \alpha f_{t-1} + \varepsilon_t \quad (9)$$

and then define the welfare gain of this 1% extra growth rate as

$$\eta = \frac{\sum_f \pi_g(f) W_g(f)}{\sum_f \pi(f) W(f)} - 1, \quad (10)$$

where π_g and W_g are correspondingly the unconditional probability vector and value under the 1% extra growth rate process.

3 Data and Calibration

3.1 The Data

The data used in this study is obtained from the Comprehensive Statistical Data and Materials on 50 Years of New China. We use the population, household consumption and CPI to compute the annual real consumption per capita for each province over the period of 1967 – 1998. Although there is not much debates on the consumption data, but researchers such as Rawski (2001) cast the doubt on the reliability of the GDP data after year 1998. In order to avoid the data problem and produce results comparable to the literature of output growth, we use data from the time period before year 1998.

3.2 Calibration

For computing the welfare cost of consumption volatility and welfare gain of extra 1% of consumption growth, it requires the parameter σ to captures the consump-

tion volatility and g to captures the consumption growth in the sample period respectively. We apply OLS estimation to the $\log(c_t)$ to a constant and time trend to obtain the law of motion of consumption. The growth rate g is recovered from the coefficient of time trend and the σ is computed from the standard deviation of the regression residual. In table 1, the aggregate growth rate is higher than average provincial growth rate, it can be due to the provinces with higher growth with insufficient data like Guangdong. In general, we observe eastern and central region have higher growth (at 3.9%) than the west (at 3.5%). On the other hand, the aggregate level volatility is lower than the provincial volatility due to cancellation of idiosyncratic shock from provinces. Moreover, the volatility in eastern is higher that in central and western.

The second law of motion of consumption is estimated by running an AR(1) regression for factor growth of consumption per capita. If the coefficient of lag consumption growth factor is not significant,² we then assume that it is zero and re-estimate the law of motion by running the growth factor on a constant. Using the coefficient of lag consumption growth factor and constant term, we recovered the parameter of consumption growth and the σ is computed from the standard deviation of the regression residual. In Table 4, we observe eastern and central region have higher growth (at 4.4 and 4.3% respectively) than the west (at 4%). On the other hand, the aggregate level volatility is more than 40% lower than the provincial volatility and the volatility in western is higher that in the other regions.

The parameters used in the CRRA and Epstein-Zin utility, we use the param-

²At 5% significance level.

eters estimated from the literature. Following the literature, one of the common used discount factor β is 0.95 and 0.99. We choose the one with more conservative value for discounting, due to the uncertainty in developing countries is usually higher than the developed countries, thus we pursue a conservative estimates for discounting. For the coefficient of relative risk aversion γ , we use the value 2 and 5 which are within the range of acceptable values as reported in Mehra and Prescott (1985). We aware that it may not be fit for matching the model to equity premium using the consumption based model since asset pricing literature have pursued γ even larger than 50, but we do not intend entering into the debate in this direction.

4 Policy Evaluation

We perform the welfare calculations for the calibrated Lucas (1987) economy using aforementioned parameterization. To have a general picture about the Chinese economy, we first calculate the welfare cost of business cycle and welfare gain of extra growth. Table 1 presents the results of the welfare cost of business cycle and welfare gain in 1% extra consumption growth over the whole sample period. We calibrate the model the two commonly used parameter value of γ , 2 and 5. Finally, at the bottom of the table, we classify China into 3 regions namely eastern, central and western according to geography and show the effect at the regional level.

For the result at national level, the welfare gains of eliminating consumption fluctuation is 2.2% and 5.6% of lifetime consumption for γ equal to 2 and 5 respectively. On the other hand, the welfare gain from 1% extra growth is 10% and 4%. Furthermore, within a reasonable range of parameterization, the welfare gain

from eliminating business cycle can be higher than that from extra 1% growth.

For disaggregate results, we found that the welfare gain from eliminating consumption volatility at provincial level is 50% higher than that at national level. There are 12 provinces have higher welfare cost of business cycle than the national level and 8 of them come from eastern region which is characterized by higher consumption volatility and higher growth. The eastern region exhibits higher cost of business cycle due to the volatile consumption regardless of its superior economic performance in growth. The consumption in western region is smoother but the growth is slower than the eastern counterpart, thus it has lower cost in business cycle and higher welfare gain from growth. From a welfare perspective, Chinese face a tradeoff of growth and volatility as advocated by Ramey and Ramey (1995) and the net effect is not clear. The welfare cost of consumption volatility do not only come from market incompleteness at the provincial level since the eastern is more developed in terms of financial institution but the risk sharing is weaker instead. Tochkov (2004) shows that the net fiscal transfers from the central government to provinces are countercyclical and smooth idiosyncratic shocks to provincial income, but the stabilization effect is much stronger in rich provinces than in poor provinces. Thus, volatility does not due to lack of government intervention through stabilization program.

Turning back to our main interest, table 2 and 3 reports the provincial level Lucas's welfare cost of business cycle and welfare gain of 1% extra growth in consumption before and after reform. A reduction in the welfare cost of business cycle after market reform means that the willingness to pay for an agent to avoid

consumption fluctuation is decreased after reform because the consumption fluctuation one need to face is reduced. For a person who want to eliminate the consumption, the cost is lower due to the market reform facilitates risk sharing through improving market institution by promoting intra-regional trade or modernizing the financial institutions. From an indirect utility perspective, the welfare improvement is the saving from the less costly consumption insurance. Similarly, the welfare improvement through economic growth is the reduction of willingness to pay for 1% extra growth in consumption in the post reform era compare to the pre reform era.

At the aggregate level, the welfare gain from reducing volatility are 0.1% (or 0.3%) of lifetime consumption, while enhancing growth is 4.8% (or 3.3%) at the coefficient of risk aversion equal to 2 (or 5). In total, the welfare improvement is about 3.6% to 4.9% of the lifetime consumption. At the provincial level, the welfare gain from reducing volatility are 0.8% (or 2.2%) of lifetime consumption enhancing growth is 4.1% (or 3.5%) at the coefficient of risk aversion equal to 2 (or 5). The welfare improvement is about 4.9% to 5.7% of the lifetime consumption. The welfare improvement at the aggregate level is lower than the provincial level in which the proportion and the absolute amount of welfare contribution from reducing volatility is higher.

The sources of welfare improvement at the regional level are quite different across regions. The eastern region gains 6%, the central region gains 3.7% and the west gains 4.6% of lifetime consumption. The welfare improvement from market reform is higher in the coastal area than the inland area. It consistent with

the literature on income equality such as Ho and Li (2006) which argue that the income inequality of inland-coastal income experienced structural change owing to the rapid economic growth in these special economic zones which bring important FDI resource as well as foreign technology. In terms of the composition of welfare improvement, the contribution of volatility reduction on the welfare gain for the eastern region is less than 10% of the total gain whereas it contributes to about half of the welfare gain for the western region.

Focusing on the results in the post reform era, we observe that the further room of welfare gain through eliminating consumption volatility is limited. Even in the case of coefficient of risk aversion equal to 5 which is the most favorable case for eliminating consumption volatility, the gain from eliminating business cycle is still only half of the gain from an extra 1% of consumption growth. Therefore, economic policy should concentrate on growth in most of the provinces. The result is only reversed in the provinces of Jiangsu, Zhejiang and Shanghai where the investment is active and the growth is high. In these provinces, there is a substantial gain from from stabilization.

5 Robustness check

We repeat the above experiment with persistent shock specification to the consumption process to check for the robustness of our result. With such specification, we generally have higher trend consumption growth rate and smaller variance in consumption. For example, the regional provincial mean, overall provincial mean and the nation's trend growth rate are all slightly higher and the σ are all smaller

than the corresponding measures under the previous specification in the whole sample, pre-reform sample and post-reform sample period.

Focusing back to the welfare evaluation of the reform policy under this consumption specification (the last two columns of table 5 and 6). We find that, in the nation's level, the welfare gain from reducing volatility are slightly higher in this case—the gain is 0.6% (or 1.3% if $\gamma = 5$) of lifetime consumption and the welfare gain from having higher trend consumption growth rate increase by 4.4% (or 3.1% if $\gamma = 5$) after the introduction of market reform. Comparing these two numbers to the responding measures in the previous case, they do not change significantly even if we change the consumption process specification. However, in terms of evaluating the welfare gain from reducing consumption volatility in the regional level, such measure change quite significantly as we can see from the tables. We have a significantly higher mean welfare gain from reducing volatility in the aggregate level, Eastern region and the central region under this consumption process after the introduction of market reform. As shown in Table 6, the consumption process is unit root. Therefore, with the same magnitude of shock, the consumption path is more volatile since the change in the consumption is perceived to be permanent. It implies that the gain from reducing the market incompleteness is more substantial than the benchmark case. On the other hand, the welfare gain from having extra growth after reform do not change significantly under this consumption specification in the aggregate level, Eastern region and Central region for both parameter meter values of γ . Interestingly, both of these two measures change quite a lot for the western region under the current specification.

Admittedly, if we change the consumption specification from trend stationary to the current one, then these two welfare measures of market reform do change significantly in the provincial level, which implies that such consumption specification provides a more liberal estimate of the welfare improvement for the market reform policy.

6 Conclusion

This paper employs the consumption based model to provide an useful framework for policy analysis. The empirical results show that the economic reforms improve the welfare through both reducing the business cycle fluctuation and enhancing growth by completeing the market structure. In particular, the reforms reduce a large portion the welfare cost from business cycle fluctuation such that further gain in this margin is limited. Therefore, the government should focus on increasing economic growth in the current development plan.

Further research can extend our research in two aspects. First, an reliable estimates of relative risk aversion is essential to produce accurate policy analysis. Estimation for the deep parameter is of policy interest. Second, Sen (2000) concerns about the social inequality resulted from economic development and its negative impact on economic growth. Studies use multi-dimensional welfare measures to complement and assess the results obtained in consumption based approach.

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TABLE 1: Welfare Cost of Business Cycle and Growth (% of Consumption)

<i>Region</i>	<i>Area</i>	<i>g</i> (%)	σ (%)	Welfare Cost of Business Cycle		Welfare Cost of Extra 1% growth	
				$\gamma = 2$	$\gamma = 5$	$\gamma = 2$	$\gamma = 5$
<i>Beijing</i>	<i>East</i>	3.0	28.8	8.7	23.1	11.7	4.9
<i>Tianjin</i>	<i>East</i>	4.1	12.6	1.6	4.0	10.3	3.8
<i>Liaoning</i>	<i>East</i>	3.7	15.1	2.3	5.8	10.8	4.2
<i>Jilin</i>	<i>East</i>	3.5	10.1	1.0	2.6	11.0	4.3
<i>Helongjiang</i>	<i>East</i>	2.7	11.1	1.2	3.1	12.2	5.3
<i>Shanghai</i>	<i>East</i>	3.6	28.0	8.2	21.7	10.9	4.3
<i>Jiangsu</i>	<i>East</i>	4.8	15.3	2.4	6.0	9.6	3.4
<i>Zhejiang</i>	<i>East</i>	5.0	21.8	4.8	12.6	9.4	3.3
<i>Fujian</i>	<i>East</i>	4.3	21.7	4.8	12.5	10.0	3.7
<i>Shangdong</i>	<i>East</i>	4.4	16.5	2.7	7.0	10.0	3.7
<i>Hebei</i>	<i>Central</i>	3.5	15.9	2.6	6.6	11.1	4.4
<i>Anhui</i>	<i>Central</i>	3.8	10.7	1.2	2.9	10.6	4.1
<i>Henan</i>	<i>Central</i>	3.7	17.3	3.1	7.8	10.8	4.2
<i>Hubei</i>	<i>Central</i>	4.2	18.7	3.6	9.2	10.2	3.8
<i>Hunan</i>	<i>Central</i>	4.1	12.8	1.7	4.2	10.3	3.8
<i>Shanxi</i>	<i>West</i>	3.6	14.8	2.2	5.6	11.0	4.3
<i>Inner Mongolia</i>	<i>West</i>	3.6	14.9	2.2	5.7	10.9	4.3
<i>Guizhou</i>	<i>West</i>	3.7	11.5	1.3	3.3	10.8	4.2
<i>Yunnan</i>	<i>West</i>	4.1	12.1	1.5	3.7	10.2	3.8
<i>Shanxi</i>	<i>West</i>	3.1	12.6	1.6	4.1	11.5	4.7
<i>Gansu</i>	<i>West</i>	3.7	27.6	7.9	21.0	10.8	4.2
<i>Qinghai</i>	<i>West</i>	3.2	13.2	1.8	4.4	11.5	4.7
<i>Xinjiang</i>	<i>West</i>	2.8	17.5	3.1	8.0	12.1	5.2
<i>Nation</i>		4.1	14.7	2.2	5.6	10.3	3.9
<i>Mean</i>		3.7	16.5	3.1	8.0	10.8	4.2
<i>Estern Mean</i>		3.9	18.1	3.8	9.8	10.6	4.1
<i>Central Mean</i>		3.9	15.1	2.4	6.1	10.6	4.1
<i>Western Mean</i>		3.5	15.5	2.7	7.0	11.1	4.4

TABLE 2: Welfare Gain of Growth (% of Consumption)

<i>Region</i>	<i>Area</i>	Pre Reform			Post Reform			Δ Welfare	
		<i>g</i> (%)	$\gamma = 2$	$\gamma = 5$	<i>g</i> (%)	$\gamma = 2$	$\gamma = 5$	$\gamma = 2$	$\gamma = 5$
<i>Beijing</i>	<i>East</i>	-0.2	19.8	17.5	3.8	10.7	4.1	9.1	13.3
<i>Tianjin</i>	<i>East</i>	2.8	12.0	5.1	5.3	9.1	3.1	3.0	2.0
<i>Liaoning</i>	<i>East</i>	1.7	14.2	7.1	5.1	9.2	3.2	5.0	3.9
<i>Jilin</i>	<i>East</i>	2.3	12.8	5.8	4.3	10.1	3.7	2.8	2.1
<i>Helongjiang</i>	<i>East</i>	1.7	14.0	6.9	4.5	9.9	3.6	4.2	3.3
<i>Shanghai</i>	<i>East</i>	0.3	17.6	12.0	7.9	7.2	2.1	10.5	9.9
<i>Jiangsu</i>	<i>East</i>	2.9	12.0	5.0	5.9	8.5	2.8	3.4	2.2
<i>Zhejiang</i>	<i>East</i>	2.0	13.4	6.3	7.1	7.7	2.4	5.8	4.0
<i>Fujian</i>	<i>East</i>	1.6	14.3	7.2	8.0	7.1	2.1	7.2	5.1
<i>Shangdong</i>	<i>East</i>	2.4	12.8	5.7	5.4	9.0	3.1	3.8	2.6
<i>Hebei</i>	<i>Central</i>	1.6	14.4	7.3	5.5	8.9	3.0	5.5	4.3
<i>Anhui</i>	<i>Central</i>	3.2	11.5	4.7	4.2	10.1	3.8	1.3	0.9
<i>Henan</i>	<i>Central</i>	1.6	14.2	7.2	4.5	9.8	3.6	4.4	3.6
<i>Hubei</i>	<i>Central</i>	2.0	13.5	6.4	6.1	8.3	2.7	5.2	3.7
<i>Hunan</i>	<i>Central</i>	2.5	12.6	5.6	4.6	9.7	3.5	2.9	2.1
<i>Shanxi</i>	<i>West</i>	1.7	14.1	7.0	4.1	10.2	3.8	3.8	3.1
<i>Inner Mongolia</i>	<i>West</i>	2.1	13.2	6.1	2.2	13.0	6.0	0.2	0.1
<i>Guizhou</i>	<i>West</i>	2.5	12.6	5.6	3.9	10.5	4.0	2.1	1.6
<i>Yunnan</i>	<i>West</i>	2.9	12.0	5.0	5.6	8.8	2.9	3.2	2.1
<i>Shanxi</i>	<i>West</i>	1.7	14.2	7.1	3.4	11.2	4.5	3.0	2.6
<i>Gansu</i>	<i>West</i>	2.5	12.5	5.5	3.4	11.2	4.5	1.3	1.0

<i>Qinghai</i>	<i>West</i>	3.1	11.6	4.8	2.6	12.3	5.3	-0.7	-0.6
<i>Xinjiang</i>	<i>West</i>	0.1	16.8	10.6	4.6	9.7	3.5	7.1	7.1
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<i>Nation</i>		2.2	13.3	5.9	6.3	8.3	2.7	4.8	3.3
<i>Mean</i>		2.0	13.7	7.0	4.9	9.6	3.5	4.1	3.5
<i>Estern Mean</i>		1.8	14.3	7.9	5.7	8.8	3.0	5.5	4.9
<i>Central Mean</i>		2.2	13.2	6.2	5.0	9.4	3.3	3.8	2.9
<i>West Mean</i>		2.1	13.4	6.5	3.7	10.9	4.3	2.5	2.2
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TABLE 3: Welfare Cost of Business Cycle (% of Consumption)

<i>Region</i>	<i>Area</i>	Pre Reform			Post Reform			Δ Welfare	
		σ (%)	$\gamma = 2$	$\gamma = 5$	σ (%)	$\gamma = 2$	$\gamma = 5$	$\gamma = 2$	$\gamma = 5$
<i>Beijing</i>	<i>East</i>	22.1	5.0	13.0	9.4	0.9	2.2	4.1	10.8
<i>Tianjin</i>	<i>East</i>	9.0	0.8	2.0	7.1	0.5	1.3	0.3	0.8
<i>Liaoning</i>	<i>East</i>	7.1	0.5	1.3	4.3	0.2	0.5	0.3	0.8
<i>Jilin</i>	<i>East</i>	5.5	0.3	0.8	7.2	0.5	1.3	-0.2	-0.5
<i>Heilongjiang</i>	<i>East</i>	7.8	0.6	1.5	6.6	0.4	1.1	0.2	0.4
<i>Shanghai</i>	<i>East</i>	16.2	2.7	6.8	8.2	0.7	1.7	2.0	5.1
<i>Jiangsu</i>	<i>East</i>	7.4	0.5	1.4	10.4	1.1	2.8	-0.5	-1.4
<i>Zhejiang</i>	<i>East</i>	7.9	0.6	1.6	10.5	1.1	2.8	-0.5	-1.2
<i>Fujian</i>	<i>East</i>	6.6	0.4	1.1	6.7	0.5	1.1	-0.0	-0.1
<i>Shandong</i>	<i>East</i>	9.0	0.8	2.0	11.6	1.3	3.4	-0.5	-1.4
<i>Hebei</i>	<i>Central</i>	7.0	0.4	1.2	7.8	0.6	1.5	-0.1	-0.3
<i>Anhui</i>	<i>Central</i>	9.1	0.8	2.1	11.1	1.2	3.2	-0.4	-1.1
<i>Henan</i>	<i>Central</i>	10.4	1.1	2.8	11.7	1.4	3.5	-0.3	-0.7
<i>Hubei</i>	<i>Central</i>	11.0	1.2	3.1	7.6	0.6	1.4	0.6	1.6
<i>Hunan</i>	<i>Central</i>	5.8	0.3	0.8	6.6	0.4	1.1	-0.1	-0.3
<i>Shanxi</i>	<i>West</i>	8.6	0.7	1.9	5.7	0.3	0.8	0.4	1.0
<i>Inner Mongolia</i>	<i>West</i>	8.3	0.7	1.8	11.7	1.4	3.5	-0.7	-1.7
<i>Guizhou</i>	<i>West</i>	7.9	0.6	1.6	8.3	0.7	1.7	-0.1	-0.2
<i>Yunnan</i>	<i>West</i>	7.6	0.6	1.4	6.9	0.5	1.2	0.1	0.2
<i>Shanxi</i>	<i>West</i>	8.1	0.7	1.6	6.0	0.4	0.9	0.3	0.7
<i>Gansu</i>	<i>West</i>	34.0	12.3	33.6	6.1	0.4	0.9	11.9	32.6

<i>Qinghai</i>	<i>West</i>	16.3	2.7	6.9	5.9	0.4	0.9	2.3	6.0
<i>Xinjiang</i>	<i>West</i>	9.5	0.9	2.3	4.4	0.2	0.5	0.7	1.8
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<i>Nation</i>		4.2	0.2	0.4	5.4	0.3	0.7	0.1	0.3
<i>Mean</i>		7.9	1.5	3.9	7.4	0.7	1.7	0.8	2.2
<i>Eastern Mean</i>		7.9	1.2	3.2	7.3	0.7	1.8	0.5	1.4
<i>Central Mean</i>		7.4	0.8	2.0	9.1	0.9	2.1	-0.1	-0.1
<i>West Mean</i>		8.1	2.4	6.4	7.0	0.5	1.3	2.1	5.1
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TABLE 4: Welfare Cost of Business Cycle and Growth (% of Consumption)

<i>Region</i>	<i>Area</i>	<i>a</i>	<i>g</i> (%)	σ (%)	Welfare Cost of Business Cycle		Welfare Cost of Extra 1% growth	
					$\gamma = 2$	$\gamma = 5$	$\gamma = 2$	$\gamma = 5$
<i>Beijing</i>	<i>East</i>	0.0	3.1	10.2	13.3	23.7	13.2	11.6
<i>Tianjin</i>	<i>East</i>	0.0	4.5	6.8	4.5	4.8	10.0	4.4
<i>Liaoning</i>	<i>East</i>	0.0	4.2	5.6	3.1	3.4	10.3	4.4
<i>Jilin</i>	<i>East</i>	0.0	4.1	5.9	3.5	3.9	10.4	4.5
<i>Helongjiang</i>	<i>East</i>	0.0	3.7	8.8	8.6	11.5	11.6	6.8
<i>Shanghai</i>	<i>East</i>	0.0	4.1	8.0	6.6	8.0	10.8	5.5
<i>Jiangsu</i>	<i>East</i>	0.4	5.3	6.2	6.0	7.4	9.4	4.6
<i>Zhejiang</i>	<i>East</i>	0.0	5.1	7.7	5.4	5.7	9.5	4.2
<i>Fujian</i>	<i>East</i>	0.3	5.3	6.5	5.8	7.0	9.4	4.4
<i>Shangdong</i>	<i>East</i>	0.0	4.9	7.8	5.6	6.1	9.7	4.4
<i>Hebei</i>	<i>Central</i>	0.0	3.6	5.8	3.6	4.2	11.1	5.1
<i>Anhui</i>	<i>Central</i>	-0.3	4.8	10.3	9.0	8.6	10.2	4.8
<i>Henan</i>	<i>Central</i>	0.4	4.2	6.7	9.8	17.4	11.1	8.5
<i>Hubei</i>	<i>Central</i>	0.0	4.7	9.2	8.4	10.0	10.3	5.4
<i>Hunan</i>	<i>Central</i>	0.0	4.1	5.4	2.9	3.2	10.3	4.4
<i>Shanxi</i>	<i>West</i>	0.0	3.5	6.5	4.7	5.7	11.3	5.5
<i>Inner Mongolia</i>	<i>West</i>	0.4	3.7	6.0	7.8	13.2	11.5	7.7
<i>Guizhou</i>	<i>West</i>	0.0	4.0	6.5	4.4	5.0	10.6	4.9
<i>Yunnan</i>	<i>West</i>	0.0	4.5	6.6	4.2	4.5	10.0	4.3
<i>ShanXi</i>	<i>West</i>	0.0	3.3	6.2	4.3	5.3	11.6	5.7

<i>Gansu</i>	<i>West</i>	0.3	5.3	21.4	.	.	54.3	23.4
<i>Qinghai</i>	<i>West</i>	-0.4	4.4	10.7	10.3	10.1	10.9	5.5
<i>Xinjiang</i>	<i>West</i>	0.0	3.3	5.8	3.8	4.6	11.5	5.5
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<i>Nation</i>		0.0	4.4	4.5	1.9	2.0	9.9	3.9
<i>Mean</i>		<i>N/A</i>	4.2	7.9	6.2	7.9	12.6	6.3
<i>Eastern Mean</i>		<i>N/A</i>	4.4	7.3	6.3	8.2	10.4	5.5
<i>Central Mean</i>		<i>N/A</i>	4.3	7.5	6.7	8.7	10.6	5.6
<i>Western Mean</i>		<i>N/A</i>	4.0	8.7	5.2	6.3	15.7	7.4
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TABLE 5: Welfare Gain of Growth (% of Consumption)

Region	Area	α	Pre Reform			α	Post Reform			Δ Welfare	
			g (%)	$\gamma = 2$	$\gamma = 5$		g (%)	$\gamma = 2$	$\gamma = 5$	$\gamma = 2$	$\gamma = 5$
<i>Beijing</i>	<i>East</i>	0.0	1.3	18.7	.	0.0	5.2	9.6	4.5	9.1	.
<i>Tianjin</i>	<i>East</i>	0.0	3.4	11.8	6.6	0.0	5.9	8.4	3.0	3.4	3.6
<i>Liaoning</i>	<i>East</i>	0.0	2.7	12.6	6.6	0.0	6.0	8.3	2.9	4.3	3.7
<i>Jilin</i>	<i>East</i>	0.0	2.9	12.2	6.4	0.0	5.7	8.6	3.2	3.6	3.2
<i>Helongjiang</i>	<i>East</i>	0.0	2.7	14.1	15.4	0.0	5.4	8.9	3.5	5.2	12.0
<i>Shanghai</i>	<i>East</i>	0.0	0.6	18.3	23.4	0.0	8.6	6.7	2.2	11.6	21.2
<i>Jiangsu</i>	<i>East</i>	0.0	3.1	11.9	5.9	0.6	8.0	7.4	3.4	4.4	2.4
<i>Zhejiang</i>	<i>East</i>	0.0	2.7	12.7	6.9	0.0	8.7	6.7	2.4	5.9	4.5
<i>Fujian</i>	<i>East</i>	0.0	2.4	13.2	7.5	0.0	9.1	6.3	2.0	6.9	5.5
<i>Shangdong</i>	<i>East</i>	0.0	3.0	12.1	6.5	0.0	7.8	7.3	2.7	4.8	3.7
<i>Hebei</i>	<i>Central</i>	0.0	2.1	13.6	7.7	0.0	5.9	8.5	3.2	5.1	4.5
<i>Anhui</i>	<i>Central</i>	-0.6	3.7	12.0	6.5	0.5	6.5	8.9	6.0	3.2	0.5
<i>Henan</i>	<i>Central</i>	0.0	2.3	13.4	7.9	0.5	5.7	9.7	7.8	3.7	0.1
<i>Hubei</i>	<i>Central</i>	0.0	3.3	13.1	13.1	0.0	7.1	7.5	2.5	5.7	10.6
<i>Hunan</i>	<i>Central</i>	0.0	3.2	11.6	5.5	0.0	5.6	8.7	3.3	2.9	2.2
<i>Shanxi</i>	<i>West</i>	0.0	2.8	12.6	7.1	0.0	4.4	10.1	4.4	2.5	2.7
<i>Inner Mongolia</i>	<i>West</i>	0.0	2.5	12.7	6.5	0.5	3.4	12.7	17.0	0.0	-10.5
<i>Guizhou</i>	<i>West</i>	0.0	3.2	11.8	6.1	0.0	5.2	9.2	3.7	2.6	2.4
<i>Yunnan</i>	<i>West</i>	0.0	3.7	11.0	5.2	0.0	6.0	8.5	3.2	2.5	2.0
<i>Shanxi</i>	<i>West</i>	0.0	2.9	12.5	7.0	0.0	4.1	10.3	4.3	2.2	2.7
<i>Gansu</i>	<i>West</i>	0.0	6.3	65.7	1.1	0.0	3.9	10.7	4.9	55.0	-3.9

<i>Qinghai</i>	<i>West</i>	-0.4	5.2	10.6	6.0	0.0	3.0	11.8	5.4	-1.2	0.6
<i>Xinjiang</i>	<i>West</i>	0.0	1.9	14.3	9.3	0.0	5.1	9.1	3.4	5.2	5.8
<i>Nation</i>		0.0	2.8	12.1	5.7	0.0	6.7	7.7	2.6	4.4	3.1
<i>Mean</i>		<i>N/A</i>	2.9	15.3	7.9	<i>N/A</i>	5.9	8.9	4.3	6.5	3.6
<i>Eastern Mean</i>		<i>N/A</i>	2.5	13.8	9.5	<i>N/A</i>	7.0	7.8	3.0	5.9	6.5
<i>Central Mean</i>		<i>N/A</i>	2.9	12.8	8.1	<i>N/A</i>	6.1	8.6	4.6	4.1	3.6
<i>West Mean</i>		<i>N/A</i>	3.6	18.2	6.0	<i>N/A</i>	4.4	10.0	5.5	8.1	0.5

TABLE 6: Welfare Cost of Business Cycle (% of Consumption)

<i>Region</i>	<i>Area</i>	Pre Reform				Post Reform				Δ Welfare	
		α	σ (%)	$\gamma = 2$	$\gamma = 5$	α	σ (%)	$\gamma = 2$	$\gamma = 5$	$\gamma = 2$	$\gamma = 5$
<i>Beijing</i>	<i>East</i>	0.0	10.9	22.0	.	0.0	8.8	7.1	7.8	14.9	.
<i>Tianjin</i>	<i>East</i>	0.0	8.0	7.3	9.6	0.0	4.5	1.6	1.5	5.6	8.1
<i>Liaoning</i>	<i>East</i>	0.0	5.8	4.1	5.5	0.0	4.8	1.8	1.6	2.3	3.9
<i>Jilin</i>	<i>East</i>	0.0	6.2	4.7	6.1	0.0	5.3	2.3	2.2	2.4	3.9
<i>Helongjiang</i>	<i>East</i>	0.0	10.3	14.8	31.2	0.0	5.9	3.0	2.9	11.8	28.2
<i>Shanghai</i>	<i>East</i>	0.0	6.8	8.4	25.9	0.0	7.3	3.3	2.7	5.2	23.2
<i>Jiangsu</i>	<i>East</i>	0.0	5.9	4.0	5.0	0.6	5.5	6.7	7.1	-2.7	-2.1
<i>Zhejiang</i>	<i>East</i>	0.0	6.2	4.8	6.5	0.0	8.7	4.7	4.0	0.1	2.5
<i>Fujian</i>	<i>East</i>	0.0	6.0	4.6	6.6	0.0	6.1	2.2	1.7	2.5	4.9
<i>Shangdong</i>	<i>East</i>	0.0	6.6	5.2	6.9	0.0	8.7	5.2	4.6	0.0	2.2
<i>Hebei</i>	<i>Central</i>	0.0	5.4	3.9	5.6	0.0	5.8	2.7	2.6	1.1	3.1
<i>Anhui</i>	<i>Central</i>	-0.6	10.5	12.3	11.2	0.5	7.1	10.1	14.8	2.2	-3.6
<i>Henan</i>	<i>Central</i>	0.0	6.2	5.1	7.4	0.5	7.3	11.3	19.2	-6.2	-11.8
<i>Hubei</i>	<i>Central</i>	0.0	11.0	15.4	29.2	0.0	5.5	2.1	1.8	13.3	27.4
<i>Hunan</i>	<i>Central</i>	0.0	5.3	3.2	3.9	0.0	5.6	2.6	2.4	0.7	1.5
<i>Shanxi</i>	<i>West</i>	0.0	6.8	5.8	7.9	0.0	6.3	3.8	4.2	1.9	3.8
<i>Inner Mongolia</i>	<i>West</i>	0.0	5.0	3.1	4.2	0.5	6.3	12.0	33.9	-8.9	-29.8
<i>Guizhou</i>	<i>West</i>	0.0	6.7	5.2	6.6	0.0	6.4	3.7	3.7	1.5	2.9
<i>Yunnan</i>	<i>West</i>	0.0	6.6	4.7	5.5	0.0	6.7	3.6	3.4	1.1	2.1
<i>Shanxi</i>	<i>West</i>	0.0	6.9	5.9	8.1	0.0	5.2	2.7	2.9	3.2	5.2
<i>Gansu</i>	<i>West</i>	0.0	29.0	.	.	0.0	6.5	4.3	4.9	.	.

<i>Qinghai</i>	<i>West</i>	-0.4	13.4	15.9	15.7	0.0	4.4	2.2	2.7	13.7	13.0
<i>Xinjiang</i>	<i>West</i>	0.0	6.2	5.5	8.9	0.0	4.7	1.9	1.9	3.6	7.0
<i>Nation</i>		0.0	4.1	2.0	2.4	0.0	4.3	1.3	1.2	0.6	1.3
<i>Mean</i>		<i>N/A</i>	8.3	7.5	10.4	<i>N/A</i>	6.2	4.4	5.8	3.1	4.5
<i>Eastern Mean</i>		<i>N/A</i>	7.3	8.0	11.5	<i>N/A</i>	6.6	3.8	3.6	4.2	7.9
<i>Central Mean</i>		<i>N/A</i>	7.7	8.0	11.5	<i>N/A</i>	6.3	5.8	8.2	2.2	3.3
<i>West Mean</i>		<i>N/A</i>	10.1	6.0	7.4	<i>N/A</i>	5.8	3.9	6.5	2.0	0.9