

Sonderheft 2002



DIW Berlin

Deutsches Institut
für Wirtschaftsforschung

173

**Doris Fischer
Andreas Oberheitmann
(Hrsg.)**

**China im Zeichen
von Globalisierung
und Entwicklung**

**Festschrift zum 70. Geburtstag
von Ernst Hagemann**

Duncker & Humblot Berlin

DOI <https://doi.org/10.3790/978-3-428-51032-0>

Generated for Hochschule für angewandtes Management GmbH at 88.198.162.162 on 2025-12-18 04:15:18

FOR PRIVATE USE ONLY | AUSSCHLIESSLICH ZUM PRIVATEN GEBRAUCH

Deutsches Institut für Wirtschaftsforschung

gegründet 1925 als Institut für Konjunkturforschung
von Prof. Dr. Ernst Wagemann

Königin-Luise-Straße 5
14195 Berlin
Deutschland

Vorstand:

Präsident Prof. Dr. Klaus F. Zimmermann
Vizepräsident Prof. Bengt-Arne Wickström, Ph. D.
Geschäftsführer Michael Herzog

Kollegium der Abteilungsleiter:

PD Dr. Gustav A. Horn
Dr. Kurt Hornschild
Wolfram Schrettl, Ph. D.
Prof. Dr. Viktor Steiner
Prof. Dr. Gert G. Wagner
Dr. Hans-Joachim Ziesing

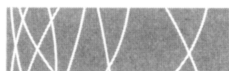
Doris Fischer
Andreas Oberheitmann (Hrsg.)
**China im Zeichen von Globalisierung
und Entwicklung**

DIW Berlin

Sonderhefte Nr. 173

Sonderhefte Nr. 173

DIW Berlin



Deutsches Institut
für Wirtschaftsforschung

Doris Fischer

Andreas Oberheitmann (Hrsg.)

**China im Zeichen von Globalisierung
und Entwicklung**

**Herausforderungen für die statistische Analyse
und empirische Forschung**

**Festschrift zum 70. Geburtstag
von Ernst Hagemann**

Bibliografische Information Der Deutschen Bibliothek

Die Deutsche Bibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über <<http://dnb.ddb.de>> abrufbar.

Herausgeber: Deutsches Institut für Wirtschaftsforschung, Königin-Luise-Str. 5,
D-14195 Berlin, Telefon (0 30) 8 97 89-0 -- Telefax (0 30) 8 97 89 200

Alle Rechte vorbehalten

© 2002 Duncker & Humblot GmbH, Berlin

Konzept und Gestaltung: kognito, Berlin

Fotoprint: Berliner Buchdruckerei Union GmbH, Berlin

Printed in Germany

ISSN 0720-7026

ISBN 3-428-11032-3

DOI <https://doi.org/10.3790/978-3-428-51032-0>

Generated for Hochschule für angewandtes Management GmbH at 88.198.162.162 on 2025-12-18 04:15:18

FOR PRIVATE USE ONLY | AUSSCHLIESSLICH ZUM PRIVATEN GEBRAUCH

Vorwort der Herausgeber

Am 16. September 2000 hat Ernst Hagemann sein 70. Lebensjahr vollendet. Aus Anlass dieses Tages und in Dankbarkeit für sein Engagement der Gründung und Erhaltung des Iserlohn-Kreises sowie der Anerkennung seines Lebenswerkes im Bereich der China-Forschung widmen ihm Freunde und Kollegen im Iserlohn-Kreis sowie Kollegen des DIW die vorliegende Festschrift. Diese Widmung ist verbunden mit dem Wunsch nach weiterem Erfolg in seiner wissenschaftlichen Arbeit und Wohlergehen im persönlichen Bereich.

Als jüngere Kollegen von Ernst Hagemann können die Herausgeber dieser Festschrift nur für einen relativ kurzen Zeitraum aus der eigenen Zusammenarbeit berichten. Auch steht ihnen eine überschwängliche Würdigung des Lebenswerkes nicht gut zu Gesicht. So stützt sich das Nachfolgende in weiten Teilen auf die Worte derer, die ihn schon länger kennen.

Ernst Hagemann war nach dem Krieg zunächst in der volkswirtschaftlichen Abteilung der Berliner Zentralbank tätig. Am 16. Juli 1963 ging er dann als Mitarbeiter ins Deutsche Institut für Wirtschaftsforschung (DIW) und war dort ursprünglich in der Abteilung „westliche Industrieländer und Entwicklungsländer“ tätig. Insbesondere rekonstruierte er dort die Daten der Außenhandelsstatistik der VR China, welche bis dahin nicht verfügbar waren und ein Novum in der deutschen Chinaforschung darstellten. Mitte der 1980er Jahre wirkte er in der Abteilung „weltwirtschaftliche Strukturen“. Sein Forschungsschwerpunkt war auch dort die Wirtschaft Chinas; hier makroökonomische Analysen, insbesondere auch struktur- und finanzwissenschaftliche Fragen. In den 1980er Jahren trat zunehmend die Transformationsforschung in den Vordergrund seiner wissenschaftlichen Tätigkeit. Vor allem seine Analysen außenwirtschaftlicher Fragestellungen sind seit langer Zeit ein wichtiger Fundus an Detailinformationen und wirtschaftspolitischer Interpretation.

Begleitet wurde seine Arbeit von zahlreichen Kooperationsprojekten mit chinesischen Universitäten und diversen Tätigkeiten als Lektor an deutschen Universitäten und wissenschaftlichen Forschungseinrichtungen. Seit seinem Ausscheiden aus dem DIW im Jahr 1996 ist Ernst Hagemann weiterhin als Berater für internationale Organisationen und Unternehmen aktiv.

Seine Arbeit ist stets das Ergebnis gründlicher, methodisch anspruchsvoller empirischer Untersuchungen und von wirtschaftspolitischer Relevanz. Dabei kommt ihm seine Fähigkeit zugute, komplexe Zusammenhänge in analytisch fassbare Bestandteile zu zerlegen. Immer betrachtete er entgegen des „Mainstreams“ die Chinaforschung als eine

„Entwicklungsforschung“, nicht, wie in den 1990er Jahren oft zu lesen und zu hören, als eine Analyse der Systemtransformation vom Sozialismus zur Marktwirtschaft.

Diese knappe Wiedergabe der Denk- und Arbeitsweise dürfte nicht nur das breit gestreute Forschungsinteresse des Jubilars widerspiegeln, sondern auch die Themenvielfalt der nachfolgenden Beiträge rechtfertigen.

Will man über China empirisch arbeiten und aus den Ergebnissen valide Empfehlungen etwa über die Rolle Chinas in einer sich globalisierenden Wirtschaft ableiten, ist eine gründliche Analyse des zu Grunde liegenden statistischen Materials erforderlich. Die Beiträge von Margot Schüller „Getting the numbers right – deficiencies in China's statistical system“, von Doris Fischer „What's in a number? The role of statistics in China's contemporary economic research and economic policies“, von Björn Alpermann „Die chinesische Umweltstatistik: Eine materialkritische Einführung“, und Bettina Gransow „Counting China's floating population: A gendered perspective“ gehen den wichtigen Fragen des Umgangs mit chinesischen Originaldaten nach.

Globalisierung und Entwicklung in China zeigen sich an einer Fülle von Beispielen. Christian von Hirschhausen und Michael Andres untersuchen diese Frage in ihrem Beitrag „Long-term electricity demand in China – from quantitative to qualitative growth?“ in bezug auf die Elektrizitätswirtschaft, Andreas Oberheitmann in seinem Artikel „WTO and the Kyoto process – possible effects on China's energy policy and trade“ hinsichtlich der Auswirkungen der internationalen Klimaverhandlungen auf die Energiepolitik und den Handel Chinas.

Doris Fischer

Andreas Oberheitmann

Inhaltsverzeichnis

Getting the numbers right – deficiencies in China's statistical system 9

Von Margot Schüller

What's in a number? The role of statistics in China's contemporary economic research and economic policies 25

Von Doris Fischer

Die chinesische Umweltstatistik: Eine materialkritische Einführung 41

Von Björn Alpermann

Counting China's floating population: A gendered perspective 54

Von Bettina Gransow

Long-term electricity demand in China – from quantitative to qualitative growth? 61

Von Christian von Hirschhausen and Michael Andres

WTO and the Kyoto process – possible effects on China's energy policy and trade 78

Von Andreas Oberheitmann

Getting the numbers right – deficiencies in China's statistical system*

Von Margot Schüller

In the post-reform period, China's economy has undergone tremendous structural changes. Collecting statistical data, which reflect the development of this fast changing economy accurately, has proven to be quite difficult. Statistical methods and definitions have been adapted in the course of time. However, serious bias in the appraisal of the economic development still remained. The time lag between economic system reform and the statistical system reform accounts to a large extent for this tendency.

The dual-track strategy¹ pursued during the process of transition to a market economy has added to the difficulties in assessing the economic outcome. New economic institutions, rules and organisations of a market economy have been allowed to emerge, however, they did not replace the old ones of the planning system but coexisted besides administrative guided prices and non-market institutions. Problems with the quality of statistical data are not only due to the statistical system lagging behind the fast changes in the economic system, but also related to the still low level of China's economic development.

Doubts about the accuracy of officially published statistics grew after 1996, when low growth rates of key expansion indicators such as power consumption and rail freight traffic started to deviate considerably from the high overall economic growth rate. Some Chinese and foreign experts saw this statistical manipulation by government officials as a means of "getting the numbers right", inflating figures to prove their "achievements in office".

This contribution will try to explain the reasons for the deficiencies in the statistical system 1) within the context of China's economic transition, 2) with regard to China's low level of overall economic development and 3) by looking at the incentives for local governments to falsify statistics. Finally, the impact of the statistical system's deficiencies on economic analysis will be looked at.

* Paper prepared for the EU-China Academic Network (ECAN) Private Policy Workshop "Assessing the Interface Between Economics and Politics in China", Stockholm, 28-29 May 1999.

¹ For a discussion of the reform strategy see for example Woo (1999), pp. 115-37 and Rawski (1999), pp. 139-56. Contrasting views on the reform path are presented by Walder (1995), pp. 963-79.

1 **Difficulties in keeping track of a fast changing economic system**

1.1 From NMP to GDP: Adapting to a new system of national accounts

When the Chinese government announced its ambitious program of economic modernisation at the end of the 70s, the need for statistical data on which long term planning could be based became obvious. To organise, direct and coordinate the collection and dissemination of statistical data throughout the country the State Statistical Bureau was established under the State Council and made responsible for statistical work.² The SSB's most important publication, the Statistical Yearbook of China, appeared for the first time in 1982 and contained an impressive number of data.³ In the tradition of the Material Product System as the accounting framework used by centrally planned economies, the Statistical Yearbook reported data on the Net Material Product (NMP). The NMP is regarded as a concept equivalent to Gross Domestic Product (GDP) in the System of National Accounts. It sums up the output value of agriculture, industry, construction, transportation and commerce on the production side, but excludes many types of services as unproductive activities. On the expenditure side it consists of consumption and accumulation. The differences between the two concepts of accounting, especially the net output value of the Material Production System and the value added in the System of National Accounts, are fairly important: 1) depreciations of fixed assets are not included in the net output value of the NMP and 2) the intermediate consumption of services used in the material production process is not excluded from the net output value of the NMP. With the fast changes in economic structure, the discrepancies between the value added and the net output value became larger (see table 1) as demonstrated by Chen (1995).

Table 1
Discrepancies between value added and net output value
(billion Yuan, current prices)

	1979	1993
1) Value Added of Agriculture minus Net Output Value of Agriculture	3.3	33.3
2) Value Added of Industry minus Net Output Value of Industry	14.2	127.8
3) Value Added of Construction minus Net Output Value of Construction	1.4	5.1
4) Value Added of Transportation, Postal and Telecommunication Services minus Net Output Value of Transportation	6.3	78.8
5) Value Added of Commerce minus Net Output Value of Commerce	-2.5	-75.4
Added discrepancies (sector 1-5)	22.7	169.6

Chen, Kang (1996), The Chinese Economy in Transition. Micro Changes and Macro Implications, pp. 16-7.

2 The State Statistical Bureau is called now the National Bureau of Statistics (NBS).
3 Chow points to two other yearbooks which appeared around the same time, the Agricultural Yearbook of China published in 1981 by the Ministry of Agriculture and the Almanac of China's Economy published by the Economic Research Centre in 1982. See Chow (1994), p. 102.

During the course of the economic transition, the importance of the service sector increased remarkably. To better reflect the structural changes in the economy, the socialist accounting system had to be changed into the Western System of National Accounts. Although the SSB continued to report data based on the Material Product System until 1994, it started to publish Gross National Product (GNP) and GDP in its Statistical Yearbook by 1988. Comparing GNP and National Income based on the Material Product System for the year 1987, the value of GNP was 19% larger than the value of National Income.⁴

After the introduction of the System of National Accounts, a number of shortcomings of the GNP and GDP data remained which can be related to their adaptation from NMP data. On the one hand, GNP tended to be understated because prices for the evaluation of in-kind consumption and of subsidised goods and services, especially housing, were too low. On the other hand, the growth rate of real GNP was overstated because inflation had not been sufficiently accounted for. The implicit deflator applied by the SSB to the components of GNP was much lower than other price indexes. With the level of inflation being too low, Naughton (1995) presumes that real GNP growth was overstated by 1-2%.⁵

A similar conclusion was made in the World Bank report *China 2020*. When analysing the national accounts deflators for consumption and investment, the authors of this World Bank report estimated that relative to other price measures such as the consumer price index or the price indexes for capital goods, the growth of the deflators for consumption and investment were unusually slow during the period 1978-95. Therefore, real growth of consumption and investment may be overstated. When using alternative measures to deflate nominal GDP, the World Bank analysts estimated that annual per capita growth during the period 1978-95 may be 1.2 percent lower than the official growth rate. The alternative GDP growth rates have been obtained by redeflating the expenditure components of GDP using the consumer price index (CPI) for consumption and by applying the price index for building materials for re-deflating investment.⁶

Table 2
Adjustment of annual per capita GDP growth by the World Bank

	1978-95	1978-86	1986-95
GDP growth based on official deflators	8.0	7.8	7.9
GDP growth based on alternative deflators	6.8	7.4	6.6

Source: World Bank (1997), *China 2020. Development Challenges in the New Century*. Washington D.C., p. 3.

⁴ See China Statistical Yearbook of 1988, pp. 36 and 51.
⁵ See Naughton (1995), p. 327.
⁶ The World Bank report notes that similar results have been obtained by analysing the deflators for the components of GDP by sector of origin. In their database on per capita incomes at purchasing power parity Summers and Hesters assume – although somewhat arbitrarily from the point of view of the World Bank – that consumption and investment growth has been overstated by 30 percent and 40 percent respectively, leading to a lower annual GDP growth rate than officially estimated. See World Bank (1997), Note 2, p. 13.

Even after adjusting the official annual per capita real GDP growth for the reform period 1978 – 95, the World Bank analysts note that China belonged among the world's ten fastest-growing economies. However, they pointed out that an overstated GDP growth by 1 or more percentage points over long periods could lead to large errors in per capita income levels.⁷

1.2 Statistical data on industrial output and employment: Changing concepts and definitions

The emergence of small-scale industrial activities and new forms of enterprise ownership confronted the statistical system with a number of problems. On the one hand, small-scale enterprises were not included in the statistical surveys, on the other hand, statisticians did not expect these enterprises to value their output in constant prices. To compare to these deficiencies, the collection of primarily current price output data covering enterprises of different sizes and administrative subordination began after the industrial census in 1985.⁸

Industrial development is measured using the Gross Industrial Output Value (GIOV), and after 1988, the Value Added of Industry (VAI). Since the mid-1980s, the SSB used four categories of ownership to classify industrial enterprises: 1) state owned, 2) collective owned, 3) individually owned and 4) other forms of ownership.⁹ The breakdowns of industrial output value followed this classification until 1993. The growing importance of enterprises belonging to "other forms of ownership", especially foreign funded enterprises and share holding enterprises, led to the introduction of new system of classification by the SSB. The Bureau's Statistical Yearbook of China divided in the following years the GIOV at and above the township level into the following categories: 1) state owned enterprises, 2) collective owned enterprises, 3) share holding enterprises, 4) foreign funded enterprises and 5) enterprises funded by Overseas Chinese from Hong Kong, Macao and Taiwan. These categories represented a mixture of various concepts because enterprises were classified not only according to their ownership, but also with regard to their organisational form and to their origin of investment.

Even after adapting to this new classification, the Bureau was not able to supply precise data on the proportion between public sector and private sector to the State Council who required these data when preparing for the XV. Congress of China's Communist Party in September 1997. The existing system of classification could not deal satisfactorily with various private sector activities and the mixing of different ownership structures which was to some extent the result of the state owned enterprises' reform.

⁷ See World Bank (1997), Box 1.1, p.3.

⁸ See Naughton (1996), pp.329-30.

⁹ See Statistical Yearbook of China 1986 (in Chinese), p.356.

Table 3
Changes in the statistical concepts of ownership and economic sector classification

Classification of sectors and industrial enterprises by ownership since 1985				
<i>state - owned</i>	<i>collective owned</i> urban and rural collectively owned enterprises; enterprises registered with the State Administration of Industry and Commerce as collective units. 1) township enterprises 2) Village enterprises 3) cooperative enterprises	<i>individually owned</i> urban and rural individually owned enterprises; enterprises registered with the State Administration of Industry and Commerce.	<i>other forms of ownership</i> 1) enterprises of the private economy: joint owned enterprises, share holding enterprises, foreign funded enterprises 2) companies funded by entrepreneurs from Hong Kong, Macao and Taiwan (including joint ventures with mainland enterprises and wholly owned companies) 3) other types of enterprises	
Additional classification of industrial enterprises by ownership at and above the township level since 1993				
<i>state -owned</i>	<i>collective owned</i>	<i>share holding enterprises</i>	<i>foreign funded enterprises</i>	<i>enterprises funded by Overseas Chinese from Hong Kong, Macao and Taiwan</i>
Classification of economic sectors by ownership in September 1998				
<i>public owned economy</i> 1) state owned sector 2) collective owned sector		<i>non-public owned economy</i> 1) private owned sector 2) sector of the economy funded by investors from Hong Kong, Macao and Taiwan 3) sector of the economy funded by foreign investors		

Sources: Statistical Yearbook of China, various issues; "Wo guo zhongxin huafen jingji chengfen leixing" (Important new classification of economic sectors), Jingji Ribao, 30.9.98.

To reflect the proportion of the state owned economy better, the SSB together with the State Administration for Industry and Commerce jointly introduced new concepts of classifying enterprises and economic sectors in 1998. The new concept distinguishes between the registration of enterprises with the State Administration for Industry and Commerce following certain criteria and the recording of enterprises for statistical purposes following other criteria. The basic criteria for the registration is the enterprise's organisational form. When registering with the State Administration for Industry and Commerce, the enterprises are classified as follow:

- Enterprises funded with domestic capital, among them state owned enterprises, collective owned enterprises, cooperative share enterprises, jointly run enterprises, companies with limited liability, joint stock companies with limited liability, private enterprises and other forms of enterprises.
- Enterprises funded by investors from Hong Kong, Macao and Taiwan, among them equity and contractual joint ventures, wholly owned enterprises and companies with limited liability.

- Foreign funded enterprises, among them equity and contractual joint ventures between mainland and foreign investors, foreign owned enterprises and foreign funded companies with limited liability.

On the contrary to the classification of enterprises on the basis of their organisational forms, the SSB divides economic sectors. There are five categories of enterprises assigned to either the public owned or non-public owned economy. The public owned economy comprises the state owned sector and the collective owned sector of the economy. The non-public owned economy consists of the private owned, the sector funded by investors from Hong Kong, Macao and Taiwan and the sector funded by foreign investors.

The calculation method for assigning enterprises to different sectors of the economy is based on the origin of their paid-in capital (shishou ziben). While in the past, enterprises with a capital structure consisting of for example 50 per cent paid-in capital by state units, 20 per cent paid-in capital by collective units and 30 per cent paid-in capital by companies from Hong Kong were counted as part of the state owned economy, now, each paid-in capital share is now allocated to different economic sectors.¹⁰ The new classification aims at reflecting more accurately the ownership structure of China's economy.

2 Economic development level and deficiencies in the statistical system

The quality of statistical data depends to a large degree on the circumstances in which they are constructed. For the collection, use and dissemination of statistics a complex system of norms and institutions governing the behaviour of those doing the statistical work is required. Although centrally planned economies need an elaborated statistical system for economic planning, the collection of statistical data remained inadequate for economic planning in China until the end of the 70s. Due to political disruptions of the statistical system, there was a lack of systematic data collection and statistical surveys.¹¹

Compared to the Central Statistical Administration (CSA) of the former Soviet Union, China's SSB was shaped by different technical and institutional characteristics. While the Soviet system was based on ministerial planning, the Chinese system was characterised by territorial planning. Under ministerial planning, economic activities in one sector are controlled by one ministry independent from geographic boundaries. On the contrary, under territorial planning, one institution such as a province for example, directs all economic activities in various sectors within one region. Detailed planning was not pursued by the State Planning Commission or by other central ministries in China, whereas in the former Soviet Union, under ministerial planning, the center allocated a

¹⁰ See "Wo guo zhongxin huafen jingji chengfen leixing" (Important new classification of economic sectors), Jingji Ribao, 30.9.98; "Chinas Wirtschaftssektoren neu klassifiziert" (1999), Beijing Rundschau, No. 1, pp.22-24; "Statistics Bureau Adopts New Enterprise Classification Method", Xinhua News Agency, in: Summary of World Broadcasts (SWB), FE/3346 S1/2, 1.10.98. Other accounting conventions were introduced in official Chinese statistical publication in 1994. It comprises quantitative indicators of the financial and output status of enterprises. See Ash and He (1998), p. 7.

¹¹ See Chow (1994), p. 104. See Herrmann-Pillath (1996), pp.2-3. See also World Bank (1983), pp. 223-6.

large number of products and took most decisions on allocation. Therefore, ministries had a very strong incentive to invest in technical upgrading and to exercise central control. The need for detailed information was enforced by the fact, that the ministerial system was more specialised and based on a higher degree of interregional interdependence, making coordination more necessary. That investment in the statistical system was much higher in the former Soviet Union than in China can be shown by looking at the technical equipment of both the SSB and the CSA. As late as 1986, the SSB handled 90 per cent of the data manually, and the standard of input-output tables was rather simple.¹²

When comparing the economic organisation and the statistical system of the Soviet Union with the ones in China, the different ranking and hence differences in power of the two statistical organisations also needs to be mentioned. While the status of the CSA was that of a ministry, the SSB being directly subordinated to the State Council was less independent and weaker with a rank between a ministry and a bureau within a ministry. Closely related to these differences in power between the SSB and the CSA was their respective relationship to local authorities. The regional branches of the SSB had to operate under dual subordination, their staff being employed by the local governments who decided about their payrolls and administrative budgets.¹³ The aspect of dual subordination can be regarded as a major organisational deficiency in China's statistical system challenging the administrative leadership by the SSB until today.

With the beginning of the economic reform, the Chinese government supported the rebuilding of a statistical system which was, according to the Statistics Law of 1983, assigned the important role for "...comprehending the actual condition and strength of the country and in guiding national economic and social development and to promote the smooth progress of the socialist modernization".¹⁴ Initially, the rebuilding of the statistical infrastructure was confronted with severe staff shortages and a lack of well-trained personnel which negatively influenced the quantity and quality of statistical data. The total staff working in the SSB on the central level, in the Provincial Statistical Bureaus and in the Statistical Units on the county level amounted to only 18.000 at the beginning of the 80s.¹⁵

While much progress has been made in this respect, the weakness of the basic level of statistical work is even now regarded by some Chinese experts as the main reason for the insufficient quality of data. Low qualification of personnel not being able to adopt to new requirements and shortages in personnel account among the biggest problems. The average statistical bureau on the county level comprises only 13 staff members, with less than 10 of them doing statistical work. The lack in the number and qualification of the staff in the statistical bureaus contrasts sharply with the increasing work load including regular reports and census, and unscheduled surveys. The situation is supposed to be even worse in statistical bureaus at the town level which are extremely understaffed and

¹² Huang (1994), pp. 110-1.

¹³ Huang (1994), pp. 113-5.

¹⁴ See Statistics Law of the PRC, adopted of the Sixth National People's Congress on 8th December 1983, amended in accordance with the "Decision on Amending the Statistics Law of the PRC", adopted at the 19th meeting of the Standing Committee of the Eighth National People's Congress on 15th May 1996, in: SWB, FE/2633, 8.6.1996.

¹⁵ See World Bank (1983), p.228.

are lacking sufficient funds. Audits and examinations of statistical reports by county level statisticians is seen as nearly impossible because of shortages in personnel. Furthermore, the operation rules for statistical surveys are regarded by local statisticians as sometimes confusing, with indices too elaborate. Since the introduction of the census system, this situation has become worse because different categories have to be applied for census data and for data of the annual statistical review.¹⁶

Besides the problems related to the basic weakness of local statistical bureaus, the dual subordination of SSB regional branches explains why unified statistical rules and regulations are often interpreted differently on the regional level. Although the SSB is the administrative head responsible for organising, directing and coordinating statistical work within a system officially described as centralised and unified, SSB's statistical rules and regulations have often been applied in quite a different manner on the local level. The fact, that the statistical system was constructed along the lines of the general administrative structure meant "... that there is a systematic distinction between imperative authority ("lingdao guanxi") and professional authority ("yewu guangxi").¹⁷ Under the conditions of a dual leadership structure, the regional Statistical Bureau being part of the local government tended to interpret unified statistical rules and definitions in coordination with local government officials. An example is given by Herrmann-Pillath (1995) who cites urbanisation rates of various provinces published in the provincial statistical yearbooks which were extremely high in poor provinces such as Anhui and Guizhou and varied strongly over the years.¹⁸

The problem of interpreting unified statistical rules differently at local level is aggravated by the lack of transparency of how some important data, such as the consumer price index, are constructed. There are doubts, whether local statisticians can deal with the complex price system constituting of a reference basket of around 1500 goods. The organisational deficiencies in the statistical system and the "procedural fuzziness"¹⁹ can be related to the still low level of China's economic development. That is, 1) the statistical system in most regions can not meet all the requirements for an elaborated system of data collection because of the lack in funds and human resources,²⁰ and 2) the work of professional administration tends to be influenced and even dominated by the political decision making of party cadres and governments officials. In this respect, China seems to resemble most developing countries in which political interference in the work of the administration is common practice.

3 Officials turn out figures, figures turn out officials

The local SSB's dual subordination under the regional government on the one hand and the professional leadership of the State Statistical Bureau on the other describes the context in which those being responsible for statistical data have to work. Pressure on

16 "Statistical Figures and The Appraisal of Achievements in Office", (1999), Inside China Mainland, January, pp. 13. The Article is based on excerpts from the journal China Statistics (Zhongguo Tongji), Beijing, Issue 9, 1998, pp.26-27.

17 Herrmann-Pillath (1996), p.6.

18 Herrmann-Pillath (1995), p.26, table 1-5.

19 Herrmann-Pillath (1996), p. 8.

20 See also the example of environment statistics presented by Björn Alpermann in this volume.

the local statistical bureau's staff to distort data has increased in the course of the economic reform. Government officials and CCP cadres are no longer promoted because of their "political qualification" but with regard to their "achievements in office". Therefore, there is a strong incentive for officials and party cadres to report data to upper level governments proving economic success. In this chapter we will look at the phenomenon of falsifying statistics by local governments and at counter-strategies of the central government.

3.1 Incidence and scope of false data

Although the limited reliability of statistical data has been referred to in Western publications, incidences of the fabrications of data and other malpractices in statistical work were more often reported in the Chinese and foreign press after 1994. With the introduction of the austerity policy by summer 1993, the central government had put a lot of pressure on the regional governments to dampen overheated growth and inflation.²¹ To analyse whether the central government's policy has been successfully implemented on the local level, accurate statistics were urgently needed. Therefore, when the National Statistical Work Meeting was held at the end of February 1994, a warning was given to local governments not to falsify data.²² The official newspaper *Renmin Ribao* complaint that exaggeration of statistical figures had been quite serious in some places. Pointing to the disastrous experience with boasted figures in the Great Leap Forward, the newspaper required not to allow this tendency to reemerge.

According to the *Renmin Ribao*, officials either inflated figures by practising the old working style of imperative planning or boasted economic data to impress higher authorities. Some local governments computed statistical figures by way of a top-down breakdown of very high economic targets to subordinate units at the beginning of the year. The units or localities were required at the end of the year to submit statistical figures somewhat higher than the targets. In case the targets were set too high and beyond reach, subordinate units or localities used to inflate the figures. Some local governments had waited before submitting data to higher authorities until other governments had handed in their economic statistics. Then, they had held a meeting and had decided on a somewhat higher figure than other governments had achieved. The newspaper criticised this practise and pointed out that the way cadres are appraised was of vital importance for obtaining reliable statistics. That cadres got promoted by making up of figures had let to the spread of a satirical poem cited by the newspaper: "... those who seek truth from facts are criticized, while those who make false statistical reports get generous awards and promotions. What those above are fond of, those below will be addicted to."²³

Manipulation of statistical data was practised in various areas. In view of the 1994 tax reform, some governments manufactured economic statistics at the end of 1993. As economic figures of the preceding year were defined as the basis for revenues and tax contribution to the central government in 1994, by falsifying data they tried to gain ad-

21 For the implementation of the austerity policy see for example World Bank (1996), pp.3-6.

22 "State Statistical Bureau to reform data collection to reflect market economy", *Zhongguo Xinwen She News Agency*, Beijing, in English, 22.2.94, in: SWB FE/D1930/CNS, 24.2.94; *Renmin Ribao*, 21.2.99; "Cheating Grows in Gathering of Statistics", in: *China Morning Post*, 22.2.94.

23 *Renmin Ribao*, 13.2.94, p.2; SWB FE/D1929/CNS 23.2.94.

vantages or to minimise damage to them.²⁴ Some officials reported undervalued per capita income statistics hoping to obtain preferential treatment given to underdeveloped regions. Other officials fabricated birth registration statistics to cover up that their localities had exceeded population targets.²⁵

Most false reports were made on industrial output value which was obviously an indicator to show "achievements in office". These reports met the suspicion of the SSB and the Ministry of Supervision who joined forces in the fight against unreliable data at the beginning of 1994. They dispatched investigation teams to several areas and discovered that "Some party and government leaders exaggerated their achievements and made false reports on industrial output value. Local statistical bureaus under pressure from their leading bodies could not help but follow instructions from the local leadership in making false reports on industrial output value in breach of regulations on statistics."²⁶ To what extent industrial output was exaggerated in some places can be demonstrated by the following examples. The petrochemical plant in Taicang City had an actual industrial output value of 115 m Yuan in 1993, but reported an output value of 173 m Yuan, a figure inflated by 50 per cent. The industrial output value of the city's township enterprises was even more exaggerated.²⁷ Representative samples were used by the SSB to correct data on the growth of industrial output in 1994, which was initially reported as being 27 per cent compared to 1993. The direct sample of the SSB, however, indicated a growth of only 18 per cent which was eventually published as the official figure.²⁸ The widespread exaggeration of township enterprises' industrial output figures forced the Ministry of Agriculture to issue a circular banning this practise. The Ministry announced in August 1994, that for the evaluation of enterprises, output value will no longer be used but replaced by new criteria such as sales value, profits and tax contributions.²⁹

Investigations on statistical work continued in the following years. In 1995, 70,000 cases concerning statistics in violation of the law were discovered, among them 20,000 cases of false, deceptive, fabricated or altered statistical data. Again, false reports referred mainly to output of township and town enterprises as well as birth rate registrations. The investigations revealed that "...leading groups in some localities pursuing personal interests by abusing power ..." were chiefly responsible for false reporting.³⁰ A commentary of the official news agency Xinhua in March 1995, warned that the practice of falsifying, doctoring and exaggerating figures would damage the credibility of the party and the government, and could lead to enormous economic losses. At the centre of the problem were "... persons in charge of some localities, departments and enterprises [who] sacrifice the interests of the country and people for the sake of promotion and their individual

²⁴ "Cheating Grows in Gathering of Statistics", in: South China Morning Post, 22.2.94.

²⁵ "Statistics Cheats Disrupt China's Economic Plans", in: South China Morning Post, 18.8.94.

²⁶ "Investigation Launched into False Statistical Reports From Regions", Zhongguo Xinwen She News Agency, Beijing, in English, 19.3.99, in: SWB FE/D1952/CNS, 22.3.94.

²⁷ Circular Issued on "Quite Widespread" Problem of Statistical Exaggerations", Zhongguo Tongxun She News Agency, Hong Kong, in Chinese, 23.3.94, in: SWB FE/D1964/CNS, 6.4.94.

²⁸ See Herrmann-Pillath (1996), p.5. The author referred the statement in Zhongguo Tongji, May 1995, p. 11.

²⁹ For a comprehensive analysis of the deficiencies in data collection in rural China see Cai (2000), pp. 783-805.

³⁰ See "Statistics Campaign Reveals False Reports" and "Seriously Unreliable Information", Zhongguo Tongxun She News Agency, Hong Kong, in Chinese, 23.2.95, in: SWB FE D/2247/9.3.95.

interests by condoning, suggesting, tempting, tacitly allowing, instructing or pressuring staff to grossly falsify statistics."³¹

With inflation running high in summer 1993, the dampening of price increases without slowing down economic growth too much, became the central government's major policy aim. Among the key measures of China's stabilisation policies in 1994 and 1995 were administrative restrictions on investment by state-owned units, restrictions of central bank credit to banks, price control for food, petroleum, fertiliser, coal and steel.³² That inflation decreased from its peak of 25.2 per cent in October 1994³³ to 18 per cent in March 1995, awoke the suspicion of some foreign analysts. They were not only critical of the applied inflation indexes and the use of year-on-year inflation rates, but questioned even the reliability of the officially published data on inflation, claiming the government might have massaged the results. Because of strong political pressure to show falling inflation, they presumed that officials felt forced to report good results.³⁴

By 1996, the central government claimed that a soft landing of the economy had been achieved. Retail prices decreased to 6.1 percent and consumer prices to 8.3 per cent, while GDP had still grown as much as 9.6 per cent. The end of the austerity policy almost coincided in summer 1997 with the Asian crises and its negative effects on China's foreign trade and foreign capital absorption. At the same time, the restructuring of state-owned enterprises had increased urban unemployment, which resulted in bleaker economic expectations for workers in the cities who reduced their consumption. As a counterstrategy against a further slowdown in economic growth, an active fiscal and monetary policy was regarded as key for the creation of new employment and social stability. The target for GDP growth was set at 8 per cent at the beginning of 1998 and local officials were held responsible to achieve this growth rate.³⁵

When the SSB announced an annual growth figures of 7.8 per cent in December 1998, even prime minister Zhu Rongji was surprised. However, he reportedly ridiculed claims that 30 out of 31 administrative regions had attained the government's 8 per cent target and warned officials not to make false reports again.³⁶ Doubts about the accuracy of officially published statistics seemed to be supported by discrepancies between the growth of key expansion indicators such as power consumption and freight traffic compared to GDP growth.

In its publication "World Economic Outlook" of December 1998, the International Monetary Fund (IMF) analysed the question why the gap between the growth rates of GDP and of industrial production on the one hand and of electricity and freight traffic on the other started to widen in the last years. Before 1996, a strong correlation between

31 "Xinhua Commentary Urges Action to Curb Falsification of Statistics", Xinhua News Agency, Domestic Service, Beijing, in Chinese, 2.3.95, in: SWB FE/D2247/CNS, 9.3.95.

32 World Bank (1996), p. vii, p.3.

33 See World Bank (1996), p.3. Data on inflation refers to the retail price index on a twelve-month basis. For statistics on inflation in March 1995 see "Experts Cast Doubt Over State Data on Inflation", South China Morning Post, 23.5.95.

34 See "Experts Cast Doubt Over State Data on Inflation", South China Morning Post, 23.5.95; "Figures Deflate the Miracle", Sunday Morning Post, 28.5.95; "Statistics May not Tell True Story on the Inflation Front", South China Morning Post (China Business Review), 10.8.95.

35 "Reality Check. At Least Premier Zhu Isn't Hiding China's problems", Far Eastern Economic Review, 19.3.99, p. 26; Dongxiang (Trend), Januar 1999, pp.11-13.

36 "Statisticians Promising to Put up Better Numbers", Asian Wall Street Journal, 19./20.2.99.

those indicators had been observed. Therefore, the slow growth in freight traffic and electricity consumption in 1998 should have normally been accompanied by a somewhat lower GDP growth than 7.8 per cent. The IMF explained the low figure of electricity consumption and freight traffic with 1) the decline of the share of industry and especially state owned enterprises which were energy intensive combined with the fast growth of sectors which were less energy intensive, 2) with incentives for energy conservation because of increased prices, 3) with the output decline of the coal industry which influenced the development of freight traffic as coal transportation accounted for around 40 per cent of total freight and 4) referring to deficiencies in the collection of statistical data on electricity consumption and freight traffic, which meant, that electricity output of newly built small-scale power stations and freight traffic carried by the private sector may not have been fully accounted for.³⁷

The IMF acknowledges the scepticism that has arisen because of the low growth of key expansion indicators compared to high growth of GDP. Its explanation helps to understand these discrepancies to some extent and points to the fact, that power supply seems to be no longer the restraint it used to be.³⁸ However, the IMF doubted as to whether statistical data on electricity consumption and freight traffic are entirely reliable and concluded that "... the quality of Chinese statistics remains a major difficulty for both policymakers and outside analysts, both in the national accounts and in other areas."³⁹

3.2 Strategies to counter deviate administrative behaviour

To counterbalance the inherent weaknesses in the statistical system, the central government has introduced various strategies in the course of the years. Pressure to apply legal sanctions was increased through amending the 1983 law on statistics, making the falsifying of statistical data a criminal act.⁴⁰ The publication of investigation reports on "irregularities" in data supplied by official agencies or business is used as means to warn officials not to distort data.

A second approach to increase pressure on the local governments and statisticians not to falsify data was the introduction of new control mechanisms. Representative samples in certain economic areas such as price indices, grain production or urban average incomes have been used to correct data distorted by the interference of local governments.⁴¹ According the SSB, it was on the basis of representative samples collected by SSB teams directly, that the Bureau was able to know the annual economic growth rate of 7.8 per cent as early as December 1998. However, the SSB survey methods have not made transparent and critics questioned how the value of industrial output of factories which cannot sell their goods or at least not sell them for a profit has been determined by the survey teams.⁴²

37 International Monetary Fund (1998), p. 79.

38 See "IMF Defence of China's GDP Figures is Lacking, International Herald Tribune, 24/25.12.98.

39 IMF (1998), p. 78.

40 See Statistics Law, Chapter V, Legal Responsibility.

41 Herrmann-Pillath (1995), p. 11.

42 "Take Mainland Figures with Large Grain of Salt", South China Morning Post, 31.12.98.

Another approach to overcome the problems of inaccurate and false statistics was announced by the SSB at a working conference on statistics in January 1999. The SSB plans to improve the assessment of statistics, expand coverage and will simplify the reporting procedure. The Bureau admitted that "Since statistics are used to assess government performance, local officials sometimes tamper with the figures for personal or departmental interest...".⁴³ The introduction of new sample surveys on enterprise performance by the SSB aims at better reflecting the changes in the economic system. Traditional methods of collecting statistical data were appropriate under the planned economy when almost all enterprises were state owned and their production and sales were determined by the government. These statistics, however, did not include the performance of small-scale private firms. In contrast, the new sample surveys will cover small-scale industrial firms with annual sales of under five million Yuan as well as privately owned wholesale and catering businesses. Another survey will cover around 17,000 enterprises with a sales volume of more than five million Yuan annually. For this survey, the enterprises are required to report their monthly figures directly to the SSB. The direct link of 5,000 major industrial enterprises will be a further innovation concerning survey methods. These enterprises account for 49 per cent of the total of China's industrial sector. To strengthen control of statistic data, especially those on GDP, industrial output value, retail of consumer goods and population growth, the SSB has prepared detailed plans for the central and provincial statistics bureaus to assess reports submitted by local governments.⁴⁴

International cooperation is regarded by the Chinese government as another means to improve the statistical system. The World Bank, the UNDP, the FAO and the IMF account among the most prominent multilateral partners supporting the adaptation of modern methods for the collection, dissemination and use of data. The OECD too, got involved into a cooperation project with the SSB. The objective of the work with China is the development of a basis set of national accounts consisting of a time series of final expenditures on GDP at current and constant prices, together with the income and outlay accounts for the government and household sectors. The lack of reliable price statistics and inadequate coverage of the growing "informal" or "hidden" economy are seen as major problems of the statistical system by the OECD.⁴⁵

Bilateral cooperation between China and the USA, Canada, France, Germany⁴⁶ and other countries exist as well. One of the current cooperation projects with Germany concerns the collaboration with the ifo Institute for Economic Research as the German partner organisation. Beginning in autumn 1999, various surveys of small and medium sized enterprises will be conducted on topics such as enterprise personnel, acquisition and finance to reveal the business climate in China. From next year onwards, a system for the analysis of economic trends will also be introduced with the help of the ifo Institute.

⁴³ That statistics were tampered by local government officials was admitted by the SSB's Director Liu Hong. See "China Improving Statistics Accuracy (1)", Xinhua News Agency, 26.1.99.

⁴⁴ "China to Reform Statistics-Gathering", Xinhua News Agency, 16.1.96, "China Improving Statistics Accuracy (2)", Xinhua News Agency, 26.1.99.

⁴⁵ See "Building the Basic Statistical Set in China", internet: www.oecd.org//sge/ccnm/news/outreach3/china/stat.htm.

⁴⁶ Moore (1996), "Das chinesische Statistiksistem im Wandel. Die Zusammenarbeit mit der deutschen amtlichen Statistik bei der Anpassung an neue Informationsanforderungen", StBA, Wirtschaft und Statistik, pp.289-95.

This project aims at establishing statistical techniques needed for more reliable economic forecasts.

4 Impact of the statistical system's deficiencies on economic analysis

The deficiencies in China's statistical system confront foreign analysts with various problems.⁴⁷ We have to be suspicious that the use of official data to interpret the outcome of economic reform might lead to wrong conclusions. The work of Ravallion and Chen on measuring and explaining income inequality in rural China seems to be a good example for this problem. While official data from household surveys suggested rising income inequality in post-reform rural China, the authors arrived at different findings by using refined micro data for four provinces. They explain this difference by pointing to the fact that the methods in the official household survey have not been sufficiently adjusted to the structural changes in the economic system. Income inequality was much less prominent, when consumption of the rural household's own production were valued at market prices and regional differences in the level of inflation had taken into account. By re-evaluating own-grain production at average local selling prices, imputing rents for housing and consumer durables and taking account of regional cost of living difference, they found that actual inequality was by two-thirds lower than the conventionally measured inequality in the period 1985-90 had shown.⁴⁸

Another problem directly related to China's economic transition which seems to be even more difficult to cope with refers to the exclusion of parts of the economy from data collection. That official statistics do not fully capture the development of the non-public sector, and that the "hidden economy" including large-scale smuggling of consumer durables, cars, petroleum etc. seems to be fairly large, calls the application of complex econometric models into question and reduces the reliability economic forecasts. However, taking China's level of overall economic development into account, we might look at statistical problems from a different angle and agree with some scholar's view that China's economic statistics are fairly reliable by developing country standards.⁴⁹

To be confronted with statistics which are deliberately distorted threatens the confidence in the whole system of data collection. We must be aware that some sensitive data such as industrial output value of township enterprises, grain reserves, population growth or employment figures might only be reliable to a limited extent. On the other hand, new strategies to counter the deviate behaviour of local government officials will hopefully reduce this source of data distortion.

47 For a comprehensive analysis of the repercussions of the flaws in the statistical system on the measurement of industrial concentration see Fischer (2000), *Chinesische Statistik im Umbruch: Konsequenzen für die wirtschaftswissenschaftliche Forschung am Beispiel der Unternehmens- und Industriestatistik*, in: *Asien*, April, pp. 20-43.

48 Ravallion, Martin and Shaohua Chen, *When Economic Reform is Faster than Statistical Reform: Measuring and Explaining Income Inequality in Rural China*. This is a background paper prepared for the publication of the World Bank (1997), *China 2020: Sharing Rising Income*. Internet: netec.mcc.ac.uk/WoPEc/data/Papers/wopwobate1902.htm.

49 See Naughton (1996), p. 327.

References

- Ash*, Robert F. / *He*, Liping (1998): Loss-Making and the Financial Performance of China's Industrial Enterprises: data from the new accounting and statistical system. In: *Journal of Contemporary China*, 7, (17).
- Cai*, Yongshun (2000): Between State and Peasant: Local Cadres and Statistical Reporting in Rural China. In: *China Quarterly*, pp. 783-805.
- Chen*, Kang (1996): *The Chinese Economy in Transition. Micro Changes and Macro Implications*.
- Chow*, Gregory C. (1994): *Understanding China's Economy*, Singapore.
- Eastern Economic Review (1999): Reality Check. At Least Premier Zhu Isn't Hiding China's problems, 19.3.99, p. 26.
- Fischer*, Doris (2000): Chinesische Statistik im Umbruch: Konsequenzen für die wirtschaftswissenschaftliche Forschung am Beispiel der Unternehmens- und Industriestatistik. In: *Asien*, April, pp. 20-43.
- Huang*, Yasheng (1994): Information, Bureaucracy, and Economic Reforms in China and the Soviet Union, *World Politics*, October, pp. 110-1.
- Herrmann-Pillath*, Carsten (1995): *Wirtschaftliche Entwicklung in China, Provinzen und Regionen, ein statistisches Handbuch*, Baden-Baden.
- (1996): Strange Notes on Modern Statistics and Traditional Popular Religion in China: Further Reflections on the Importance of Sinology for Social Science as applied on China, Working Papers on East Asian Studies, Duisburg.
- Inside China Mainland (1999): Statistical Figures and The Appraisal of Achievements in Office, January, p.13.
- International Herald Tribune (1998): IMF Defence of China's GDP Figures is Lacking, 24/25.12.98.
- International Monetary Fund (1998): *World Economic Outlook and International Capital Markets, Interim Assessment*, Washington, D.C.
- Jingji Ribao (1998): Wo guo zhongxin huafen jingji chengfen leixing (Important new classification of economic sectors), 30.9.98.
- Moore*, Waltraud (1996): Das chinesische Statistiksistem im Wandel. Die Zusammenarbeit mit der deutschen amtlichen Statistik bei der Anpassung an neue Informationsanforderungen, *StBA, Wirtschaft und Statistik*, S. 289-95.
- OECD: Building the Basic Statistical Set in China, internet: www.oecd.org/sge/ccnm/news/outreach3/china/stat.htm.
- Naughton*, Barry (1996): *Growing Out of the Plan. Chinese Economic Reform 1978-1993*, Cambridge.
- Rawski*, Thomas G. (1999): Reforming China's Economy: What Have We Learned? *The China Journal*, No. 41, pp. 139-56.
- Statistics Law of the PRC, adopted of the Sixth National People's Congress on 8th December 1983, amended in accordance with the "Decision on Amending the Statistics Law of the PRC", adopted at the 19th meeting of the Standing Committee of the Eighth National People's Congress on 15th May 1996, in: SWB, FE/2633, 8.6.1996.

South China Morning Post (1998): Take Mainland Figures with Large Grain of Salt, 31.12.98.

- (1995): Statistics May not Tell True Story on the Inflation Front, 10.8.95.
- (1995): Experts Cast Doubt Over State Data on Inflation, 23.5.95.
- (1994): Statistics Cheats Disrupt China's Economic Plans, 18.8.94.
- (1994): Cheating Grows in Gathering of Statistics, 22.2.1994.

Walder, Andrew G. (1995): China's Transitional Economy: Interpreting its Significance, *The China Quarterly*, Vol. 144 (December), pp. 963-79.

Woo, Wing Thy (1999): The Real Reasons for China's Growth. In: *The China Journal*, Vol. 41, pp. 115-37.

World Bank (1997): *China 2020. Development Challenges in the New Century*, Washington D.C.

- (1996): *The Chinese Economy. Fighting Inflation, Deepening Reforms*, Washington D.C.
- (1983): *China. Socialist Economic Development. Volume I: The Economy, Statistical System, and Basic Data*, Washington, D.C.

Xinhua News Agency (1995): Xinhua Commentary Urges Action to Curb Falsification of Statistics, Domestic Service, 2.3.95. In: SWB FE/D2247/CNS, 9.3.95, Beijing (in Chinese).

Zhongguo Tongxun She News Agency (1995): Statistics Campaign Reveals False Reports and Seriously Unreliable Information, 23.2.95. In: SWB FE D/2247/9.3.95, Hong Kong (in Chinese).

- (1994): Quite Widespread – Problem of Statistical Exaggerations, Hong Kong, in Chinese, 23.3.94. In: SWB FE/D1964/CNS, 6.4.94.

Zhongguo Xinwen She News Agency (1994): Investigation Launched into False Statistical Reports From Regions, 19.3.99. In: SWB FE/D1952/CNS, 22.3.94.

- (1994): State Statistical Bureau to reform data collection to reflect market economy, In: SWB FE/D1930/CNS, 24.2.94, Beijing (in English).

What's in a number?

The role of statistics in China's contemporary economic research and economic policies

Von Doris Fischer

1 Chinese economic research and economic policy in transition

In February 2001, interested people in China and abroad could witness a rare example of public debate between several Chinese economists. During a TV interview the well-known Chinese economist Professor Wu Jinglian had formulated some criticism concerning the situation and the development of the Chinese capital markets. He especially stressed that the financial markets in China still worked quite similar to "casinos", and that more and better supervision and regulation would be necessary for the markets to function rationally.¹ These remarks immediately called for reactions from some Chinese economists who are famous for their support of the concept of ownership reforms by the means of developing capital markets.² The public discussion that evolved from this dispute went on for several weeks. To an external observer the dispute may have seemed artificial, especially because the positions of the different economists were hardly as controversial as the dispute and the public reactions to it implied. Most interesting in the context of this paper is the point made by Professor Wu that the capital markets are flawed by the massive influence of state capital in the markets, by insider influence and by a lack of reliable information about listed enterprises.

Though the dispute deals with capital market problems, its real background is the unfinished reform of state-owned enterprises. The dispute has thus to be connected with another issue that has been a topic in the Chinese media at least since the beginning of the year 2001: The much-praised recovery of the majority of large and medium debt-ridden state-owned enterprises (SOE) during the last three years. This program had been announced in autumn 1997 in the wake of the XVth Party Congress. Its importance had been repeatedly stressed during the following months and finally been fixed within the government report in March 1998.³ Prime Minister Zhu Rongji himself made the program a central task of the reforms lying ahead at that time, just as he announced an economic growth target for 1998 of at least 8.0 percent.⁴ While the growth target had been subject of national and international criticism during the year 1998, being interpreted as a relapse into planning economics, the reform target for SOE was broadly welcomed.

¹ Zhonghua Gongshang Shibao, 13.2.2001.

² See Casinos by Another Name?, in: Far Eastern Economic Review, 8.3.2001, pp. 46-47, and Zhonghua Gongshang Shibao, 12.2.2001.

³ See for example Renmin Ribao, 18.12.1997, reporting about the annual meeting of the Central Economic Working Group.

⁴ See Heilmann, Sebastian (1998), p. 278; Wu, Jiajun (2001), p.18.

Given the economic development in China since 1998, it was nevertheless surprising to hear that the reform plan had "basically" been realized.⁵ It thus seems necessary to have a deeper look into the data on which such appraisals are based.

The two examples of recent economic issues debated in China have several things in common: they concern the enterprise reforms in China, especially the situation of the SOE. In both examples the question of the quality of public information is vital for evaluating the impact of the points made, and both examples deal with political sensitive issues. The difference between the two examples lay in the fact that one is focussing on an intellectual or research debate, the other on political propaganda. At least, that seems to be the difference at a first glance. Actually, the separation between a research and a political realm of economic discussions in China is hardly that clear. Prof. Wu is not only a well-known researcher in China, but the vice-president of the Research Institute of the State Council. As such he regularly "teaches" to political cadres and is highly exposed in the media. Apart from this, the timing of his remarks concerning the Chinese capital market did coincide with the National People's Congress annual session and with new campaigns and regulations against fraud in the capital markets. Actually, such an important issue as the public critique of the capital markets could hardly be articulated in the mass media had there not been political back-up for Wu's interpretation.

Vice versa, the ongoing appraisal of the SOE's recovery is not something limited to political pamphlets or speeches of politicians. Material supporting the success story has been published and repeated in mass media and research magazines for quite a while.

2 Statistical information in research and politics

Economic research on China has experienced a rapid development since the beginning of the reform. In the first thirty years of the People's Republic, Chinese research in economics had been basically limited to "orthodox" reasoning on the basis of the works of Marx and Lenin (i.e. *zhengzhi jingjixue*). Though there had been politically important debates concerning the correct interpretation of socialist economic policies,⁶ in terms of theoretical studies and progress in economics, these years have been hardly influential. The beginning of the reform process allowed a new perspective on Chinese economic policies and gradually led to an "opening-up" of the economic debate to western theories and concepts. Since then Chinese economists have made every effort to catch up in economic theory by studying abroad and translating western economic literature. During this process several different approaches to western economics could be discerned: While some scholars use their knowledge in Western economics as a means to become famous in China, others strive to become internationally recognized.⁷ Similar, we can observe economists who indulge in "pure" theory while others strive to make use of economic theory to analyse the Chinese economic situation, develop reform strategies etc. A third line of differentiation lies in the use of statistics and mathematics: Before the reform, statistics and mathematics did hardly matter at all for economic reasoning and access to statistical data apart from production numbers was very limited. Since the

⁵ See National Bureau of Statistics 06.03.01.

⁶ See for a summary of these disputes Wei Xinghua (1999), p. 3-11

⁷ See Fischer, Doris (2000a), pp. 190-195.

beginning of the reform the statistical system has been reorganized. Today much more statistical information is available. While the official statistics still dominate, alternative means to collect empirical information have been permitted.

Nevertheless, the use of statistical data on China is still a problem. Though some Chinese economists blame their colleagues for not being well enough trained in modern quantitative analysis,⁸ this might not be the only reason why many economists still shrink back from in-depth statistical analyses: The quality of the official statistical data may be one important argument, the limited access to reliable statistical material another. Interestingly though, while even Chinese experts frequently criticize fraud and manipulation within the Chinese statistical system, these shortages are no topic within the Chinese debate on the status quo and development perspectives of Chinese economic research.⁹

One important aspect in this context is the question to what purpose statistical data is collected and published. In the past, the statistical data was mainly intended to inform the government, to provide means to control plan fulfilment etc. The published part of the statistical data first of all followed propaganda needs. This was best proven by the commonly known fact that published data were more or less deliberately manipulated while so-called "internal material" with supposedly more accurate data was available only to certain politicians, bureaucrats and other economic actors. With growing international presence and growing dependence on international trade as well as foreign investors, the purpose of collecting and publishing statistical data had to become more service-oriented. Accurate and international comparable statistical data may be a means to enhance investors trust into the transparency and stability of the Chinese economy and thus an asset within the international competition for foreign investment.

To summarize the basic problems of the current Chinese statistical system we can concentrate on three issues:¹⁰

2.1 Alignment of the Chinese statistical system with international standards

Before the beginning of the reform and still during the eighties the Chinese statistical system was similar to other socialist countries' statistical systems in using the material product system (MPS). This system was quite satisfying in collecting the information needed for the planning authorities of the former socialist economy. With progressing economic reforms, though, this system proved insufficient to either supply the Chinese government with necessary and useful data or to allow comparative analysis within an international perspective. The need for better and more reliable information as well as pressure from outside, for example from the World Bank, resulted in efforts to reform the Chinese statistical system and to adopt the international standard of the System of National Accounts. This alignment process, which in itself is a welcomed development, is still going on. Major problems resulting from the piecemeal alignment process are time inconsistencies of data sets and often changing definitions of data units. With fur-

⁸ See for example Fan Yuejin; Yin Yujie (2001), p. 106.

⁹ See for example Yu Guangyuan; Dong Fureng (1997).

¹⁰ See Fischer, Doris (2000b), pp. 22-28; Rawski, Thomas G. (2001), pp. 25-34. See also the paper of Margot Schüller in this volume.

ther integration into the world economy, especially following China's accession to the WTO, the Chinese statistical system will have to further adapt international standards. The problem of inconsistencies of statistical time data sets will therefore continue to limit the quality of long-term analyses.

2.2 Mistakes and manipulation within the process of data collection and publication

The transformation of the statistical system according to SNA standards may in itself be a source for mistakes as this transformation depends on reforms in the system of data collection and reporting at every hierarchical level of the statistical system. Personnel within the enterprises and within the statistical bureaux at grass-root level have to be retrained to learn the new standards. As the Chinese statistical system has undergone such a rapid change and is still in a constant process of reform, it is easily understood that these changes alone can be source of faults and mistakes.

In addition to the argument of change, there are institutional sources for mistakes and manipulations to be taken into account. The most important of these institutional sources are the incentive structures for political careers within the Chinese bureaucracy and party hierarchies. The reputation and career chances of political cadres depend to a great extent on the economic situation (for example growth rates) and the degree of fulfilment of national policy strategies (for example the reform of state-owned enterprises) within the administrative or regional entity they are responsible for. While the first aspect – economic development – could be a reasonable criteria for upward mobility within the political hierarchy, problems arise when a lack of separation between "party" and "government" or "party" and "administration" allows for the political actors to manipulate official statistics. The need to document compliance with national economic policies only strengthens the incentive to recur to fraud and false reports.

2.3 Information control in a non-liberalized political system

While one can assume that the central government and the upper echelons of the Party would welcome less fraud and manipulation within the statistical data collected regionally and at the lower tiers of the statistical administration, it can not be ignored that we still have numerous examples of data manipulation at the national level.

Though the Chinese government denies the deliberate manipulation of statistics, even in recent years such manipulation had to be assumed for the statistics on GNP growth, employment etc.¹¹

Even in democratic systems the government, that is the ruling party, would sometimes probably like to manipulate statistical data if this could enhance its reputation and the chances of its re-election. Within a democratic system, though, there exist opposing parties which would protest against such manipulation. In addition, direct interference with the tasks of the statistical administration would not be allowed. If such manipulation occurred, the responsible people would have to fear legal consequences as well as

¹¹ See Rawski, Thomas G. (2001), p. 29.

media coverage. The checks and balances within a system of democratic rules and freedom of press are the main guarantees to prevent manipulation of statistical data for political targets.¹²

In China these two countervailing factors do not work. We do not have any institutionalised opposition and no freedom of press. Criticism concerning the flaws of the Chinese statistical system is published and can be published as long as it does not question the basics of the political system. Thus, while we find numerous reports on statistical problems resulting from false reports at the lower hierarchical levels there is few discussion of the systemic flaws resulting from political control of information and media.

This paper will document the above-mentioned changes and problems of the statistical material using the example of statistics available for industrial enterprises. All three aspects – changes in the statistical system, mistakes and manipulation arising from a decentralised and changing system as well as manipulation for the sake of national policies – can be traced down within the industrial statistics.

3 The Example: Industrial Statistics

Current statistical problems within the industrial statistics result to a large extent from the characteristics of the Chinese enterprise reforms. The focus of the following analysis will concentrate on this aspect. Other sources of problems such as the reform of business calculation and bookkeeping, the price reforms etc. will not be considered in detail.

3.1 Enterprise Reforms

Enterprise reform in the industrial realm started during the 1980s. Though the reform of the state-owned enterprises was always seen crucial for the overall reform success, its progress has been limited throughout the 1980s and of questionable results during the 1990s. The limitations of the reform progress during the 1980s have resulted from the particular characteristics of the reform targets and measures.¹³ The reforms actually were based on a mixture of direct or active, and indirect or passive strategies. The active strategies aimed at boosting the situation of the SOE by mainly revising management principles and enlarging the rights of the enterprise management. A privatisation of SOE has not been included in these reform strategies, and is still not the official target of SOE reform even today. The passive or indirect reform approach included the reemergence of a private sector and the tolerance of quasi-privatisation and asset-stripping. While privatisation has not been part of the official reform agenda, the competitive pressure evolving from the private sector was one of the factors forcing the government to proceed with SOE reforms during the 1990s.

During the 1990s the government has proceeded along a different reform path: State-owned enterprises have been led through a process of incorporation, with a certain part

¹² The importance of democratic principles for the quality of statistics is stressed by von der Lippe, Peter (1999), pp. 17-20.

¹³ See for a more detailed analysis Fischer, Doris (2000a), pp. 319-331.

of them being transformed into share-holding enterprises. This incorporation has been described as a "separation of enterprises and government", the interpretation being that the government institutions in charge of enterprises have less influence on (daily) management decisions if a modern enterprise management with clarified property rights and governance structures is introduced. The reemergence of a private sector as well as the incorporation process have resulted in a reform program that can be characterized as "pluralization without (open) privatization".

The incorporation of state-owned enterprises was soon accompanied by a redefinition of the role of state-owned enterprises and of the government's attitude towards them. Since 1997 the official target of state enterprise reforms, characterized as "strategic reorganization" as well as "zhua da, fang xiao" (to take command of the large ones and let the small ones go),¹⁴ is to concentrate central government support mainly on a selection of large enterprises in strategic branches. Similarly, provincial governments have selected larger local enterprises for special support, while the smaller state-owned enterprises were allowed to be closed, merged or sold. The above mentioned policy of striving for a recovery of the majority of large and medium debt-ridden SOE within three years, started in 1997/98, has been part of this strategic reorganization policy.

The reform process as summarized above has influenced the statistical data in numerous aspects which shall be summarized and exemplified for industrial enterprises and statistics.

3.2 Enterprise statistics reform

Chinese enterprise reform was accompanied – necessarily – by a change of vocabulary, of statistical categories, and bureaucratic responsibilities. The correct grasp and counting of enterprises has been a topic discussed by Chinese statisticians since the 1980s.

During the eighties, industrial statistics continued to use the traditional socialist enterprise categories: "owned by the people" (*quanmin suoyou*) and "owned by a collective" (*jiti suoyou*). Enterprises not fitting into these two categories were summarized under the category of "other forms of industry" (*qita leixing gongye*). These traditional categories became increasingly misleading because of the growing share of the "other forms of industry" and changes in the understanding of "ownership".

Parallel to changes in the system of national accounts, the statistical categories for industrial enterprises were newly defined in 1992. Nine different categories were introduced: state-owned, collective, individual, private and cooperative (joint) economy, as well as share-holding enterprises, foreign investment enterprises and enterprises funded

¹⁴ The "strategic reorganization" (*zhanluexing tiaozheng*) added an aspect of industrial policy to the earlier "zhua da, fang xiao" policy. The latter had already been initiated in 1995. In addition, "zhua da" especially meant to concentrate efforts on management patterns within large SOE, while the strategic reorganization focused on the optimization of the state's shareholding in SOE. See McNally, Christopher; Lee, Peter Nansheng (1998), p. 22; SOE reform working group of the Chinese Academy of Social Sciences (1999), p. 25.

Table 1
Categories of "economic character" in official statistics (1999)

No.	Categories and structure
1	<i>Public economy (gongyou jingji)</i>
11	state-owned economy (guoyou jingji)
12	collective economy (jiti jingji)
2	<i>Non-public economy (fei gongyou jingji)</i>
21	private economy (siying jingji)
22	economy funded by investments from Hong Kong, Taiwan and Macao
23	economy funded by foreign investments

Source: Jingji Ribao, 15.10.1998.

Table 2
Classification and Numbering of enterprises by registration (1999)

No.	registered types of enterprise
100	<i>Enterprises with local capital</i>
110	state-owned enterprises
120	collective enterprises
130	joint stock enterprises
140	enterprises with joint management
141	state-owned joint enterprises
142	collective joint enterprises
143	state and collective owned joint enterprises
149	other jointly run enterprises
150	limited liability corporations
151	wholly state-owned limited liability corporations
159	other limited liability corporations
160	share-holding corporations
170	private enterprises (siying qiye)
171	private one-investor enterprise (siying duzi qiye)
	private cooperative enterprises (siying hehuo qiye)
173	private limited liability corporations
174	private share-holding corporations
190	others
200	<i>Enterprises funded with capital from Hong Kong, Taiwan and Macao</i>
210	equity joint venture
220	contractual joint venture
230	wholly foreign-owned enterprises
240	share-holding enterprises
300	<i>enterprises with foreign capital</i>
310	equity joint venture
320	contractual joint venture
330	wholly foreign-owned enterprises
340	share-holding enterprises

Source Jingji Ribao, 15.10.1998.

by entrepreneurs ("compatriots") from Hong Kong, Taiwan and Macao.¹⁵ The new classification was more detailed, but still unspecific in terms of the criteria selected for classification. While the categories "state-owned" and "collective" are based on a rather unspecific concept of ownership, other categories such as the share-holding enterprises represented a legal form. In the following years the nine categories were explained as representing different types of "economic character". In addition, different types of legal persons such as limited liability companies, enterprise groups etc. were used in the economic literature, but were seldom used within statistical reports.

In 1998 the Chinese government announced a new reform of the enterprise statistics. The systems of classification for (industrial) enterprise statistics and for the registration of enterprises were separated, with the former applying a revised version of the concept of "economic character", and the latter referring strictly to the legal form of the enterprises (see table 1 and 2).

The main differences between the new classification and the system used since the beginning of the 1990s is the disappearance of the so-called individual-owned enterprises (*geti*) which are now counted and registered as private enterprises. In addition, within the types of economic character, the collective economy is counted as part of the public sector. Enterprises registered as "jointly managed", share-holding corporations etc. should be integrated into the categories of "economic character" according to their structure of assets. For example, according to official explanations to the reform, assets of an enterprise with more fifty percent state capital, twenty percent of collective and thirty percent of capital funded by investors from Hong Kong, Taiwan and Macao would in the past have completely been integrated into the category of state-owned economy, it should in future be integrated into the different types of economy accordingly.¹⁶ These changes reflect the "spirit" of the XVth Party Congress in 1997 that pointed to the importance of the private economy and liberated it from the stigma of capitalism. The category of individual-owned enterprises, that so far had been assumed to be political more correct (as it was reserved for small enterprises with less than eight employees), was no longer necessary. Similarly, the use of the term "public economy" for state and collective ownership followed a reinterpretation of the characteristics of socialist economy presented at the Party Congress.¹⁷

Table 3
Calculation of state-ownership in change

number in thousand	1994	1995	1996	1997	1998	1999
1. SOE	102,2	118	113,8	98,6	-	-
2. SOE and enterprises with majority stake state capital	-	-	127,6	110	64,7	61,3

Source: Data for 1. according to CSY 1998, p. 431, data for 2. according to CSY 2000, p. 407.

15 Interestingly, the first bilingual China Statistical Yearbook (CSY) 1994 speaks of "guoyou jingji, jiti jingji" etc. but translates the word "jingji" (economy) into "enterprise".

16 See Jingji Ribao, 15.10.1998.

17 See Lam, Willy Wo-lap (1999), pp. 325-327.

It is still unclear whether it will be possible to ensure the correct classification and counting especially of the jointly managed or jointly owned enterprises in practise and how this new classification method will influence industrial statistics, especially the data for state-owned enterprises. The Statistical Yearbook of 1999, presenting data for 1998, does not provide the usual tables with "main indicators" for state-owned enterprises. The Statistical Yearbook of China 2000 is still applying the former categories of enterprises in the time-series statistics for all industrial enterprises, with an adjustment to the classification of state-owned enterprises starting from 1996 (table 3). According to this data, state ownership was higher in 1996 and 1997 due to the new method of counting, but was reduced considerably between 1996 and 1999. The decrease between 1997 and 1998 is probably a result of the statistical reform introduced in 1998 as described above.¹⁸

The traditional detailed tables for state-owned enterprises are titled "Main indicators of state-owned enterprises and enterprises with a majority of state held shares by industrial branch" and "Main Indicators of Economic Benefit of state-owned enterprises and enterprises with a majority of state held shares by industrial branch" accordingly within the CSY 2000.¹⁹ If we look into the data for the total number of industrial enterprises we actually find a considerable statistical increase of the state-ownership.

Unfortunately, this increase in the share of state-ownership can not (solely) be explained by the change in the classification of enterprises. Between 1997 and 1999 other changes within the industrial statistics have added to the questions concerning time consistency and reliability of enterprise data.

Between 1998 and 1999 the CSY shifted from presenting detailed data for "industrial enterprises with independent accounting system" to presenting data for "industrial enterprises of all state-owned and non-state owned enterprises above designed size", the latter being defined as non-state enterprises with annual sales income above 5 million yuan.²⁰ As shown in table 5, even before 1998 detailed data for industrial enterprises, referring to enterprises with independent accounting systems represented only a small share of all industrial enterprises. Since 1998 the new category even reduces the number of enterprises represented in the detailed statistics. In terms of gross output, the only data available for all categories throughout the period 1994 to 1999, the sub-categories represented more than 70 percent in 1994 and next to 60 percent in 1999. Obviously, the change in definition between 1997 and 1998 has reduced the number of enterprises observed considerably but not the share in gross output. Either the former category integrated a huge amount of enterprises not producing anything at all, or the new category integrates some very large enterprises that were not counted previously because they did not have an independent accounting system.

18 The hint to the reform of statistical classification is the annotation that "Adjustment was made on 1998 data by different types of ownership to make them comparable with data of previous years". CSY 2000, p. 407.

19 This is the translation of the Chinese headings. The English translation given in the CSY is "... state-owned and state holding shares industrial enterprises...". CSY 2000, p. 429.

20 CSY 2000, annotation p. 410.

Table 4

Share of SOEs in the total number of industrial enterprises

	Share of SOE (1997) and enterprises with a majority of state held shares (1999)		growth in share 1997 to 1999
	1997	1999	
Total	15,3	37,1	142,5
large	66,7	-	
medium	60,5	-	
small	13,4	-	
Tobacco Processing	72,6	88,1	21,3
Gas Production and Supply	71,5	86,4	20,9
Petroleum and Natural Gas Extraction	62,7	88,0	40,5
Logging and Transport of Timber and Bamboo	61,7	98,8	60,0
Tap Water Production and Supply	43,3	93,8	116,5
Electric Power, Steam and Hot Water Production and Supply	36,8	87,0	136,5
Medical and Pharmaceutical Products	35,3	51,1	44,8
Food Processing	28,8	55,4	92,2
Food Manufacturing	28,6	52,5	83,8
Printing and Record Medium Reproduction	22,0	63,9	191,0
Nonferrous Metals Mining and Dressing	21,9	47,5	116,7
Beverage Manufacturing	21,5	56,4	161,7
Special Purpose Equipment	21,2	46,4	118,9
Transport Equipment	19,9	45,7	129,8
Instruments, Meters, Cultural and Office Machinery	19,6	44,2	126,2
Chemical Fiber	14,7	32,4	120,9
Ordinary Machinery	13,6	35,0	157,0
Electric Equipment and Machinery	12,8	25,6	100,2
Rubber Products	12,1	25,0	106,1
Ferrous Metals Mining and Dressing	12,0	32,2	169,0
Papermaking and Paper Products	11,7	26,0	121,3
Nonmetal Mineral Products	10,7	34,5	222,9
Nonmetal Minerals Mining and Dressing	9,1	39,4	335,3
Cultural, Educational and Sports Goods	8,4	17,2	103,4
Plastic Products	7,9	19,2	143,8
Metal Products	7,9	20,8	164,7
Timber Processing, Bamboo, Cane etc.	7,5	31,6	323,5
Leather, Furs, Down and related Products	6,9	13,3	93,7
Other Manufacturing	6,1		
Furniture Manufacturing	6,0	20,9	248,5
Garments and other Fiber Products	5,4	12,0	120,7

Source: calculations according to CSY 2001 pp. 414 and 424.

Table 5

Different entities of industrial enterprises presented in the CSY

	1994	1995	1996	1997	1998	1999
number in thousand						
1. all industrial enterprises	10017	7342	7987	7923	7975	7930
2. industrial enterprises with independent accounting system	465	510	506	469		
3. all industrial SOE and non-state industrial enterprises above designed size					165	162
gross output in billions yuan						
1. all industrial enterprises	7018	9190	9960	11373	11905	12611
2. industrial enterprises with independent accounting system	5135	6835	5495	6835		
3. all industrial SOE and non-state industrial enterprises above designed size					6774	7271

Source: CSY 1995 to 2000.

The increase in the share of SOE as documented in table 4 is at least in part a result of the reduction in the total numbers of industrial enterprises caused by redefinition of the categories. Hence, the increase in the share of SOE does probably not indicate an increase of the number of SOE between 1997 and 1999, but their higher presence and greater relative importance among the larger enterprises.

If these examples are sufficient to create confusion about the real number of industrial enterprises and state ownership within this sector, other data, not coming from the CSY, does not help to clarify the situation.

Table 6

SOE statistics 1999 according to the "State-owned enterprise efficiency working group" within the Ministry of Finance

enterprise category	number of enterprises	net profits (billions Yuan)
all SOE (without financial enterprises)	217.000	114,58
SOE at central level	22.000	95,42
SOE at local level	195.000	19,09
large SOE	9012	148,48
SOE with controlling majority of the state	24712	101,21
quoted corporations	856	60,40
other stock corporations	2170	13,58
joint ventures	1784	11,42

Source: State-owned enterprise efficiency working group: 1999 nian woguo guoyou qiye jingying xiaoyi tongji fenxi, in: Zhongguo gongye jingji, Vol. 2000, No. 9, pp. 23-24.

Table 6 quotes 1999 data for all SOE enterprises, i.e. not limited to the industrial sector (but excluding financial enterprises). We would expect the number of SOE to be higher than in table 3, considering that enterprises of the service sector etc. should be included. But, surprisingly, the total number of SOE – including those with a controlling majority of the state – is considerably lower than the number given in the CSY 2000, amounting only to a third of the respective number quoted in table 3.

Also, these data, still counting for 22.000 SOE at central level, do not seem to reflect a successful implementation of the "strategic reorganisation" or "zhua da, fang xiao" policies propagated since 1997.

3.3 Progress, deficits and manipulation

The examples of changes within the statistical categories presented above demonstrate the problems incurring for statistical analysis in times of economic transition. They are not necessarily a result of intended manipulation. In case that the new categories are better in reflecting the relative importance of the state sector or in reducing the costs of data collection, they even represent a certain progress within the statistical system. Unfortunately, though, we are regularly reminded, that data manipulation is still part of the political work.²¹

The central governments' policy of strategic reorganisation was accompanied by the selection of 300 SOE as priority enterprises (*guoyou zhongdian qiye*) in 1996. These enterprises were supposed to be very large, very successful, and to have extraordinary perspectives for future development. The program obviously intended to provide them with special support for their reorganisation into modern enterprises and other reform tasks. In 1997 the number of priority SOE was increased to 512,²² in 1999 the State Economic and Trade Commission redefined the program by adding some "extraordinary strong" non-state enterprises. The program was renamed into "State priority enterprises" (*guojia zhongdian qiye*).²³

The Information Center of the State Economic and Trade Commission regularly publishes reports concerning the economic development of the priority enterprises, the annual reports for the years 1998-2000 can be found within the internet presentation of the commission. At first glance, the reports create the impression of an accurate and detailed information concerning the economic performance of the enterprises. A closer look into the data, though, a selection of which is presented in table 7, reveals a much more fragmented picture resulting from the following defaults:

- Data for 1998 is not published in the report concerning that year, but year-to-year growth rates are given in the data for 1999.

21 I would disagree with the opinion of John Wong (2001), p.58, that "virtually all serious China scholars agree that the Chinese government has not engaged in any deliberate falsification of statistical data, for the simple reason that it is technically and administratively impossible for a government to deliberately manufacture statistics[...]" (italics added by D.F.). We have examples that such falsification has been possible in other countries.

22 See Zhu Yong (2001), p. 5.

23 See GJJXZ (2000), p.1.

Table 7:
Statistical Data concerning priority enterprises

	1998	1999	2000
Number	512	520	516
Gross industrial production (GIP) in prices of 1990		1609,56	1845,28
Sales revenue		2985,5	3421,39
Exports		127,90	174,21
Total tax and profits		302,94	465,83
profit	67,62	110,52	229,88
asset liability ratio	58,36	b) 57	55,1
sales ratio		a) 99,6	99,6
	b) 99	b) 99,2	
number of loss-making enterprises (LME)		52	60
total loss of LME		9,72	8,99

	1998		1999		2000	
Share in all industrial enterprises	off.	own	off.	own	off.	own
Number			0,3	0,3		
total assets			54,9		58,2	
GIP				24,8		
Sales revenue			42,7	42,7		
Total tax and profits			45,2	56,2		
profit	137,9		48,3	48,3	53,9	
			b) 50,2			
year per year growth	off.	own	off.	own	off.	own
Number				-1,5		7,7
GIP	a) 10,8		12,9		16,4	14,6
	c) 11,3					
Net industrial production			15,1			
Sales revenue			12,5		17,3	14,6
Exports					35,6	36,2
Total tax and profits			b) 14,7		39,7	53,8
profit			b) 24,5		70,7	108
number of LME						15
total loss of LME			-30,3		-10,5	-7,51

a) as given in the annual report

b) as calculated according to growth statements in the report of the following year

d) as given in the introduction of GJJXZ (2000) (p.1)

e) as given in the final part of GJJXZ (2000) (p.5)

f) as given in GJJXZ (2001b)

Source: If not commented otherwise, official ("off.") data for 1998 according to Almanac of China's Economy 1999, p. 726; data for 1999 according to GJJXZ (2000), data for 2000 according to GJJXZ (2001a). Own calculations ("own") based on the official numbers as given in the tables and CSY 2001.

- Apart from total assets and total profits, the share of the priority enterprises in all industrial enterprises has not been published for a number of economic indicators within the report of 2000.
- Growth rates published deviate considerably from growth rates resulting from own calculations based on the published nominal data. Especially, the growth rates pub-

lished for 2000 are lower in categories of profits etc. if compared to calculations based on the report for 1999, giving a less favorable picture. On the other hand the official numbers and indices published for loss-making enterprises paint a better picture for 2000 in comparison to calculations based on the published report for 1999.

These discrepancies within the data published by the State Economic and Trade Commission may be a result of growing sophistication in data collection among the priority enterprises and changes in the number and categories of enterprises included into the program.²⁴ Still, in this case, the growth rates etc. presented by the Information Center would have to be commented accordingly. Such comments are lacking, raising doubts that the unexplained deviations of official data from formerly published data are used politically.

Unfortunately, the numbers and indices published in the reports of the Information Center are cited and republished again and again by newspapers and economic research magazines. Critical recalculations as presented in table 7 are never published, supporting the impression that data concerning SOE is still a highly political issue, with researchers refraining from doing in-depth analyses or from questioning the official material in public.

If we reconsider the above examples concerning industrial enterprise statistics, and if we extend the experiences to information available for whole industries and listed companies, the argument of Prof. Wu Jinglian, that China's stock markets can be compared with a casino, receives its persuasive power just from the fact that we have to have serious doubts concerning the quality of information available. Even if we assume that reporting by the listed companies is gaining in quality, it is still impossible to deduce reliable indices for their relative importance within a certain branch or for the relative importance of state-ownership within share-holding corporations etc.

The policy of enterprises restructuring with the target of getting a majority of the large and medium SOE in dire straits rescued within three years, and the appraisal of the success since the year 2000 has to be evaluated in the light of the analysis presented above. The stereotype description of the success story of this policy is that of the original 6599 SOE integrated into the program, until the end of 2000 next to 4000 had escaped from "misery" (*tuo kun*) (the detailed numbers vary). Unfortunately though, the total number of large and medium enterprises in 1997 was next to 15.000. The question is: what has happened with the more than 8.000 enterprises that were not in dire straits in 1997? How have they performed during the respective three years? Have their profits increased or have they slid into misery? And if so, has this happened because government support had been concentrated on the 6599 SOE that were in the red in 1997? An evaluation of the three year revitalisation program would only be reliable, if such comparative data were available.

²⁴ GJXZ (2001a) contains an annotation explaining that three enterprise groups had been restructured or closed since 1999.

References

- China National Bureau of Statistics: China Statistical Yearbook, Beijing, various issues.
- Fischer, Doris* (2000a): Aufbau einer Wettbewerbsordnung im Transformationsprozess – Problematisierung am Beispiel der wettbewerbstheoretischen Diskussion und der Wettbewerbspolitik in der VR China (Schriftenreihe zur Ostasienforschung Band 13), Baden-Baden: Nomos.
- (2000b): Chinesische Statistik im Umbruch: Konsequenzen für die wirtschaftswissenschaftliche Forschung am Beispiel der Unternehmens- und Industriestatistik. In: ASIEN, Vol. 2000; No. 75, pp. 20-33.
- Guojia jingmaowei jingji xinxi zhongxin (2000): 1999 nian guojia zhongdian qiye yunying baogao (Report on the performance of the national priority enterprises in 1999), www.setc.gov.cn/zdqy/setc_zdqy_main08.htm.
- (2001a): Chixu fazhan de guojia zhongdian qiye, www.setc.gov.cn/zdqy/setc_zdqy_main88.htm.
 - (2001b): 2000nian 1-12 yue zhongdian qiye shengchan jingying kuaibao, www.setc.gov.cn/zdqy/setc_zdqy_main53.htm.
- Heilmann, Sebastian* (1998): Die neue chinesische Regierung: Abschied vom sozialistischen Leviathan. In: China aktuell, Vol. 1998, No. 3, pp. 279-287.
- Lam, Will Wo-Lap* (1999): The Era of Jiang Zemin, Prentice Hall: Singapore et al.
- McNally, Christopher / Lee, Peter Nan-shong* (1998): Is Big Beautiful? – Restructuring China's State Sector under the Zhuada Policy. In: Issues & Studies, Vol. 34, No. 9, pp. 22-48.
- National Bureau of Statistics (06.03.01): Gongye jingji zhan xinyan (The industrial sector develops new perspectives), <http://www.stats.gov.cn/ztxw/jwxl/200103210060.htm>
- SOE reform working group of the Chinese Academy of Social Sciences (1999): Kua shiji Zhongguo guoyou qiye de gaige yu fazhan (Reform and development of China's SOE at the turn of the century). In: Zhongguo gongye jingji, Vol. 23-33.
- State-owned enterprise efficiency working group: 1999 nian woguo guoyou qiye jingying xiaoyi tongji fenxi (1999 Statistical analysis of the management efficiency of our state-owned enterprises). In: Zhongguo gongye jingji, Vol. 2000, No. 9, pp. 23-29.
- Rawski, Thomas G.*: China by the Numbers. In: China Perspectives, Vol. 2001, No. 33, pp. 25-34.
- von der Lippe, Peter* (1999): The Political Role of Official Statistics in the former GDR (East Germany). In: Historical Social Research, Vol. 24, No. 4, pp. 3-28.
- Wei, Xinghua* (1999): Wushinian lai wo guo zhongyao jingji lilun fazhan de huigu yu pingxi (di yi bu) (Retrospective and Evaluation of important developments in our country's economic theory during the past 50 years). In: Jingjixue Dongtai, Vol. 1999, No. 11, pp. 3-11.
- Wong, John*: Understanding Recent Changes in China's Statistical System. In: China Perspectives, Vol. 2001, No. 35, pp. 56-61.
- Yuejin, Fan / Yujie, Yin* (2001): Zhongguo jingjixue ruhe tiaozhan nuobei'er jiang (How Chinese economists can fight for the Nobel Prize). In: Jingji xuejia, Vol. 2001, No. 1, pp. 101-107.

Wu, Jiajun: Guoyou qiye tuokun de jinzhan he jinhou de keti (Progress and future challenges concerning the task of getting state-owned enterprises out of their misery). In: *Zhongguo gongye jingji*, Vol. 2001, No. 2, pp. 17-23.

Die chinesische Umweltstatistik: Eine materialkritische Einführung*

Von Björn Alpermann

Angesichts der drängenden ökologischen Herausforderungen der Volksrepublik China (VRCh) hat der Umweltbereich in der westlichen China-Forschung im letzten Jahrzehnt eine wachsende Bedeutung eingenommen.¹ Während sich manche Studien direkt mit den zum Teil katastrophalen durch Wirtschaftswachstum und Bevölkerungsdruck hervorgerufenen ökologischen Problemen befassen,² legte eine große Zahl von Arbeiten ihren Schwerpunkt auf die organisatorischen oder rechtlichen Aspekte des chinesischen Umweltschutzes.³ Sowohl zur Beurteilung der bestehenden Schäden wie auch der Effektivität des Umweltschutzes ist eine verlässliche Datengrundlage essentiell. Hierbei spielen von chinesischen Behörden erhobene und bearbeitete Umweltstatistiken eine entscheidende Rolle.

Obwohl die Schwierigkeiten, vor welche die China-Forschung immer wieder durch unzuverlässige oder widersprüchliche offizielle Statistiken gestellt wird, keineswegs neu sind und schon vielfach erörtert wurden, ist doch eine kontinuierliche und differenzierte Betrachtung der amtlichen Statistik unentbehrlich. Dies liegt an fortwährenden Veränderungen in Untersuchungsgegenständen und Erfassungsmethoden sowie an den Eigenheiten der verschiedenen Bereiche amtlicher Statistik. Gerade die Umweltstatistik im engeren Sinn ist bisher kaum Gegenstand westlicher Untersuchungen geworden. Die Diskussion ökologisch relevanter Zahlenangaben chinesischer Behörden beschränkte sich weitgehend auf die Forstwirtschaft und den Agrarsektor, die nicht Umweltschutzämtern, sondern Forst- und Landwirtschaftsämtern unterstehen.⁴ Auch in der chinesischen Fachliteratur spielte die Umweltstatistik bisher eine untergeordnete Rolle. So ergab eine Sichtung der beiden vom Chinesischen Statistischen Amt herausgegebenen

* Bei diesem Beitrag handelt es sich um eine ausgearbeitete Fassung eines Vortrages, der auf dem China-Workshop Iserlohn 2000 gehalten wurde. Ich danke Doris Fischer, Jutta Ludwig, Andreas Oberheitmann und allen anderen Beteiligten für die angeregte und anregende Diskussion.

1 Einen guten Überblick über diese Herausforderungen bieten: World Bank (Hrsg.): *Clear Water, Blue Skies. China's Environment in the new Century* (Washington, D.C.: World Bank, 1997); Dirk Betke: „Umweltkrise und Umweltpolitik“, in: Carsten Herrmann-Pillath; Michael Lackner (Hrsg.): *Länderbericht China. Politik, Wirtschaft und Gesellschaft im chinesischen Kulturraum* (Bonn: Bundeszentrale für politische Bildung, 1998).

2 S. etwa Vaclav Smil: *China's Environmental Crisis. An Inquiry into the Limits of National Development* (Armonk, N.Y.: M.E. Sharpe, 1993); Richard L. Edmonds: *Patterns of China's Lost Harmony: A Survey of the Country's Environmental Degradation and Protection* (London: Routledge, 1994).

3 S. Lester Ross; Mitchell A. Silk: *Environmental Law and Policy in the People's Republic of China* (New York: Quorum Books, 1987); Barbara J. Sinkule, Leonard Ortolano: *Implementing Environmental Policy in China* (Westport, Conn.: Praeger, 1995); Abigail R. Jahiel: „The Organization of Environmental Protection in China“, *China Quarterly* Nr. 156 (Dezember 1998), S.757-787.

4 Lester Ross: *Environmental Policy in China* (Bloomington: Indiana University Press, 1988), S.33-42; Robert F. Ash; Richard L. Edmonds: „China's Land Resources, Environment and Agricultural Production“, *China Quarterly* Nr. 156 (Dezember 1998), S.836-879; Vaclav Smil: „China's Agricultural Land“, *China Quarterly* Nr. 158 (Juni 1999), S.414-429.

Zeitschriften *Zhongguo Tongji* (China Statistics) und *Tongji Yanjiu* (Statistical Research) der letzten Jahre, dass dieses Thema völlig ausgeklammert wurde. Allein eine Publikation des Staatlichen Umweltschutzamtes, die Monatszeitschrift *Huanjing Baohu* (Environmental Protection), greift gelegentlich Einzelaspekte der Umweltstatistik auf.

Angesichts dieser dürftigen Sekundärliteratur versucht der vorliegende Beitrag eine Einführung in die chinesische Umweltstatistik, die keinesfalls Anspruch auf Vollständigkeit erhebt. Im Folgenden soll vielmehr der organisatorische Rahmen, in dem diese amtlichen Statistiken entstehen, aufgezeigt und anschließend anhand ausgewählter Beispiele die spezielle Problematik der Umweltstatistik verdeutlicht werden. Wichtige Quellen sind hierbei Interviews, die der Verfasser 1996 während eines dreimonatigen Aufenthaltes in der Provinz Sichuan in Umweltbehörden auf verschiedenen Verwaltungsebenen führen konnte, sowie zwei interne statistische Kompendien über die Umweltsituation Sichuans bzw. Tibets während des 8. Fünfjahrplans (1991-1995). Verglichen werden diese mit dem wichtigsten veröffentlichten Kompendium zur Umweltstatistik, dem Chinesischen Umweltjahrbuch.⁵

1 Institutioneller Rahmen der Umweltstatistik

Der Umweltbereich kann als exemplarisch für die Fragmentierung von Autorität innerhalb der chinesischen Verwaltung gelten.⁶ Neben den Umweltämtern selbst tragen eine Reihe von anderen Verwaltungssträngen Verantwortung für Teilbereiche des Umweltschutzes und damit auch der Datenerfassung.⁷ Die folgende Darstellung beschränkt sich auf die durch die Umweltschutzverwaltung selbst gesammelten Daten.

Ende der 1970er Jahre begann die chinesische Regierung zur Datenerfassung im Umweltbereich spezielle Verwaltungsorgane zu bilden. Diese Umweltmessstationen (*huanjing jiancezhan*) existieren auf allen Verwaltungsebenen von der Zentrale bis zur Kreisebene, wobei jedoch noch nicht alle Kreise über sie verfügen. Die Einrichtung dieser Stationen schritt in den 1990er Jahren weiter langsam voran: 1993 waren es 2.131 Stationen auf allen Ebenen,⁸ 1995 2.156 Stationen und 1996 dann 2.223, von denen 37 auf

⁵ Es handelt sich hierbei um: Sichuan Sheng Huanjing Baohuju: Sichuan sheng huanjing zhiliang baogaoshu, 1991-1995 [Umweltschutzamt der Provinz Sichuan: Bericht über die Umweltqualität der Provinz Sichuan, 1991-1995] (o.O.: 1996), hinfort: Sichuan Umweltbericht (1996); Xizang Zizhiqu Chengxiang Jianshe Huanjing Baohuting: Xizang zizhiqu huanjing zhiliang baogaoshu (1991-1995) [Amt für städtischen und ländlichen Aufbau und Umweltschutz der Autonomen Region Tibet: Bericht über die Umweltqualität der Autonomen Region Tibet (1991-1995)] (o.O.: 1997), hinfort: Tibet Umweltbericht (1997); sowie um „Zhongguo Huanjing Nianjian“ Bianji Weiyuanhui (Hrsg.): Zhongguo Huanjing Nianjian 1996 [Herausgeber-Komitee „Chinesisches Umweltjahrbuch“ (Hrsg.): Chinesisches Umweltjahrbuch 1996] (Beijing: Zhongguo Huanjing Nianjian Chubanshe, 1996), hinfort: Chinesisches Umweltjahrbuch (1996). Zur Vergleichbarkeit der Zahlen muss hier dieser Jahrgang herangezogen werden. Interne Berichte aus späteren Jahren liegen dem Verfasser leider nicht vor.

⁶ Vgl. Kenneth G. Lieberthal: „The 'Fragmented Authoritarianism Model' and Its Limitations“, in: Kenneth G. Lieberthal; David M. Lampton: Bureaucracy, Politics, And Decision Making in Post-Mao China (Berkley: University of California Press, 1992), S.1-30.

⁷ Dieses Problem blieb auch nach der Verwaltungsreform von 1998 bestehen; vgl. Jahiel (1998) a.a.O., S.763f u. 784; Liu Silong: „Huanjing zhifa tizhi zhang'ai ji qi xiaochu duice“ [Systembedingte Hindernisse der Durchsetzung von Umweltrecht und dagegen gerichtete Maßnahmen], Huanjing Baohu (Environmental Protection) [hinfort: HJBH], 2000/1, S.3f. Diese Verwaltungsreform brachte dem Nationalen Umweltamt (guojia huanjing baohuju) neben neuen Kompetenzen einen höheren administrativen Rang, der sich in dem neuen Namen Staatliches Umweltamt (guojia huanjing baohu zongju) ausdrückt.

⁸ Vgl. Cai Shouqiu et al. (Hrsg.): Huanjingfa jiaocheng [Lehrgang Umweltrecht] (Beijing: Falü Chubanshe, 1995), S.104.

Provinz-, 277 auf Regierungsbezirks- und 1.808 auf Kreisebene angesiedelt waren. Sie beschäftigten insgesamt 35.928 Personen, bzw. 42,4% aller Angestellten der Umweltbehörden.⁹ Diese Messstationen bilden lokale, provinz- und landesweite Netze zur Umweltdatenerfassung, die der Führung durch das jeweilige Umweltschutzamt bzw. -ministerium unterstehen.¹⁰ Diese Führungsbeziehung (*lingdao guanxi*) wirkt im chinesischen Verwaltungssystem stärker als die zwischen den einzelnen Netzen bestehenden fachlichen Beziehungen (*yewu guanxi*).¹¹ In einem Konfliktfall setzt sich in der Regel das Organ durch, mit dem die Führungsbeziehung besteht. Während Umweltämter den Messstationen gegenüber bindende Vorschriften erlassen können und auch deren Personal und Finanzen verwalten, dürfen die übergeordneten Umweltnetze nur fachliche Anweisungen erteilen. Tatsächlich geht die Verknüpfung zwischen Umweltämtern und ihren Messstationen so weit, dass letztere wie Abteilungen innerhalb der den Ämtern nachgeordneten Umweltforschungsinstituten (*huanjing kexue yanjiusuo*) behandelt werden.¹²

Eine solche institutionelle Verschränkung kann theoretisch Probleme aufwerfen. Zwar sprechen viele gute Gründe für eine enge fachliche Zusammenarbeit der verschiedenen Behörden im Umweltschutz; bedenklich scheint aber, dass das Umweltamt als diejenige Behörde, welche die Umsetzung und Einhaltung von Umweltvorschriften zu verantworten hat, so eng mit der Stelle verbunden, ihr sogar übergeordnet ist, die für die Messung des Endergebnisses zuständig ist. Das Umweltamt einer Lokalregierung könnte versucht sein, seinen Einfluss auf die Messstation geltend zu machen, um bei eigenem Versagen die Folgen zu vertuschen, d.h. die Statistiken zu fälschen. Ein solcher Verdacht erscheint durchaus begründet. Zum einen berichten viele Studien über ähnliche Mechanismen der Einflussnahme im Umweltbereich,¹³ zum anderen machten selbst chinesische Praktiker der Umweltbehörden in informellen Gesprächen ihre Zweifel an der „Genauigkeit“ der Messergebnisse deutlich.

Allerdings gibt es keine Möglichkeit zu bestimmen, inwieweit diese theoretische Missbrauchsmöglichkeit tatsächlich ausgenutzt wird. Ein praktischer Einwand gegen solchen Missbrauch liegt darin, dass manche lokalen Messstationen durch Einnahmen aus Dienstleistungen für Unternehmen ihre finanzielle Unabhängigkeit erheblich ausweiten können. So berichten Sinkule und Ortolano, die Messstation der Stadt Foshan habe 1990 bereits über 50% ihrer Einnahmen auf diese Weise erzielt.¹⁴ Es liegt nahe, hier große regionale Unterschiede in Abhängigkeit vom allgemeinen wirtschaftlichen Entwicklungsstand zu vermuten. So sahen etwa die Leiter des Umweltforschungsinstituts der Stadt Leshan, Sichuan, den Finanzmangel als ihr dringlichstes Problem an.¹⁵ Es besteht

⁹ Vgl. Chinesisches Umweltjahrbuch (1996), a.a.O., S.191f u. 551ff.

¹⁰ Vgl. Cai Shouqiu et al. (1995), a.a.O., S.103.

¹¹ Vgl. Xiao Haijun (Hrsg.): *Huanjing baohufa shili shuo* [Das Umweltschutzrecht an tatsächlichen Fällen erklärt] (Changsha: Hunan Remmin Chubanshe, 1999), S.74; und zu *lingdao* und *yewu guanxi* allgemein: Kenneth G. Lieberthal: *Governing China. From Revolution Through Reform* (New York: W.W. Norton, 1995), S.169f.

¹² Vgl. Interviews Sichuan 1996. Da es solche Institute i.d.R. nur auf zentraler, Provinz- und Regierungsbezirksebene gibt, ist die Verbindung von Messstationen und Umweltschutzbehörden auf der Kreisebene noch unmittelbarer.

¹³ Vgl. Sinkule/Ortolano (1997), a.a.O., S.200f; Liu Guojun: „Huanjing xingzheng chufa zhong cunzai de wenti yu duice“ [Probleme und Lösungen bei administrativen Strafen im Umweltbereich], *HJBH* 1999/4, S.17-19; Liu Silong (2000), a.a.O., S.3.

¹⁴ Vgl. Sinkule/Ortolano (1997), a.a.O., S.170f.

¹⁵ Je nach Art der Abgabe lag der Anteil der Gebühren, der in der Verwaltung verbleibt in Sichuan Mitte der 1990er Jahre zwischen 10% und 30%. Die jährlichen Gebühreneinnahmen betrugen 150 Mio. RMB, wobei dies allerdings nur etwa 40% der Außenstände entsprach. Der Rest war nicht einzutreiben; vgl. Interviews Sichuan 1996.

aber auch ein theoretischer Anreiz für Umweltämter auf eine sehr genaue Arbeit der Messstationen Wert zu legen. Ein Teil der Messarbeit betrifft die Einschätzung von einzelnen Verschmutzungsquellen, z.B. Firmen, im Rahmen des Systems der Verschmutzungsgebühren (*paiwu shoufei zhidu*).¹⁶ Je mehr Verschmutzung oberhalb der erlaubten Grenzwerte durch die Messungen festgestellt wird, desto höher liegen die Gebühren, welche das Umweltamt von einzelnen Verschmutzern eintreiben kann. Über die Verwendung der Gebühren entscheidet das Umweltamt selbst. Der größte Teil fließt in Form von Krediten und Zuschüssen für Umweltprojekte zwar wieder an die zahlenden Unternehmen zurück, ein nicht unerheblicher Rest kann aber auch für die eigene Administration ausgegeben werden.¹⁷

Obwohl also das Ausmaß der Datenfälschung nicht abzuschätzen ist, kann kein Zweifel daran bestehen, dass hier ernste Schwierigkeiten bestehen. Nur so lässt sich erklären, weshalb in den 1995 vom Nationalen Umweltschutzamt erlassenen „Vorläufigen Bestimmungen zur Verwaltung der Umweltstatistiken“ mehrfach sehr deutlich jegliche Einmischung und Manipulation durch nicht zuständige Einheiten und Einzelpersonen verboten wird. Offenbar um das Personal der Messstationen vor willkürlichen Eingriffen durch die Lokalregierungen zu schützen, sollen mit Umweltstatistiken betraute Angestellte der Umweltbehörden ab einer bestimmten Qualifikationsstufe nur noch mit Zustimmung der Behörde, die auf einer Verwaltungsebene höher für Umweltstatistiken zuständig ist, versetzt oder ausgetauscht werden können. Dabei dürfen keine Posten vakant bleiben. Zudem wird die wissentliche Weitergabe falscher Statistiken explizit unter Verwaltungsstrafe gestellt. Allerdings werden diese weitreichenden Maßnahmen in ihrer realen Wirkung erheblich abgeschwächt, indem es in das Ermessen der Lokalregierungen gestellt wird, ob sie ihnen folgen wollen.¹⁸

Ein Mittel des Nationalen Umweltamtes, den Einfluss der Lokalregierungen zu umgehen, sind die 200 Stationen des Nationalen Umweltqualität-Überwachungsnetzes. Sie sind im ganzen Land verteilt und berichten dem Nationalen Umweltamt direkt über Luft- und Wasserqualität, radioaktiven Abfall und spezielle schutzbedürftige Gebiete.¹⁹ Darüber hinaus können übergeordnete Ebenen der Umweltverwaltung striktere Kontrollen bestimmter Verschmutzungsquellen durchsetzen, indem sie solche als „Schwerpunkt-Verschmutzungsquellen“ einstufen. Während bei nicht designierten Emissionsquellen nur einmal jährlich die Korrektheit der Eigenangaben kontrolliert wird, müssen in Schwerpunkten ab Regierungsbezirksebene aufwärts zwei- bis viermal pro Jahr Messungen vorgenommen werden. Im Regierungsbezirk Stadt Leshan beispielsweise konnten 1996 durch die Kontrolle von elf Schwerpunkten für Luft- und neun für Wasserverschmutzung zwischen 80 und 90% der gesamten Emissionen dieser Bereiche erfasst

16 Dieses System wird ausführlich dargestellt in Abigail R. Jahiel: „The Contradictory Impact of Environmental Protection in China“, China Quarterly Nr.149 (März 1997), S.81-103; Sinkule/Ortolano (1997), a.a.O., Kap.6.; Guojia Huanjing Baohuju: *Paiwu shoufei zhidu (shiyong)* [Nationales Umweltamt: Das System der Verschmutzungsgebühren (zur versuchsweisen Nutzung)] (Beijing: Zhongguo Huanjing Kexue Chubanshe, 1994), Kap.9.

17 Vgl. Interviews Sichuan 1996.

18 Vgl. Guojia Huanjing Baohuju: „Huanjing tongji guanli zanzheng banfa“ [Nationales Umweltamt: Vorläufige Maßnahmen zur Verwaltung von Umweltstatistiken], in: Chinesisches Umweltjahrbuch (1996), a.a.O., S.55-57. Wörtlich lautet § 29: „Die Verwaltung der Umweltstatistik durch die zuständigen Behörden der Volksregierungen auf Kreisebene und höher kann anhand dieser Maßnahmen durchgeführt werden.“ (Hervorhebung durch den Autor).

19 Vgl. Jahiel (1998), a.a.O., S.762f.

werden. Für diese Art der Kontrolle sind wieder die lokalen Umweltmessstationen zuständig. Die erhobenen Daten werden aber in gesonderten jährlichen Berichten an Umweltämter auf Regierungsbezirks- und Provinzebene weitergeleitet und in eine eigene Datenbank über Trends der Verschmutzungsquellen (*wuranyuan dongtai shujuku*) aufgenommen.²⁰ Diese sollte bis Ende des Jahres 2000 in ein computergestütztes Informationssystem der Umweltüberwachung umgewandelt werden, welches Umweltbehörden und Unternehmen gleichermaßen als Datenquelle zur Verfügung stehen soll.²¹

2 Emissionsstatistik

Wie gesehen, wird bei der Emissionserfassung maßgeblich auf die Angaben der Unternehmen zurückgegriffen, die je nach Bedarf eigenes technisch qualifiziertes Personal für Messungen anstellen müssen. Diese Eigenangaben werden nur stichprobenartig überprüft. Theoretisch sind zwar alle Unternehmen (einschließlich solcher mit Auslandskapital und sogar die kleinen Individualgewerbe, chin. *getihu*) sowie Behörden und Sozial Einrichtungen zur Weitergabe dieser Auskünfte verpflichtet, praktisch wird nur ein Teil in der amtlichen Statistik ausgewiesen.²² So schließt die Definition von „Abwasser“, „Abluft“ und „(Festkörper-) Abfall“ (sog. *sanfei*) im Chinesischen Umweltjahrbuch seit 1991 nur noch die Verunreinigung durch industrielle Staatsunternehmen ab der Kreisebene aufwärts ein.²³ Der tertiäre Sektor wird ganz, der industrielle Sektor in wichtigen Teilen ausgeblendet.

Insbesondere ist hier an die ländliche Kleinindustrie (*xiangzhen qiye*) zu denken, deren Ressourcenverbrauch und Emissionen in den letzten beiden Jahrzehnten enorm angestiegen sind.²⁴ Aus historischen Gründen wurden diese Unternehmen noch bis 1997 z.T. in der Agrarstatistik geführt.²⁵ Eine 1996 von den Behörden für Umweltschutz, Landwirtschaft, Statistik und Finanzen gemeinsam durchgeführte Studie bezifferte die Anzahl von Verschmutzungsquellen in der ländlichen Kleinindustrie auf 1,21 Millionen, ihre Anteile an den nationalen Industrieemissionen bei Schwefeldioxid auf knapp 24%, bei Flugasche und Staubpartikeln auf 50% bzw. 67%. Verglichen mit dem Jahr 1989 nahm der Ausstoß in diesen drei Messkategorien um 22%, 56% bzw. 182% zu. Noch verheerender fällt die Bilanz bei Abwasser aus. Hier zeichnete die ländliche Kleinindustrie 1995 für 21% der Menge nationalen Industrieabwassers, aber für 44% des Chemischen Sauerstoffbedarfs (CSB) im Abwasser verantwortlich. Das bedeutet verglichen mit 1989 ein Plus von 120% bei der absoluten Menge bzw. sogar 245% beim CSB.²⁶ Es liegt

²⁰ Vgl. Interviews Sichuan 1996.

²¹ Vgl. Chen Mingliang et al.: „Zhongguo huanjing jianli xinxi xitong zongti sheji yanjiu“ (Studie über den Gesamtentwurf eines Informationssystems zur Umweltüberwachung in China), HJBH 2000/3, S.11-13.

²² Vgl. Interviews Sichuan 1996; Guojia Huanjing Baohuju (1996), a.a.O., S.55.

²³ Vgl. Chinesisches Umweltjahrbuch (1996), a.a.O., S.476.

²⁴ Vgl. Richard L. Edmonds: „Environmental Management and the Ninth Five-Year Plan“, in: Chong-Pin Lin (Hrsg.): PRC Tomorrow. Development Under the Ninth Five-Year Plan (Kaohsiung: Graduate Institute of Political Science, National Sun Yat-Sen University, 1996), S.91-121, hier: S.96.

²⁵ Leider ist unklar, wie groß die Überschneidungen zwischen Industrie- und Agrarstatistik hier sind; vgl. Doris Fischer: „Chinesische Statistik im Umbruch: Konsequenzen für die wirtschaftswissenschaftliche Forschung am Beispiel der Unternehmens- und Industriestatistik“, Asien (April 2000) 75, S.20-43, hier: S.33f.

²⁶ Vgl. o.A.: Quanguo xiangzhen gongye wuranyuan diaocha gongbao (Untersuchungsbericht über Verschmutzungsquellen in der ländlichen Kleinindustrie Chinas), HJBH 1998/3, S.3-4. Der CSB ist „das Maß für die Sauerstoffmenge, die zum Abbau von organischen Schadstoffen in Oberflächengewässern notwendig ist.“ Aus: Michael Olsson; Dirk Piekenbrock: Kompakt-Lexikon Umwelt- und Wirtschaftspolitik (Bonn: Bundeszentrale für politische Bildung, 1996), S.72. In Deutschland wird dieser Wert zur Berechnung der Abwasserabgabe herangezogen.

damit auf der Hand, dass die Emissionsangaben der amtlichen Umweltstatistik nur sehr begrenzte Aussagekraft besitzen, nämlich ausschließlich für die größeren staatlichen Industrieunternehmen. Verallgemeinerungen für die gesamte Emissionsentwicklung erscheinen auf dieser Basis nicht möglich. So weisen Prognosen der Weltbank *ceteris paribus* für eine Reihe von Emissionstypen eine deutliche Abkoppelung der Trends für große und kleine Verschmutzungsquellen aus.²⁷ Weshalb aber werden die ökologisch immer wichtiger werdenden ländlichen Unternehmen nicht in die Erfassung aufgenommen? Der Grund ist einfach: Es ist die mangelnde Ausstattung der Messstationen mit Finanzmitteln und Personal, die eine Kontrolle der Vielzahl kleiner Emissionsquellen unmöglich macht. Unter diesen Rahmenbedingungen ist eine gezielte Erfassung der größten Verschmutzer organisatorisch sinnvoll.²⁸

Ähnliches gilt für die Emissionen durch den tertiären Sektor und private Haushalte, die ebenfalls in den *sanfei*-Angaben unberücksichtigt bleiben, obwohl auch sie rasch wachsen. So verdreifachte sich etwa die Abwassermenge dieser beiden Sektoren in Sichuan zwischen 1991 und 1995. Würde dieser Teil des Abwassers in die Berechnung der sogenannten Standarderreichungsrate (*dabiao*lǚ, d.h. Anteil des Abwassers, der die vorgeschriebenen Grenzwerte nicht überschreitet, an der Gesamtmenge) mit einbezogen werden, so wäre sie in diesem Zeitraum nicht etwa konstant bei 39% verharnt, sondern von 34% auf 25% gesunken.²⁹ Wie die obige Definition von „Abwasser“ bezieht sich diese Rate aber ausschließlich auf größere staatliche Industrieunternehmen. Diese Erfassungslücken erfordern einen genauen Umgang mit der Umweltstatistik, da es sonst leicht zu einer verzerrten Wahrnehmung der Umweltsituation kommen kann. Beispielsweise resümieren die Autoren der Weltbank: „Industrial wastewater control efforts have reduced wastewater discharges,“³⁰ und stützen diese Behauptung mit den Angaben des Chinesischen Umweltjahrbuchs. Zwar weist dieses tatsächlich für die Jahre 1991-1995 leicht gesunkene industrielle Abwasseremissionen bei einem leichten Anstieg der Standarderreichungsrate von 50 auf 55% aus. Doch schließen die verwendeten Definitionen, wie gesehen, die starke Zunahme der Emissionen von ländlicher Kleinindustrie sowie von Haushalten und Tertiärsektor aus. Damit bleibt der Effekt einer Verlagerung von Verschmutzung aus kontrollierten in nicht erfasste Produktionsbereiche unberücksichtigt.³¹

Eine wichtige Lehre ist aus diesen Betrachtungen zu ziehen: Da die Emissionserfassung sich hauptsächlich an den Erfordernissen des Systems der Verschmutzungsgebühren ausrichtet, eignen sich die so gewonnenen Statistiken nicht für eine Bewertung der Um-

²⁷ Vgl. World Bank (1997), a.a.O., S.32ff.

²⁸ Vgl. World Bank (1997), a.a.O., S.59, 67ff. Bei Unternehmen der ländlichen Kleinindustrie werden Gebühren lediglich nach einer Pauschale veranschlagt, die sich an der Produktion statt an der tatsächlichen Verschmutzung orientiert; vgl. Interviews Sichuan 1996.

²⁹ Vgl. Sichuan Umweltbericht (1996), S.21f. Hier wird vom schlimmsten Fall ausgegangen, nämlich, dass alle Abwässer der unberücksichtigten Bereiche die zulässigen Standards überschreiten; eine zugegebenermaßen strenge Annahme, die aber nicht unplausibel erscheint, da Sichuan praktisch über keine Klärwerke für nicht-industrielle Abwässer verfügte; vgl. Interviews Sichuan 1996. Die hohe Verunreinigung solcher Abwässer mit CSB zeigt sich u.a. in den Zahlen für die Jahre 1997-1999. Die landesweite CSB-Belastung durch erfasste industrielle Abwässer wurde 1999 erstmals vom entsprechenden Wert der Haushalte übertroffen; vgl. Guojia Huanjing Baohu Zongjiu: 1998 Zhongguo huanjing zhuangkuang gongbao (Staatliches Umweltamt: Bulletin zur Umweltsituation Chinas 1998), HJBH 1999/7, S.3-15, hier: S.3; Guojia Huanjing Baohu Zongjiu: 1999 nian Zhongguo huanjing zhuangkuang gongbao (Staatliches Umweltamt: Bulletin zur Umweltsituation Chinas im Jahr 1999), HJBH 2000/7, S.3-11, hier: S.4.

³⁰ World Bank (1997), a.a.O., S.14.

³¹ Vgl. Edmonds (1996), a.a.O., S.96; o.A. (1998), a.a.O., S.4. Erstaunlich ist, dass die Weltbank-Autoren zu diesem Urteil gelangen, obwohl sie eine Seite zuvor auf eben diese Erfassungslücke der amtlichen Statistik hinweisen.

weltqualität. Dies wird durch zwei weitere Aspekte unterstrichen. Erstens ändert sich die zugrunde liegende Erfassungseinheit im Laufe der Zeit. Es ist zwar aus Sicht der Emissionskontrolle zu begrüßen, dass Unternehmen der ländlichen Kleinindustrie, die als Verschmutzungsschwerpunkte eingeordnet wurden, spätestens seit 1999 in die Kategorie der *sanfei*-Emissionen aufgenommen wurden, macht allerdings einen Zeitreihenvergleich praktisch unmöglich.³² Darüber hinaus scheint sich diese Neuerung zeitlich versetzt von Osten nach Westen ausgebreitet zu haben.³³ Somit ist auch kein Stichtag auszumachen, ab dem die neue Regelung landesweit verbindlich Anwendung findet.

Zweitens sind manche Emissionsstandards, an die sich einzelne Verschmutzer halten müssen, nicht ausreichend an den Erfordernissen des aufnehmenden Ökosystems ausgerichtet. So kann es beispielsweise, selbst wenn sich alle verschmutzenden Industrien an die gesetzlichen Abwassergrenzwerte halten, dennoch zu einer übermäßigen Belastung einzelner Wasserkörper kommen. Die Standarderreichungsrate für Industrieabwässer von 100% wäre in diesem Fall extrem irreführend.³⁴ Ein anderes Beispiel betrifft die nach Industriebranchen differenzierten Abluft-Standards, in denen ein so bedeutender Wert wie Kohlenstoffdioxid fehlt. Somit kann auch hier eine Orientierung am Emissionsstandard allein für die Bewertung der gesamten Luftqualität kaum ausreichen.³⁵

3 Immissionsstatistik

Um die gesamte Umweltqualität dennoch bewerten zu können, legen die Umweltmessstationen großen Wert auf die Überwachung von Immissionswerten. Hier wird nicht nach der Herkunft der Verschmutzung gefahndet, sondern die Belastung dort gemessen, wo sie besonders schädlich ist, etwa in dicht besiedelten Stadtgebieten oder ökologisch sensiblen Zonen. Typischerweise werden aus einigen wichtigen Indikatoren zusammengesetzte Indizes gebildet, die dann die gesamte Umweltqualität des Untersuchungsgebietes widerspiegeln sollen. Für die Luftbelastung in Stadtgebieten sind dies fünf Indikatoren, nämlich die Konzentrationen von Schwefeldioxid, Stickstoffoxiden und Mikroschwebeteilchen, sowie die Menge des Staubniederschlags und die Geschwindigkeit der Schwefelsäurebildung.³⁶ Zur Berechnung des Indexes der Luftqualität wird die prozentuale Abweichung des Messwertes jedes Indikators von seinem oberen Grenzwert berechnet und dann das arithmetische Mittel aus diesen Abweichungen gebildet. Je nach Größe der gemittelten Abweichung wird dem Messgebiet eine von fünf Qualitätsstufen zugeordnet.³⁷

Die Qualität von Oberflächenwasser wird anhand einer größeren Anzahl von Indikatoren bestimmt. Im Falle Sichuans waren dies 12 Indikatoren, nämlich CSB, Biochemischer

³² Vgl. Guojia Huanjing Baohu Zongju (2000), a.a.O., S.4ff.

³³ Vgl. Interviews Sichuan 1996.

³⁴ Vgl. He Shuzhuang; Chen Lijun: Guanyu 'Wuran zonghe paifang biaozhun GB8978-1996' zhixing zhong de wenti tantao (Diskussion einiger Probleme in der Durchführung des „Standards für Abwasseremissionen“ GB8978-1996), HJBH 2000/1, S.7-11, hier: S.7. Die Autoren belegen ihre These anhand eines Beispiels aus der Provinz Yunnan.

³⁵ Vgl. Ge Dalu: Lun Zhongguo daqi wuranwu paifang biaozhun tixi de fazhan yu wanshan (Über die Entwicklung und Verbesserung des chinesischen Systems der Emissionsstandards für atmosphärische Schadstoffe) HJBH 1998/5, S.42-44.

³⁶ In Tibet wurden jedoch nur die ersten drei Indikatoren einbezogen; vgl. Tibet Umweltbericht (1997), a.a.O., S.57f.

³⁷ Vgl. Interviews Sichuan 1996; Sichuan Umweltbericht (1996), a.a.O., S.40.

Sauerstoffbedarf (BSB), Öle, nicht-ionisierter Ammoniak sowie verschiedene Schwer- und Halbmetalle.³⁸ Abweichend davon kontrollierte Tibet mit insgesamt 16 Indikatoren mehr einzelne chemische Elemente, aber in Ermangelung der notwendigen Technik beispielsweise nicht BSB und Öle.³⁹ Da sich beide Berichte dabei auf denselben staatlichen Standard berufen, scheint die genaue Zusammensetzung der Indikatorenliste in das Ermessen der Provinzumweltschutzämter gestellt zu sein. Selbstverständlich wird dadurch die Vergleichbarkeit der jeweiligen Qualitätszuordnungen beeinträchtigt. Zumindest bei der Wasserqualität geht die Vergleichbarkeit zwischen den Provinzen letztlich völlig verloren, da auch unterschiedliche Berechnungsmethoden angewandt werden: Während Sichuan dieselbe Methode verwendet wie bei der Luftqualität, schließt die in Tibet benutzte Formel neben der durchschnittlichen Abweichung eines Indikators von seinem Grenzwert zusätzlich die höchste gemessene Abweichung mit ein.

Ein Problem, das allen diesen Indizes gemeinsam ist, liegt darin, dass Unterschreitungen des zulässigen Höchstwertes mit Überschreitungen verrechnet werden. Hiervon ist insbesondere der Wasserstandard betroffen: Theoretisch kann ein extrem hoher Eintrag eines Indikators, der für das Überleben der Gewässerflora und -fauna kritisch ist, durch diese Berechnungsmethode verschleiert werden. Dies gilt sogar dann, wenn eine größere Anzahl von Indikatoren gar keine Abweichung vom Standard aufweist, denn auch dadurch wird die Zahl der Beobachtungen, durch die der ermittelte Abweichungswert geteilt wird, erhöht. Die im Sichuan Umweltbericht enthaltenen Daten für einzelne Flussabschnitte bestätigen, dass dies tatsächlich vorkommt, weil Verunreinigungen durch Schwermetalle kein flächendeckendes Phänomen, sondern lokal konzentriert sind.⁴⁰ So ergaben in Hauptflüssen der Klasse III (24 Flussabschnitte) für folgende Schwer- und Halbmetalle ein beträchtlicher Anteil der Messungen einen Wert von Null: Arsen (41%), Blei (60%), Cadmium (45%), Chrom (58%), Cyan (70%), Quecksilber (50%). Jedes dieser Null-Ergebnisse hebt die durchschnittliche Wassergüte an und nivelliert damit andere Messergebnisse.⁴¹

Nun wäre sowohl die mangelnde Vergleichbarkeit der Angaben verschiedener Provinzen als auch die Nivellierung durch die Güteklassen-Berechnung ein weniger großes Problem, bestünde Transparenz bezüglich der jeweils verwandten Verfahren und würden die Einzelergebnisse veröffentlicht. Tatsächlich aber sind die Einzelergebnisse nicht frei zugänglich, sondern nur die endgültige Klassifizierung der Wasserkörper in Güteklassen. Darüber hinaus herrscht Verwirrung bezüglich der Einteilungsmethode. Sie wird beispielsweise durch die Weltbank folgendermaßen geschildert: „The government has defined five categories of ambient freshwater quality. [...] Each grade specifies an acidity level (pH) and maximum concentrations for twenty-eight [sic!] major pollutants. Exceeding the pH or any of the concentration standards for a given grade disqualifies the measured water body from being designated as that grade.“⁴² Die oben zitierten internen Provinzberichte zeigen uns dagegen, dass nicht nur die Zahl der gemessenen Indikatoren

38 Vgl. ebd., S.67. BSB (eigentlich BSB⁵) nennt man die „Kennzahl für die Konzentration von biologisch abbaubaren organischen Verbindungen in Gewässern und im Abwasser. Gibt in Gramm pro Liter die Menge an, die von Bakterien in 5 Tagen beim Abbau dieser Verbindungen verbraucht wird.“ Aus: Olsson/Piekenbrock (1996), a.a.O., S.63. Im Unterschied zum meist höheren CSB-Wert werden im BSB nicht die schwer abbaubaren Stoffe wie Alkohole oder Essigsäure erfasst; vgl. ebd., S.72.

39 Vgl. Tibet Umweltbericht (1997), a.a.O., S.69 ff.

40 Dies gilt nicht nur für Sichuan, sondern für ganz China; vgl. World Bank (1997), a.a.O., S.14.

41 Vgl. Sichuan Umweltbericht (1996), a.a.O., S.81.

42 World Bank (1997), a.a.O., S.91.

zumindest in diesen Provinzen unter 28 liegt, sondern auch Spitzenwerte gerade nicht dazu führen, dass die Güteklasse eines Wasserkörpers niedriger eingestuft wird.

Einen anderen Deutungsversuch unternimmt Jutta Ludwig: „Die Güteklassen in China werden in die Kategorien I bis V eingeteilt, was der in Deutschland üblichen Kategorisierung von unbelastet bis übermäßig verschmutzt in etwa entspricht.“⁴³ Jedoch wird in Deutschland nicht die Eintragsmenge bestimmter Schadstoffe zur Grundlage der Wassergüteklassen gemacht, sondern es werden Kleinlebewesen (sog. Saprobien) als Bioindikatoren herangezogen, d.h. ihre Häufigkeit entscheidet über die Bewertung der Wassergüte.⁴⁴ Damit wird gerade das oben umrissene Problem der chinesischen Methode umgangen, dass ein extrem hoher Eintrag eines einzelnen Schadstoffes die Lebensbedingungen in einem Gewässer eventuell auslöscht, rechnerisch aber eine passable Wassergüte ermittelt wird.

4 Manipulationen in der Darstellung der Statistik

Die Darstellung der Umweltbedingungen in den vorliegenden internen Kompendien nähren den oben geäußerten Verdacht, es bestünden Anreize innerhalb der Umweltverwaltung das tatsächliche Ausmaß der ökologischen Schwierigkeiten zu verschleiern. So verwendet der Sichuan Umweltbericht die besonders niedrigen Emissionszahlen des Jahres 1994 für Zeitvergleiche, obwohl der Berichtszeitraum eigentlich erst 1995 endet und die Zahlen dieses Jahres vorgelegen haben müssen.⁴⁵ Dadurch ergeben sich z.T. erhebliche Verzerrungen, wie die Abbildungen 1 und 2 belegen.

Solche Manipulationen sind zwar nicht durch Erfassungssysteme oder Berechnungsverfahren bedingt, illustrieren aber die grundsätzliche Gefahr, dass Statistiken ein geschöntes Bild der Wirklichkeit zeichnen. Für die Forschung bedeutet dies, dass nach Möglichkeit Angaben für einzelne Jahre geprüft werden müssen, ob es sich um statistische Ausreißer handelt.

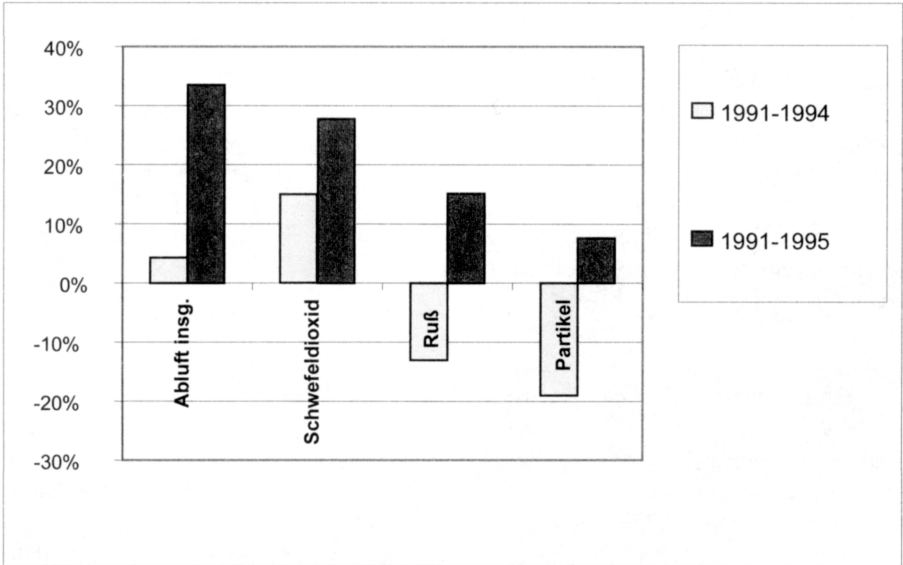
Ein weiteres, weniger offensichtliches Beispiel aus demselben Bericht betrifft die Abwasserklärung. Der Bericht spricht von „offensichtlichen Erfolgen“ bei der Verschmutzungsbeseitigung (*wuran zhili*), da die Rate des industriellen Abwassers, das einer Klärung unterzogen wurde (*wushui chulili*), zwischen 1991 und 1995 um 17 Prozentpunkte (auf 60%) gestiegen ist. Dagegen ergibt ein Vergleich mit der Rate des industriellen Abwassers, welches den Standards genügt, dass die *Qualität* der Klärung deutlich gesunken ist: Statt 92% wie 1991 erreichten 1995 maximal noch 65% der „geklärten“ Ab-

⁴³ Jutta Ludwig: „Die Wasserwirtschaft im Rahmen der Umweltpolitik in der Volksrepublik China“, Asien (Januar 2000) 74, S.7-26, hier: S.12.

⁴⁴ Vgl. Olsson/Piekenbrock (1996), a.a.O., S.163.

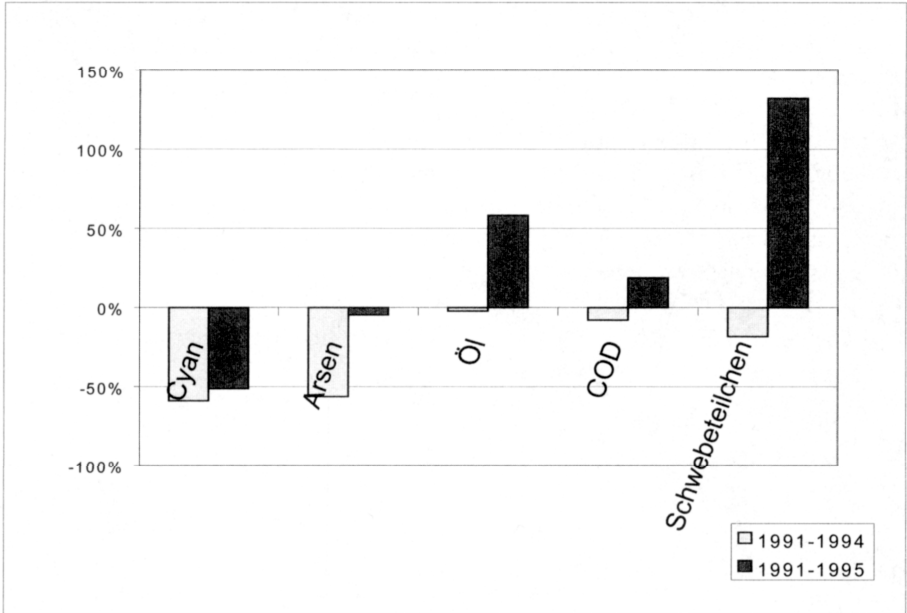
⁴⁵ Die Frage, warum die Emissionen dieses einen Jahres so ungewöhnlich niedrig waren, liegt außerhalb des Rahmens dieses Beitrags. Es konnte aber z.B. in besonders verschmutzenden Branchen wie der Pestizidproduktion ein starker Einbruch festgestellt werden: 1993 betrug sie 16.600t, 1994 nur 6.100t und 1995 wieder 18.900t; vgl. Sichuan Sheng Tongjiju (Hrsg.): Sichuan tongji nianjian [Statistisches Amt der Provinz Sichuan (Hrsg.): Statistisches Jahrbuch der Provinz Sichuan] (Beijing: Zhongguo Tongji Chubanshe, lfd. Jgg. 1994-1996).

Abbildung 1
Veränderungen der Luftverschmutzung in Sichuan, 1991-1995



Quelle: Sichuan Umweltbericht (1996), a.a.O., S.24f.

Abbildung 2
Veränderungen der Verschmutzungslast der Flüsse in Sichuan, 1991-1995



Quellen: Sichuan Umweltbericht (1996), a.a.O., S.23; Chinesisches Umweltjahrbuch (1996), a.a.O., S. 478ff.

wässer den Standard.⁴⁶ Auch in den internen Kompendien wird also zum Teil eine einseitige Darstellung betrieben.

5 Fazit

Den mit (chinesischen) Statistiken vertrauten Leser vermögen die zuletzt getroffenen Feststellungen kaum zu verwundern, stellen sie doch häufig beobachtete Phänomene heraus. Ebenso wenig können die abgeleiteten Schlussfolgerungen durch Originalität bestechen: Im Umgang mit chinesischen Umweltstatistiken ist, genau wie bei anderen Statistiken, große Sorgfalt angebracht. Vielleicht gilt hier in noch größerem Maße als in anderen Bereichen, dass viel zu wenig über die Grundlagen der Erhebung und Aggregation von Daten bekannt ist, um weitreichende Aussagen treffen zu können. Deutliche Unterschiede konnten zwischen den Emissions- und Immissionsstatistiken festgestellt werden. Während erstere vor allem an der mangelnden Erfassung wichtiger Bereiche leiden, die auf die geringe Ausstattung der Umweltbehörden mit Finanzmitteln und Personal und eine Orientierung an den Bedürfnissen des Systems der Verschmutzungsgebühren zurückzuführen ist, erregen bei letzteren vor allem die zusammen gefassten Indizes aufgrund der unklaren Methodik Misstrauen.

Diese Feststellungen sollten aber nicht als generelle Verurteilung der chinesischen Umweltstatistik bewertet werden. Die chinesische Umweltstatistik leistet, was sie derzeit zu leisten vermag. Es obliegt dem Betrachter, durch vorsichtige Interpretationen Fallstricke zu meiden. Eine größere Transparenz wäre sicherlich wünschenswert und wird sich hoffentlich mit der Zeit einstellen. Wie in allen Bereichen der chinesischen Statistik sind auch im Umweltbereich große Veränderungen im Gange. Dabei darf allerdings nicht aus den Augen verloren werden, dass gerade die Veränderungen die zeitlichen Vergleiche von Datenreihen erschweren, wie das Beispiel der schrittweisen Ausdehnung der Emissionserfassung auf Schwerpunktverschmutzer der ländlichen Kleinindustrie zeigte.

Literatur

- Ash, Robert F. / Edmonds, Richard L. (1998): China's Land Resources, Environment and Agricultural Production, China Quarterly Nr. 156, S. 836-879.*
- Betke, Dirk (1998): Umweltkrise und Umweltpolitik. In: Carsten Herrmann-Pillath / Michael Lackner (Hrsg.): Länderbericht China. Politik, Wirtschaft und Gesellschaft im chinesischen Kulturraum, Bundeszentrale für politische Bildung, Bonn.*
- Cai, Shouqiu et al. (Hrsg.) (1995): Huanjingfa jiaocheng (Lehrgang Umweltrecht), (Beijing: Falü Chubanshe).*
- Chen, Mingliang et al. (2000): Zhongguo huanjing jianli xinxi xitong zongti sheji yanjiu (Studie über den Gesamtentwurf eines Informationssystems zur Umweltüberwachung in China), HJBH 2000/3, S. 11-13.*

⁴⁶ Vgl. Sichuan Umweltbericht (1996), a.a.O., S.30 ff. Dabei wird hier der günstigste Fall angenommen, dass nämlich ausschließlich der Klärung unterzogenes Wasser den Standards entspricht. Sollten Abwässer z.T. auch ohne Klärung die Grenzwerte unterschritten haben, so läge die Erfolgsquote der Klärung noch niedriger.

- Edmonds*, Richard L. (1994): *Patterns of China's Lost Harmony: A Survey of the Country's Environmental Degradation and Protection*, London: Routledge.
- (1996): *Environmental Management and the Ninth Five-Year Plan*. In: Chong-Pin Lin (Hrsg.): *PRC Tomorrow. Development Under the Ninth Five-Year Plan* (Kaohsiung: Graduate Institute of Political Science, National Sun Yat-Sen University), S. 91-121.
- Fischer*, Doris (2000): Chinesische Statistik im Umbruch: Konsequenzen für die wirtschaftswissenschaftliche Forschung am Beispiel der Unternehmens- und Industriestatistik. In: *Asien*, April, S. 20-43.
- Ge*, Dalu (1998): *Lun Zhongguo daqi wuranwu paifang biao zhun tixi de fazhan yu wan-shan* (Über die Entwicklung und Verbesserung des chinesischen Systems der Emissionsstandards für atmosphärische Schadstoffe) *HJBH* 1998/5, S. 42-44.
- Guojia Huanjing Baohu Zongju* (2000): 1999 nian Zhongguo huanjing zhuangkuang gongbao (Staatliches Umweltamt: Bulletin zur Umweltsituation Chinas im Jahr 1999), *HJBH* 2000/7, S. 3-11.
- (1996): *Huanjing tongji guanli zanxing banfa* (Nationales Umweltamt: Vorläufige Maßnahmen zur Verwaltung von Umweltstatistiken). In: *Chinesisches Umweltjahrbuch*, a.a.O., S. 55-57.
 - (1998) 1998 Zhongguo huanjing zhuangkuang gongbao (Staatliches Umweltamt: Bulletin zur Umweltsituation Chinas 1998), *HJBH* 1999/7, S. 3-15.
 - (1994): *Paiwu shoufei zhidu (shiyong)* [Nationales Umweltamt: Das System der Verschmutzungsgebühren (zur versuchsweisen Nutzung)] (Beijing: Zhongguo Huanjing Kexue Chubanshe, 1994), Kap. 9.
- He*, Shuzhuang / *Chen*, Lüjun (2000): *Guanyu 'Wuran zonghe paifang biao zhun GB8978-1996' zhixing zhong de wenti tantao* (Diskussion einiger Probleme in der Durchführung des Standards für Abwasseremissionen GB8978-1996), *HJBH* 2000/1, S. 7-11.
- Jahiel*, Abigail R (1997): *The Contradictory Impact of Environmental Protection in China*, *China Quarterly* Nr. 14.
- (1998): *The Organization of Environmental Protection in China*, *China Quarterly* Nr. 156, S. 757-787.
- Lieberthal*, Kenneth G. (1992): *The 'Fragmented Authoritarianism Model' and Its Limitations*. In: Kenneth G. Lieberthal / David M. Lampton: *Bureaucracy, Politics, And Decision Making in Post-Mao China* (Berkley: University of California Press), S. 1-30.
- (1995): *Governing China. From Revolution Through Reform*, New York: W.W. Norton, S.169 f.
- Liu*, Guojun (2000): *Huanjing xingzheng chufa zhong cunzai de wenti yu duice* (Probleme und Lösungen bei administrativen Strafen im Umweltbereich), *HJBH* 1999/4, S. 17-19.
- Liu*, Silong (2000): *Huanjing zhifa tizhi zhang'ai ji qi xiaochu duice* (Systembedingte Hindernisse der Durchsetzung von Umweltrecht und dagegen gerichtete Maßnahmen), *Huanjing Baohu* (Environmental Protection), hinfort: *HJBH*, 2000/1, S. 3 f.
- Ludwig*, Jutta (2000): *Die Wasserwirtschaft im Rahmen der Umweltpolitik in der Volksrepublik China*. In: *Asien*, Januar-Heft S. 7-26.
- Olsson*, Michael (1996): *Dirk Piekenbrock: Kompakt-Lexikon Umwelt- und Wirtschaftspolitik*, Bonn: Bundeszentrale für politische Bildung.

- Ross, Lester (1998): *Environmental Policy in China*, Bloomington: Indiana University Press, S. 33-42.
- Ross, Lester / Silk, Mitchell A. (1987): *Environmental Law and Policy in the People's Republic of China*, New York: Quorum Books.
- Sichuan Sheng Tongjiju (Hrsg.) (Ifd. Jgg. 1994-1996): *Sichuan tongji nianjian* (Statistisches Amt der Provinz Sichuan) (Hrsg.): *Statistisches Jahrbuch der Provinz Sichuan*, Beijing: Zhongguo Tongji Chubanshe.
- Sichuan Sheng Huanjing Baohuju (1996): *Sichuan sheng huanjing zhiliang baogaoshu, 1991-1995* (Umweltschutzamt der Provinz Sichuan: Bericht über die Umweltqualität der Provinz Sichuan, 1991-1995) (o.O.).
- Sinkule, Barbara J. / Ortolano, Leonard (1995): *Implementing Environmental Policy in China*, Westport, Conn.: Praeger.
- Smil, Vaclav (1993): *China's Environmental Crisis. An Inquiry into the Limits of National Development*, Armonk, N.Y.: M.E. Sharpe.
- (1999): *China's Agricultural Land*, China Quarterly Nr. 158, S. 414-429.
- Xizang Zizhiqu Chengxiang Jianshe Huanjing Baohuting (1997): *Xizang zizhiqu huanjing zhiliang baogaoshu (1991-1995)* (Amt für städtischen und ländlichen Aufbau und Umweltschutz der Autonomen Region Tibet: Bericht über die Umweltqualität der Autonomen Region Tibet (1991-1995)) (o.O.).
- World Bank (Hrsg.) (1997): *Clear Water, Blue Skies. China's Environment in the new Century*, Washington, D.C.
- Xiao, Haijun (Hrsg.) (1999): *Huanjing baohufa shili shuo* (Das Umweltschutzrecht an tatsächlichen Fällen erklärt), Changsha: Hunan Remmin Chubanshe.
- o.A. (1998): *Quanguo xiangzhen gongye wuranyuan diaocha gongbao* (Untersuchungsbericht über Verschmutzungsquellen in der ländlichen Kleinindustrie Chinas), HJBH 1998/3, S. 3-4.
- Zhongguo Huanjing Nianjian Bianji Weiyuanhui (Hrsg.) (1996): *Zhongguo Huanjing Nianjian 1996* (Herausgeber-Komitee „Chinesisches Umweltjahrbuch“ (Hrsg.): Chinesisches Umweltjahrbuch 1996), Beijing.

Counting China's floating population: A gendered perspective

Bettina Gransow

Migration can be defined as a permanent change of residence over a significant distance (Han 2000:7-8). In China each resident has an official place of residence. A permanent change in residence must be granted by both the places of origin and of destination. Using household registration as a criterion, we can classify migrants into two groups: permanent and temporary. A migrant is considered permanent if the move involves an official change in the household registration. This is migration *de jure*. A temporary migrant is a person who has been living in a locality which is not his official place of residence. The censuses used one year (1982, 1990) or six months (SSB 1995, 1999) as the specified period. Regardless of the exact definition of the migrant population, these statistical sources indicate the *de facto* migration (Siu/Li 1993: 19.4).

At first glance, the Chinese concept of the migrating population (*qianyi renkou*) seems to be most appropriate for migration as a social scientific definition, because it defines people with a permanent change in household registration or migrants *de jure*. But in Chinese statistics the concept *qianyi* stands not for the millions of migrant workers that periodically flood the coastal areas, but – under the conditions of a planned society – for those people who got official permission to change their permanent place of residence. That is, for example, the state or their *danwei* assigned them a new job in another place.

The phenomenon of large scale spontaneous migration, on the other hand, is called *liudong renkou* or floating population. This is no precise category. To estimate the floating population, there are two main methods: one is the census method, counting people actually living in a location other than the official place of their residence for a specified period (the definition which is given in the Statistical Yearbook). This is the population without an urban household registration; in reference to Cindy Fan (1998) I will call them the *non hukou* population. The second method computes the number of temporary resident permit holders, registered at a local police station. These temporary migrants are called *zanzhu renkou* in Chinese. But these aggregates include not only the numbers of the temporary migrants as defined above, but also the numbers of those persons that have stayed in their place of destination for less than the specified period of time. In China, a temporary resident registration is required, if an individual plans to stay in an urban place for more than three days.

According to the first method, in 1998 there were 59 million persons with residence registered in other places and residing in the destination location for more than half a year. Out of them 28,8 million persons were male and 30,2 million persons were female. (SSB 1999:118).

Table 1
Population with residence registered in other township, town or subdistrict, but having actually resided in this enumeration area for more than half year 1998 (person)

Sample survey on population changes in 1998. The sampling fraction is 1.01%

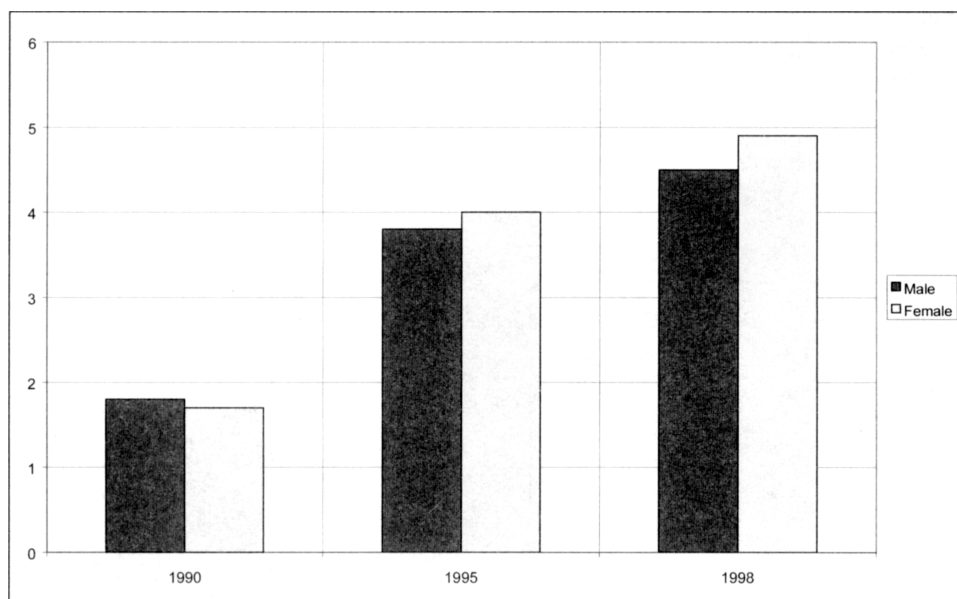
	Total	Male		Female	
			%		%
National Total	58966	28749	48.8	30217	51.2
Beijing	1838	921	50.1	918	49.9
Tianjin	794	381	48.0	413	52.0
Hebei	3161	1662	52.6	1499	47.4
Shanxi	1823	912	50.0	912	50.0
Inner Mongolia	1638	807	49.3	831	50.7
Liaoning	2413	1171	48.5	1242	51.5
Jilin	883	427	48.4	456	51.6
Heilongjiang	2035	1015	49.9	1020	50.1
Shanghai	1891	890	47.1	1001	52.9
Jiangsu	4588	2171	47.3	2417	52.7
Zhejiang	2160	959	44.4	1201	55.6
Anhui	1977	909	46.0	1068	54.0
Fujian	2751	1333	48.5	1418	51.5
Jiangxi	2022	982	48.6	1040	51.4
Shandong	4856	2575	53.0	2281	47.0
Henan	1666	900	54.0	766	46.0
Hubei	4053	2032	50.2	2020	49.8
Hunan	2472	1283	51.9	1188	48.1
Guangdong	4636	2085	45.0	2551	55.0
Guangxi	1037	467	45.0	570	55.0
Hainan	285	133	46.7	152	53.3
Chongqing	1251	581	46.4	670	53.6
Sichuan	3275	1461	44.6	1814	55.4
Guizhou	690	332	48.3	357	51.7
Yunnan	1538	751	48.8	787	51.2
Tibet	58	29	50.0	29	50.0
Shaanxi	1325	677	51.1	648	48.9
Gansu	306	144	47.1	162	52.9
Qinghai	160	72	45.0	88	55.0
Ningxia	142	67	47.9	74	52.1
Xinjiang	1242	617	49.7	625	50.3

Source: SSB 1999.

According to the 1990 census, 35.3 million people migrated between 1985 and 1990 among whom 44% (15.5 million) were female and 56% (19.8 million) were male. Female and male migrants constituted respectively 1.7 % and 1.8 % of the respective population aged 5 and older, suggesting that men had a slightly higher migration propensity than women. The 1995 one-percent population sample survey partly reflects the more relaxed "duration of stay" criterion used in the 1995 survey (six month, versus one year in the 1990 census). But more revealing is a reversal in gender ranks – the female proportion (with 4% against 3.8% for the male migrants) was higher in 1995 (see Fan 1998:10).

Figure 1

Non hukou population by gender



Source: Fan 1998; SSB 1999, proportion of population whose hukou were elsewhere: 1990 – one year criterion; 1995 and 1998 – 6 months criterion.

This trend continues in 1998: the number of the non hukou population has risen to 59 million people, among whom 51% (30 million) were female and 49% (29 million) were men. Female and male migrants constituted respectively 4.9 % and 4.5 % of the respective populations (SSB 1999:117-118).

The *second* method, counting the temporary residents (registering at the local police stations), shows 40,457,326 temporary residents, out of which 24,274,554 were male and 16,182,772 were female migrants (Gongan 1998). The *first* method results not only in a higher (19 million more) floating population, but also in more women than men (51.2%: 48.8%), whereas the *second* method shows less migrants and especially less women (40%: 60%). From these figures (that are difficult to compare because of the different computing methods) one can presume that there are less registered female migrants than men, a finding, we already know from international migration statistics.

Table 2

Temporary residents in China 1998 (person)

	Total	Male		Female	
			%		%
National Total	40 457 326	24 274 554	60.0	16 182 772	40.0
Beijing	1 470 144	1 046 822	71.2	423 322	28.8
Tianjin	394 985	259 342	65.7	253 733	34.3
Hebei	740 034	486 301	65.7	253 733	34.3
Shanxi	753 281	559 977	72.2	193 304	27.8
Inner Mongolia	664 628	433 102	65.2	231 526	34.8
Liaoning	890 902	563 387	63.3	327 515	36.7
Jilin	453 348	279 185	61.6	174 163	38.4
Heilongjiang	941 591	577 328	61.3	364 263	38.7
Shanghai	1 447 594	952 827	65.9	494 767	34.1
Jiangsu	3 401 217	2 179 852	64.1	1 221 365	35.9
Zhejiang	2 963 588	1 783 114	60.2	1 180 474	39.8
Anhui	546 678	351 540	64.3	195 147	35.7
Fujian	1 611 658	949 915	59.0	661 743	41.0
Jiangxi	301 821	199 919	66.4	101 902	33.6
Shandong	1 452 161	927 719	63.9	524 442	36.1
Henan	961 753	633 891	66.0	327 862	34.0
Hubei	1 120 763	685 881	61.2	434 882	38.8
Hunan	2 775 606	1 590 436	57.3	1 185 170	42.7
Guangdong	11 537 865	5 752 881	49.9	5 784 984	50.1
Guangxi	672 797	417 245	62.0	255 552	38.0
Hainan	380 747	285 640	75.0	95 107	25.0
Chongqing	477 582	321 209	67.3	156 373	32.7
Sichuan	1 078 648	692 250	64.2	386 398	35.8
Guizhou	364 495	243 964	67.0	120 531	33.0
Yunnan	1 041 999	705 034	67.7	336 965	32.3
Tibet	93 791	64 466	68.7	29 325	31.3
Shaanxi	505 102	335 420	66.5	169 682	33.5
Gansu	233 947	177 113	75.7	56 834	24.3
Qinghai	191 453	141 641	74.0	49 812	26.0
Ningxia	107 222	75 072	70.0	32 150	30.0
Xinjiang	879 917	602 081	68.5	277 836	31.5

Source: Gongan 1998 Gonganbu zhian guanliju (Ministry of public security): Quanguo zanzhu renkou tongji ziliao huibian (Collection of statistical materials on temporary residents in China) Beijing.

Table 3
Reasons for the movements of temporary residents 1998

	Male	Female
Total	24 274 554	16 182 772
Industry	13 709 120	8 144 935
Agriculture	878 255	515 258
Commerce	3 757 587	2 129 311
Services	1 279 528	1 993 101
Official Trip	975 709	360 930
Education and Training	568 847	406 602
Medical Treatment	147 941	109 802
Domestic Helper	7 669	208 085
Visiting Friends/Relatives	407 866	559 623
Visiting Friends/Rel.(short)	384 061	331 561
Tourism	1 389 297	898 260
Other Reasons	768 674	525 304

Source: Gongan 1998 Gonganbu zhian guanliju (Ministry of public security): Quanguo zanzhu renkou tongji ziliao huibian (Collection of statistical materials on temporary residents in China) Beijing.

The data published by the Chinese public security administration (CPSA) give only information on registered migrants, but they show more gender specific details than the data series of the State Statistical Bureau. From these CPSA-data we can get some insights into the gender specific reasons for the movements of temporary residents at the end of the 20th century.

From table 3 we can see that the largest proportion of male (56,5%) as well as female migrants (50,3%) is in industry. 15,5% of the men and 13,2% of the women are in commerce. But whereas only 5,3% of the male migrants can be found in services there were 12,3% of the female migrants working in this sector.

According to the 1990 census, about two thirds (69,4% and 65,9% respectively) of female and male migrants migrated within provinces, and one third migrated to another province (the exact figures were 30,6% for female migrants and 34,2% for male migrants). The higher proportion of female intraprovincial migration indicates that women are more likely to move short distances. As Cindy Fan observed, this is consistent with Ravenstein's migration "laws" and Chinese age-old traditions which constrain a women's mobility. But, she argues, that the data contradict the above observation: The eastern region is the most popular destination for both female (60%) and male (57%) migration. If the notion that women move shorter distances than men is valid, then one would have expected lower proportions of female migrants undertaking interregional moves. But in fact interregional moves account for as much as 64% of female interprovincial migrants, and only 57% of their male counterparts. Much of the difference is due to the prominence of eastward interregional movements. The eastward component is clearly more dominant among female migrants. For example, although Sichuan is a popular origin for

both male and female migrants, it sends out female migrants primarily to the eastern region, and male migrants to all directions. The average distance of interprovincial migration is 901 km for female migrants and 851 km for male migrants (Fan 1998:13-14).

Thus, a closer examination of the census data reveals that the sex composition of the migrant population exhibits substantial provincial variations. In the prosperous provinces of Guangdong, Jiangsu and Fujian which have benefited significantly from the open door policy and which have attracted substantial foreign investment in the processing industries, the female migrants indeed outnumber the male migrants. But in provinces such as Shanxi and Liaoning which are characterized by their heavy industries, male domination in the migration stream is most apparent. This gender difference in the direction of migration flow, with the bulk of the female migrants moving from the north and west to the southeastern coastal provinces and the male migrants exhibiting a more scattered pattern, is mainly a response to the differences in labour market conditions across the country (Siu/Li 1993:19.20).

The census data show that for men work-related reasons account for the majority of all migrations. For women, by contrast, marriage is an extremely important cause. Marriage in China is overwhelmingly patrilocal with the bride moving to her husband's home. Among intra-provincial migration the percentage of women is as high as 45%, but among inter-provincial migrants they were less significant at 39%. This contrast can be explained by marriage migration. Intra-provincial figures are naturally more strongly affected by marriage migration (Davin 1998:232).

In her view of migration as a "highly gendered phenomenon" (Davin 1997:297), Delia Davin is absolutely correct in basing her analysis on the fundamental difference between labor migration and marriage migration. Whereas it is primarily men who migrate for reasons of labor, marriage represents an almost exclusively female motivation for migration. Almost half of all women who leave their hometown do so to find a husband. Statistics on specific migration streams or individual aspects of migration can only be interpreted properly if this essential distinction is taken into consideration. This applies, for example, to an analysis of migration destinations. Whereas it can be shown that a similar predominance of migration from rural to urban regions existed for both women and men (Siu/Li 1993: 19.18, tab. 4), a far lower percentage of women than men migrated from one city to another, and the scales were clearly reversed for rural-rural migrations. The greater number of rural-rural migrations among women can obviously be traced largely to the patrilocal marriage tradition (Siu/Li 1993: 19.17).

Recognizing the significance of distinguishing between marriage and labor migrations, however, should not tempt us to contrast marriage and labor migration among women as two totally unrelated issues. To a certain extent, both of these motives for women to migrate serve the same purposes of enabling women to secure a livelihood, raise their standard of living, and improve their social status. The phenomenon of long distance marriage emphasizes how closely related these forms of migration actually are. Young women from poor inland provinces (such as Yunnan and Guizhou, Guangxi and Sichuan) marry in wealthier provinces such as Jiangsu or Zhejiang on the east coast of China, where the average rural income is more than double that of the women's home provinces. For example, a study (by Li Huijing) on marriage migration in Zhejiang

province concludes that only a small segment of women (from outside) continued to perform domestic tasks and rural activities as their main activity. This example shows how marriage migration and labor migration can overlap and how marriage migration can coincide with a shift from agrarian to nonagrarian occupations. Nevertheless, the primary destinations of marriage migrants (Hebei, Anhui, Jiangsu, Zhejiang) and female labor migrants (Guangdong, Jiangsu, Fujian) are not identical. There is some overlapping, such as in the province of Jiangsu, but in this area, patterns of female migration still need to be examined in greater detail.

References

- Davin, Delia* (1997): Migration, Women and Gender Issues in Contemporary China. In: Thomas Scharping (ed.), 297-314.
- (1998): Internal Migration in Contemporary China, Houndmills.
- Fan, Cindy C.* (1998): Migration, Gender and the Labor Market. Paper presented at the "Migration in Contemporary China" Conference, University of California at Los Angeles, December 5.
- Gongan Gong'anbu zhian guanliju (Ministry of public security) (1998): Quanguo zanzhu renkou tongji ziliao huibian (Collection of statistical materials on temporary residents in China), Beijing.
- Han, Petrus* (2000): Soziologie der Migration, Stuttgart.
- Meng, Xianfan* (1999): Chinese Rural Women in the Shift in the Rural Labor Force from Agricultural to Nonagricultural Work. In Chinese Sociology and Anthropology vol. 31, no. 2, Winter 1998-99, pp. 23-41.
- Scharping, Thomas* (ed.) (1997): Floating Population and Migration in China. The Impact of Economic Reforms, Hamburg.
- Siu, Yat-ming / Li, Si-ming* (1993): "Population Mobility in the 1980s: China on the Road to an Open Society". In: Cheng, Joseph Yu-shek, Brosseau, Maurice (eds.) (1993): China Review 1993, Hong Kong: 19.1.- 31.
- State Statistical Bureau (SSB) (1995): 1999 China Statistical Yearbook, Beijing.

Long-term electricity demand in China – from quantitative to qualitative growth?

Christian von Hirschhausen and Michael Andres*

1 Abstract

This paper develops scenarios of electricity demand in China until 2010, at a national, a sectoral and a regional level. It takes into account the recent macroeconomic downturn in the Chinese economy and the potential effects of deregulation and price increases in the power sector. The medium-growth scenario hints at a gross electricity demand of 1,500 TWh in 2010; should the structural change from agriculture and heavy industry towards light industry and services accelerate, electricity demand may be another 10% lower. These figures are significantly below the projections fixed in the government's 9th Five-Year-Plan, which forecasts a demand of 2,500 TWh. The aggregate and sectoral scenarios imply that current development plans for generating capacity and coal consumption until 2010, too, need to be scaled down. The disaggregation at the level of the 13 inter-provincial and provincial power grids hints at potential regional discrepancies: the large industrial areas in eastern China and the Central region are likely to face overcapacity, whereas North China and the peripheral regions may face deficits.

2 Introduction

China nowadays consumes over 10% of worldwide primary energy, whereas its share in global GNP is only 3.5%. Contrary to development countries, both the energy- and the electricity-intensity of GDP have been below unity over the last decade, resulting from a determined policy of energy conservation (Sinton, Levine and Qingyi, 1998). However, market forces, competition and full-cost pricing are still largely contained in the Chinese energy sector; environmental costs are not fully taken into account (Gan, 1998). With the decisions of the Chinese government to foster market-economic reform, the energy sector, too, is facing a new era, where quantitative indicators of growth may be replaced by market economy criteria. The 10th five-year plan, which is to be negotiated in 2000 and implemented in 2001-2005, may already incorporate such new orientations. In particular, the *electricity sector* may undergo fundamental changes from a system of local, state-owned monopolies to open competition, and eventually even privatisation.

* This article is a reprint of Energy Policy, Vol. 28 (2000), 231-241 © Elsevier Science Ltd. The authors thank Hans-Joachim Ziesing and Wolfram Schrettl for comments on an earlier version. Technical assistance: Wolfgang Härle and Deborah Bowen. The usual disclaimer applies.

Energy demand forecasts have traditionally played a key role in the Chinese development planning process. The government uses aggregate approaches to determine future energy consumption; thus far, bottom-up approaches are not practised. By contrast, the literature on the energy sector has developed more sophisticated models, such as adjusted input-output analysis (Garbaccio et al., 1999), and cointegration and vector error-correction models (Chan and Lee, 1996). However, all authors agree that the significance of the results is significantly reduced by data problems. For example, no serious, model-based demand forecast exists for the electricity sector.

In this paper, we adopt a pragmatic approach to forecasting electricity production and consumption patterns in China in the next decade, at the national, sectoral and regional levels. We challenge the official forecasts by integrating the perspective of regulatory changes in the sector. Indeed if electricity is to become a "market good", then demand may not increase as drastically as official forecasts are predicting; thus, the required increase in generation capacity, too, may be lower than expected. The paper is structured in the following way: the next section provides a brief introduction to recent developments of the Chinese electricity sector. Subsequently, we develop electricity demand scenarios until the year 2010, applying different assumptions to a Cobb-Douglas function, which is considered to reflect the nature of demand developments properly. The aggregate scenarios are differentiated by income and price developments (that is high, medium and low growth). Then, two desegregated scenarios are outlined: the sectoral scenario captures different possible development paths of the Chinese economy, that is fast structural change against slow structural change. The regional scenarios analyse future generation capacities and consumption at the level of the seven inter-provincial and six provincial power networks. The last section discusses some policy implications.

3 The Chinese electricity sector on the eve of the 10th five year plan

The Chinese electricity sector grew at two-digit rates in the early 1990s, but since the mid-1990s it has gone off the growth track prescribed by the 9th five-year plan (1996-2000). *Generation* capacity is expanding steadily, but its development is not as fast as forecasted five years ago. The installed capacity of about 270 GW (1999) is significantly below the 300 GW planning figure (1990: 138 GW, 1995: 217 GW). On the *consumption* side, the deviation is still more evident: due to the general economic downturn, the decreasing share of energy-intensive industry and the lagging pace of restructuring of insolvent state enterprises, electricity demand has grown less than expected; the Asian crisis (1997/98) has aggravated things. The ratio of electricity-GDP growth has fallen further (see Table 1). The discrepancy between generation and consumption may eventually even produce a phenomenon new to the developing Chinese economy: *overcapacity*. Traditionally a sellers market, power utilities are now facing the danger of being put up against competition by their clients and are struggling to keep all of their plants running. Temporary shutdowns – unheard of in former years – have been reported.

The development perspectives of the power sector are further clouded by the aggravation of fundamental structural problems that have haunted the country since the beginnings of large-scale electrification in the 1960s. The imbalances between resource-rich regions

Table 1
Economic development and energy consumption in China, 1980-1998

Year	GDP Growth (%)	Primary energy demand (mn. t sce)	Primary energy demand growth (%)	Primary energy demand growth/GDP growth	Final electricity consumption (TWh)	Final electricity consumption growth (%)	Electricity demand growth/ GDP growth	Nominal electricity price index (1980=100)	Real electricity price index (1980=100)
1980	7,8	602	1,0	0,1	276	2,2	0,3	100	100
1981	4,5	594	-1,3	-0,3	284	2,9	0,6	100	97
1982	8,8	620	4,4	0,5	302	6,3	0,7	100	94
1983	10,3	660	6,5	0,6	324	7,3	0,7	100	90
1984	14,6	709	7,4	0,5	349	7,7	0,5	100	86
1985	12,7	766	8,0	0,6	381	9,2	0,7	100	80
1986	8,3	808	5,5	0,7	417	9,4	1,1	110	84
1987	11,0	866	7,2	0,7	462	10,8	1,0	120	86
1988	11,0	930	7,4	0,7	509	10,2	0,9	133	78
1989	4,0	969	4,2	1,0	545	7,1	1,8	146	66
1990	5,2	987	1,9	0,4	580	6,4	1,2	169	84
1991	9,3	1038	5,2	0,6	632	9,0	1,0	189	99
1992	14,2	1092	5,2	0,4	702	11,1	0,8	207	106
1993	13,5	1160	6,2	0,5	781	11,3	0,8	277	149
1994	12,6	1227	5,8	0,5	866	10,9	0,9	316	138
1995	10,5	1312	6,9	0,7	928	7,2	0,7	320	98
1996	9,6	1390	5,9	0,6	999	7,7	0,8	366	119
1997	8,8	1420	2,2	0,2	1045	4,6	0,5	409	152
1998	7,8	1374	-3,2	-0,4	1072	2,6	0,3	446	193

and electricity-consuming regions have grown over time. Power exchanges between producing and consuming regions are limited due to the segmentation of the grid: China consists of not less than seven inter-provincial and six provincial grids, most of which are not interconnected. *Coal*, the only relevant fossil fuel in the power sector, is available in the Northeast and the underdeveloped regions of the North and Inner Mongolia. Complex transport schemes are required to supply the consuming coastal regions in the East of the country.¹ Hydropower, once considered to be the way out of the shortage, is in fact facing the same dilemma, with resources concentrated in the centre of the country (Yellow and Yangtzi rivers with affluents), thousands of kilometres away from the electricity-hungry regions.² The structural imbalances are sometimes considered a technical issue that can be overcome by providing the required transport infrastructure (Todd, 1996). However, this additional infrastructure is also expensive and implies transmission losses, be it the new East-West railway corridor (Shenmu to Huanhua), the Yu-Wei slag pipeline from Shanxi to Shanghai, or additional high voltage transmission lines from the Three Gorges and other inland power stations to the coast.

The "soft landing" of the power sector comes at a time when groundbreaking deregulation of the sector is for the first time being seriously considered by the government. Thus far, the sector has been dominated by state-owned monopolies at the Central and provincial levels. The abandoning of the branch Ministry for Electric Power has led to a *de jure* separation between the management of the sector (State Power Corporation) and its regulation (Power Bureau within the State Economic and Trade Commission). The SPC is at the same time *de facto* owner and regulator of the sector. It conceives the country-wide development plans and approves all major new projects. It is also responsible for setting out the principles of cost accounting, where a duality between "socialist" and "capitalist" price calculations has emerged in recent years.³ However, ambitious reform plans to liberalise the power sector have been adopted (Yao, 1999, Andrews-Speed, 1999). As a first step, a wholesale market is to be set up by 2005 with a single-buyer model to create competition between producers. In a second step, large consumers will be free to choose their suppliers directly; and finally, the retail market will be fully liberalised. The institutional separation between power generation and the network has already been introduced in six pilot regions (Liaoning, Jinin, Heilongjian, Shandong, Zhejiang, Shanghai).

Deregulation and competition will put the power sector on a more solid economic basis, but they will also contribute to further destabilising the long-term planning targets. Given the threat of overcapacity and unknown effects of deregulation, the State Power

1 Coal transports account for 40% of the total commercial rail transport. Transport costs account for about half of cif prices; for example Northern Chinese coal shipped to Shanghai costs about USD 40 per ton of coal equivalent, whereas Australian imported coal stands at about c.i.f. USD 25-30. Gas does not play a role in the national power system; gas production is marginal and it is locally concentrated. Similarly, oil resources, which are plentiful in the Northwest, are too far away from consumers to be commercially exploitable (Hirschhausen and Andres, 1999).

2 Nuclear power has yet to prove its reliability in the Chinese context, with 2 GW of installed capacity and 7 GW under construction.

3 Old power plants, dating from the socialist period and fully depreciated, only calculate variable costs (fuel) and fixed costs for personnel and maintenance). By contrast, power plants dating from the recent reform period and financed with loans – the so-called "capitalist plants" – have to include the capital costs and an appropriate return on investment in their costs. Thus, capitalist plants are about 20% more expensive than socialist ones, even though their thermal efficiency is higher and they pollute less. Thus, if direct competition was introduced without further regulatory adjustments, socialist plants would clearly out-compete capitalist ones.

Corporation has declared a general halt to new development projects.⁴ The policy of putting the "large fire" (*da huo*) on hold is to be implemented against the will of provincial governments, who stand to lose their polluting, yet existing, power generation base.

On the other hand, the official discourse continues to prescribe double-digit growth patterns of electricity consumption and corresponding plans of generation, transmission and distribution capacities. The 9th Five-Year Plan requires a doubling of generation capacity from 270 GW (1999) to over 500 GW in 2010. Likewise, gross electricity production is supposed to increase from the current 1,200 TWh to 2,500 TWh. However, given the upcoming structural changes in the power sector, it no longer seems useful to apply traditional, linear growth projections. The following three sections sketch out an alternative, hands-on approach.

4 Aggregate electricity demand to 2010

4.1 The model, data and assumptions

There are no established models for forecasting electricity consumption in China.⁵ In the policy-oriented perspective that we adopt in this paper, the marginal gains from applying complex models in this context are limited. Therefore, we apply a simple Cobb-Douglas function as shown in equation (1), assuming constant income and price elasticities as well as an autonomous increase in energy efficiency (AEEI). While this is clearly a second-best solution, it can produce a set of results relevant to the current policy debate.⁶

$$E_{2010} = \left[\left(\frac{GDP_{2010}}{GDP_{1996}} \right)^{\alpha} \times \left(\frac{P_{2010}}{P_{1996}} \right)^{\beta} \times (1 - \gamma)^{2010-1996} \right] \times E_{1996} \quad (1)$$

where

- E_t = Electricity consumption in t
- GDP_t = Gross Domestic Product in t
- P_t = electricity price (relative to consumer price index) in t
- α = income elasticity of electricity demand
- β = price elasticity of electricity demand
- γ = autonomous energy efficiency increase (AEEI)

The parameters are set upon plausibility considerations: the *income elasticity* of electricity demand (α) was below unity over the last seven years, with an average of slightly above 0.7, down from 0.8 for the 1980-89 period. This trend corresponds to the de-

⁴ Exemptions are only possible for so-called "clean coal technologies" (i.e. fluid circulation, desulphurization and denoxification equipment), for gas-fuelled power plants, combined heat-and-power units (CHP) and pump-storage plants. Older power plants, the thermal efficiency of which is about 30% lower than of new ones, are to be shut down earlier than originally scheduled.

⁵ Estimating parameters of Chinese aggregate energy demand is already full of pitfalls. An attempt to forecast energy demand was undertaken by Chan and Lee (1996) using 1953-93 data in a cointegration and error-correction model. However, due to data problems and different levels of disaggregation, different research comes to different results on identical issues; the most recent examples are Garbaccio et al. (1999) and World Bank (1993), developing different reasons for China's falling energy-output ratio.

⁶ We did run some regressions on price- and income elasticities of electricity demand between 1980-98, but the results were implausible and econometrically insignificant. Data going back to the Maoist period, that is pre-1979, can not be used due to the socialist nature of the economic environment at that time. The formula is designed according to Horn (1998).

creasing energy-output ratio of the Chinese economy in the post-Mao reform period since 1979, when the energy use per unit of GDP fell by over 50%. The decreasing energy intensity has been explained by increasing technical efficiency, which more than compensates the effects of structural change (Garbaccio, et al., 1999, Sinton, et al., 1998). This result is in line with estimates for other countries in economic transformation, such as Poland and Hungary (Dobozi, 1988). The long-run elasticity is likely to be even smaller, as the renewal of the capital stock will accelerate the improvements in energy efficiency. We opt for an income elasticity of 0.7, but will run sensitivity analysis for higher and lower values.

The *price elasticity* (β) is more difficult to estimate. Energy price increases in China have been rather slow in the 1980s, and prices today are lower than they need to be in the future. Evidence from other transformation and developing countries suggests that demand can vary greatly with price variations, reaching absolute levels of -0.1 to -0.3 in the short run, and up to -0.7 or even -1 in the long run.⁷ Based on these considerations, we hold a price elasticity of -0.2 to be realistic, and will run sensitivity analyses with other values. Nothing concrete is known on the *autonomous efficiency increase* of electricity consumption (γ), which is generally assumed to exist independently of price effects; it is estimated here at the usual 1 per cent annually.

We introduce between different scenarios in order to catch possible economic developments: scenario I ("high growth"), scenario II ("medium growth") and scenario III ("low growth"). These reflect different GDP growth rates and real price developments. Based upon a review of the existing literature on macroeconomic and institutional perspectives of the Chinese economy, our own discussions with managers and researchers of the Chinese energy industry, and considerations of plausibility derived from other studies, we make the following assumptions on the exogenous parameters:

- *GDP* has been buoyant over the last decade, though voices challenging the sustainability of this growth path are increasing, not only in the wake of the Asian crisis.⁸ Double-digit growth rates being unlikely in the medium-term, a likely estimate for the high growth scenario seems to be 9% per year. On the other hand, should China catch a late Asian crisis contagion, including a banking crisis, instability of the exchange rate and so on, a lower value of about 4% is not overpessimistic. The medium growth scenario lies in between, at 6.5%;
- *energy prices* need to be increased in order to reach a minimal economic level, including full cost recovery and appropriate profitability.⁹ Higher production efficiency can limit the required price increases only to a certain extent. It seems that all cost

⁷ See Pesaran, Hashem and Ron Smith (1993), Horn (1998), according to which this approach is designed, and the discussion in Erdmann, Georg (1995): *Energieökonomik*. Stuttgart, Teubner, pp. 227ff. Chan and Lee (1996) estimated a price elasticity of -0.9 for aggregate energy demand in China.

⁸ Deutsche Bank Research (various issues); Country Briefs Asia: China; Fukasaku, Kiichiro: *China's Long March to an Open Economy*; OECD Development Centre Studies, Paris, 1994. Taking an historical perspective on Chinese economic development, Maddison (1998) uses a 5.5% average compound growth rate until 2015 (4.5% per capita GDP growth, 1% population growth). Ho, Jorgenson and Perkins (1998) use yearly GDP growth assumptions of 4.5%, 6.5% and 7.6% for the slow-growth, medium-growth and high-growth cases, respectively. The IMF has reduced its growth forecasts for the year 2000 to 6%.

⁹ The average price of electricity of about 350-400 CHY/MWh does not cover total production costs; it is estimated that they need to be increased by 33-50% to attain cost recovery. For an overview, see Andrews-Speed et al. (1999).

components are facing upward pressure: capital expenditures for modern new build-ings, environmental standards, new transmission and distribution infrastructure; raw material costs (as long as domestic coal remains the dominant fuel); and profit pay-ments, should the commercialisation and hardening of budget constraints proceed.¹⁰ The higher the economic growth, the easier it will be to implement real energy price increases. A yearly increase of 3%, assumed for the medium-term growth scenario, would yield a relative electricity price increase of about 50% in the year 2010; this increase also seems to be a reasonable target to attain full cost recovery by 2010. Should economic growth be lower (scenario III), real price-increases may be politi-cally constrained, say to 2% p.a. On the other end, in the high growth scenario, rising living standards may lead consumers to require higher electricity standards, for ex-ample environmental protection, increased reliability, installed load, and other qual-ity aspects. This requires more investments, and thus higher price increases. The price scenarios also include the risk of a devaluation, which would increase capital expenditure for about one-third of equipment (imports).

Three minor assumptions are made with respect to network and other losses, both of which are higher than in other developing countries. Should the modernisation of the sector proceed according to the principles set down by the government, then this is likely to lead to an above-average reduction of losses. Therefore, going beyond the exogenous efficiency increases already embodied in the model, we assume that network losses fall from the current 7% of gross production to 5%, and other losses (including own losses) fall from 15% to 12%. Exports and imports do not play any significant role; we assume the export share of gross production to be constant (0.4%). The reference year is 1996, that is the last year for which an energy balance according to IEA standards is available.

4.2 Results

Table 2a presents the full set of assumptions and results of the scenarios for aggregate final electricity consumption and gross production. In the medium-term growth scenario II, final electricity consumption in 2010 rises to about 1,240 TWh, which is "only" 48% above the 1996 value, and gross electricity generation even rises less, due to increased efficiency in generation and distribution (39% to about 1,500 TWh).

In the low growth scenario, no. III, final electricity consumption increases only by 20% to 1,000 TWh, which is even lower than 1996 gross production. The high growth scenario, no. I, implies an increase of final electricity consumption of about 81%. Though highly aggregate, the results already carry one important message: electricity demand in the year 2010 may be significantly lower than prescribed in the current official govern-ment plans. Even the results of the high growth scenario I (1,831 TWh) are more than one fourth below the 9th five-year plan, requiring 2,500 TWh of gross electricity produc-tion in 2010. A comparison between these three scenarios and other institutions' fore-casts is shown in Figure 1.

10 In 1997, the State Power Corporation, owning assets of CHY 742 bn, made a pre-tax profit of CHY 8.8 bn. only, that is a return on equity of 1.2%, not much for a vertically integrated monopolist; see State Power Cor-poration (1998). Taking into account the unpaid bills of an estimated CHY 20 bn, SPC even makes losses.

Table 2a

Scenarios of aggregate electricity consumption to 2010

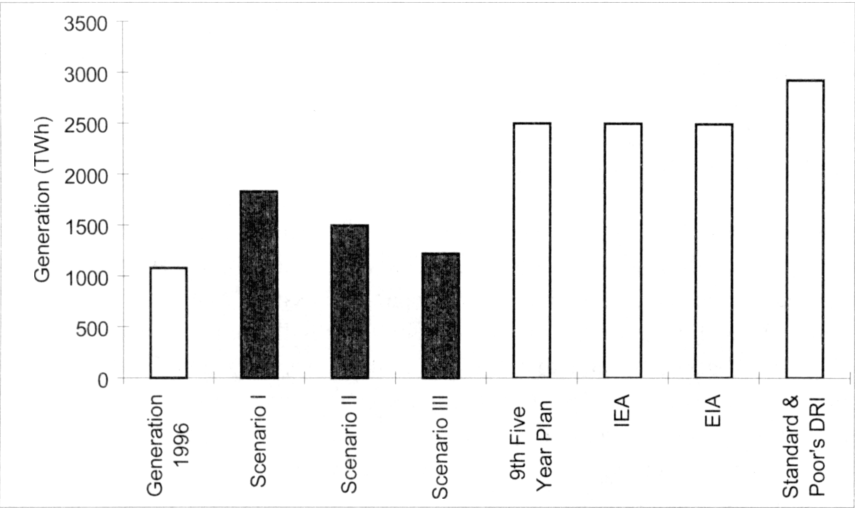
			Scenario I rapid growth	Scenario II moderate growth	Scenario III slow growth
	Unit	1996	2010	2010	2010
Assumptions					
GDP Growth and electricity price inflation					
GDP	% p.a.		9	6,5	4
	Index	100	334	241	173
Real electricity prices	% p.a.		4	3	2
	Index	100	173	151	132
Electricity demand coefficients					
GDP elasticity (a)			0,7	0,7	0,7
Price elasticity (b)			-0,2	-0,2	-0,2
AEEI* Rate (g)	%		1	1	1
Transmission losses	%	7	5	5	5
Plant requirements and other losses	%	15	12	12	12
Net exports	%	0,4	0,4	0,4	0,4
Results					
Electricity consumption					
Final electricity consumption	Index	100	181	148	121
	TWh	835	1.512	1.238	1.008
Transmission losses	TWh	77	92	75	61
Plant requirements and other losses	TWh	165	220	180	146
Net exports	TWh	4	7	6	5
Gross electricity generation					
Electricity generation	TWh	1.080	1.831	1.499	1.220
Gross electricity generation by source					
Coal	%	77	70	70	70
Oil**	%	4	4	4	4
Gas	%	0	3	3	3
Nuclear	%	1	3	3	3
Hydro	%	17	20	20	20
Coal	TWh	832	1.283	1.050	855
Oil**	TWh	43	73	60	49
Gas	TWh	3	55	45	37
Nuclear	TWh	14	55	45	37
Hydro	TWh	188	367	300	244
Primary energy requirements					
Coal efficiency	%	30	35	35	35
Oil/Gas efficiency	%	35	40	40	40
Coal	Mtoe	238	315	258	210
Oil**	Mtoe	11	16	13	11
Gas	Mtoe	1	12	10	8

Sources: Statistical Yearbook of China 1998; International Energy Agency "Energy Statistics and Balances of Non-OECD-Countries 1995-1996"; authors' calculations. *Autonomous Energy Efficiency Improvements. ** Predominantly used in coal power plants in the start-up phase. 1 Mtoe = 11630 GWh.

Table 2b
Sensitivity analysis of results with respect to income and price elasticities

Price elasticity	Income elasticity		
	0.5	0.7	0.9
-0.1	88	105	124
-0.2	84	100	120
-0.4	77	92	110
In %, calculated for scenario II (medium-growth)			

Figure 1
Comparison of demand scenarios to 2010 with other forecasts



The lower part of table 2a shows the distribution of gross electricity production by generation source, and the *primary energy required* for this production. According to government plans, *coal* will remain the dominant source, with only a small decrease from 77% to about 70%. However, the projected increase in power plant efficiency (from 30% in 1996 to 35% in 2010) will reduce the requirements for primary coal as well. In the medium-growth scenario, primary coal requirements are 258 Mtoe, only 8% above 1996 requirements. This is in contrast once again with the official government plans, which forecast coal consumption for use in power plants of about 350 Mtoe. A *sensitivity analysis* shows the results under different elasticity assumptions. For the sake of simplicity, the results are related to final electricity consumption of the medium-growth scenario only. Table 2b shows the relative deviations from the scenario II (medium-growth) for the combinations of three different income elasticities and price elasticities; the index used in the scenario II (148, resulting from an income elasticity of 0.7 and a

price elasticity of -0.2) is normalised to 100. The sensitivity analysis shows that the income elasticity is clearly the dominant variable: a reduction of the income elasticity from 0.7 to 0.5, holding the price elasticity constant, yields a 16% lower final electricity demand, whereas an increase of the income elasticity to 0.9 would increase final demand by 20%. Yet the highest possible deviation from our estimates (e.g. the combinations 0.5/-0.4 at the lower extreme, 0.9/-0.1 at the higher end), do not change the findings significantly: even the results of the higher end (24% above the medium-growth scenario, or 1,860 TWh) would still be about one fourth lower than the official governmental forecast.¹¹

5 Disaggregate electricity demand at the sectoral level

In order to broaden the scope of the scenarios, a *sectoral disaggregation* is introduced. Electricity intensities per value added differ between the sectors; hence different development paths will have different implications for electricity consumption. If, for example, the development of the service sector in the Chinese economy is as dynamic as often assumed, then electricity consumption would be much less affected than in the case of the traditional growth path based upon industrial development. The disaggregate model requires estimates of the development of the economic sectors, mainly industry as by far the largest consumer of final electricity (about two-thirds), but also of agriculture, the service sector and the residential sector. The Cobb-Douglas function is applied to each of the sectors individually, in order to obtain disaggregate electricity consumption. We make two further assumptions:

- The *sectoral composition* of value-added. Given the expected structural change of the Chinese economy from an agricultural and heavy-industry based system towards high-tech and service activities, it seems reasonable to assume that the share of agriculture in GDP will decline; that the share of industry will decline as well, although somewhat less drastically; and that the share of the services activities, including transport, will increase. The speed of structural change will depend on the overall economic development: structural change will be facilitated in a high growth environment, whereas low growth tends to favour conservatism. We adopt the following two scenarios for structural change: scenario R for rapid structural change, and scenario S for slower change (Table 3). The basis of the structural scenarios is the medium-growth assumption of 6.5% economic growth and 3% increase of real electricity prices per annum.

We introduce a *differentiation of income elasticities*, based upon the idea that the acceleration of structural change in industry will lead to relatively lower consumption increases in this sector as compared to the agricultural or service sectors.

¹¹ Interestingly, the results of our high growth scenario converge with the forecasts made in China about 10 years ago. Lu (1993, p. 171) cites the plans made in the late 1980s: electricity generation by 2010 was assumed to be 1,950 TWh.

Table 3

Disaggregate scenarios by sector: assumptions and results

	Unit	1996	Scenario II R rapid change 2010	Scenario II S slow change 2010
Assumptions				
GDP Shares				
Agriculture	%	17,5	12	16
Industry	%	49	46	48
Services, Transport, others	%	33,5	42	36
GDP-Growth (1996=100)				
Agriculture	Index	100	166	221
Industry	Index	100	227	237
Services, Transport, others	Index	100	303	260
Total	Index	100	241	241
Income elasticities				
Industry			0,6	0,7
Other sectors			0,7	0,8
Price elasticities				
All			-0,2	-0,2
Results				
Final electricity consumption				
Agriculture	Index	100	114	151
Industry	Index	100	131	146
Services, Transport, others	Index	100	174	172
Residential*	Index	100	148	148
Total	Index	100	136	149
Agriculture	TWh	62	71	93
Industry	TWh	570	745	833
Services, Transport, others	TWh	90	156	154
Residential	TWh	113	168	168
Total	TWh	835	1.139	1.248
*Corresponding to the general electricity growth (Scenario II). Sources: Statistical Yearbook of China 1998; International Energy Agency "Energy Statistics and Balances of Non-OECD Countries 1995-1996"; authors' calculations				

This reflects the accelerated change within the industrial sector, from heavy industry to light- and high-tech industries. The difference between income elasticities between industry and other sectors is 0.1%. Likewise, we assume that income elasticities are lower in the scenario of rapid structural change.

For each of the sectors of the economy, an individual growth scenario is calculated, using the assumptions specified in Table 3. The growth of the residential sector is assumed to be similar to the overall growth of final electricity consumption, as calculated in the medium-growth scenario no. II.

The lower part of Table 3 presents the results of the disaggregate scenarios of final electricity demand for the year 2010, in index form with reference to 1996 and in absolute figures. The scenario of slow structural change (II-S) is almost identical with the above aggregate scenario II; the slightly higher share of services is compensated by a higher income elasticity assumed for the non-industry sectors. However, the scenario of rapid change (II-R) implies significantly lower final electricity consumption (about 1,140 TWh). If this result were to be generalised, it would mean that the aggregate scenarios need to be corrected by about 10% downwards.

Industry will continue to dominate final electricity consumption, although its share will decrease from 68% to 65-67%. The fastest growing sector, that is services, will not even double its electricity consumption. The increase of the residential sector may eventually turn out to be higher than the estimated 48%, if residential and rural electrification proceed faster than planned, and the current bottlenecks in electricity distribution are eased.

6 Demand and supply at the regional level

China's power industry is not a homogenous block, but rather regionally diversified, with a very uneven distribution of resources, generation capacity and final electricity consumption. A regional disaggregation may therefore enhance the policy relevance of the scenarios further. Therefore we also assess demand and supply to the year 2010 at the level of each of the 13 inter-provincial and provincial power grids:

Regional electricity *demand* depends on the 1997 level and on regional economic growth. The growth of each region is assumed to be a function of the average growth rate for the period 1994-1997. The rate of aggregate economic growth, i.e. the GDP-weighted average of regional growth rates, is 6.5% per annum, as specified in the medium-growth scenario (see Table 4a).

- On the *supply side*, we assume that developments will proceed according to the governmental plans, but at a somewhat slower pace. Thus, capacity in 2010 will hover around 400 GW. The distribution of generation capacities among the regions, according to government plans, is shown in column 5 of Table 4b.¹² Assuming an average yearly running-rate of 4,500 hours, we obtain the potential gross electricity generation in the year 2010.¹³ The regional scenario does not take into account the interconnection projects that are only in a planning stage.

Table 4b and Figure 2 show the results of the regional scenario to the year 2010: potential gross generation (supply, column 6), required generation (demand, column 7) and

12 357 GW of the total capacity are already specified in large-scale power plant projects (State Power Corporation, 1998); we assume that the remaining 43 GW will be distributed according to the provincial share of total generation. The only exception is the Shandong provincial grid, for which we were able to verify a target of 25 GW, slightly above its current share.

13 4,500 hours seems to be on the low side, but it corresponds to current utilisation rates (1997: 4,613 h); it also takes into account the 'natural' overcapacities required by regular maintenance work, etc. In this version of the scenario, we do not distinguish between different sources of electricity, in particular between coal and hydropower.

Table 4a
Economic key-figures for Chinese regions

Network	Provinces	GDP 1997 (Bill. CHY)	GDP-Growth p.a. (1994-97)	Composition of GDP 1997		
				Agriculture	Industry	Services, Transport, others
Northeast PN (NEPN)	Heilongjiang, Jilin, Liaoning, Inner Mongolia	875	9,5	18	51	31
North China PN (NCPN)	Shanxi, Hebei, Beijing, Tianjin	848	12,5	13	48	39
East China PN (ECPN)	Jiangsu, Shanghai, Anhui, Zhejiang	1.735	14,5	15	52	33
Central China PN (CCPN)	Jiangxi, Hunan, Hubei, Henan	1.225	14,0	25	45	30
Northwest PN (NWPN)	Qinghai, Gansu, Shaanxi, Ningxia	255	9,0	21	41	38
South China PN (SCPN)	Yunnan, Guizhou, Guangxi, Guangdong	1.177	12,0	29	45	26
Fujian PG (FJPG)	Fujian	300	15,5	19	43	38
Shandong PG (SDPG)	Shandong	665	13,0	18	48	34
Sichuan & Chongqing PG (CYPG)	Sichuan, Chongqing	467	10,5	25	42	33
Hainan Provincial Grid (HNPG)	Hainan	41	5,0	37	20	43
Xinjiang Autonomous Region (XJAR)	Tibet	105	9,0	27	39	34
Xizang Autonomous Region (XZAR)		8	15,0	38	22	40
Hong Kong Administrative Region		1.37€	5,0	.	.	.

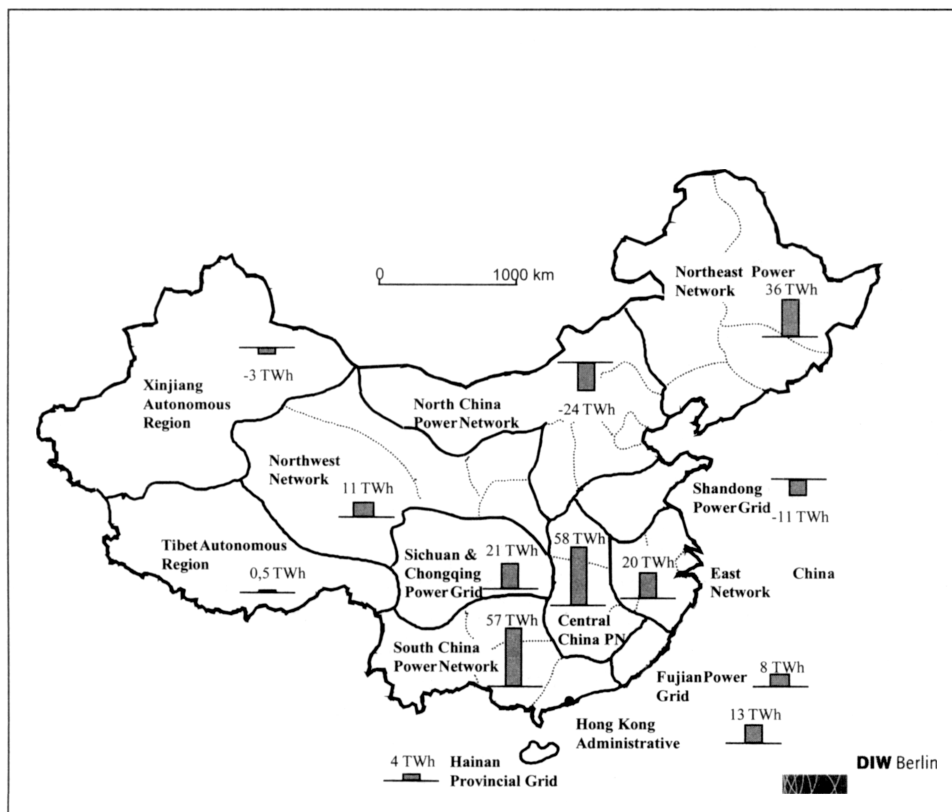
Source: China Statistical Yearbook 1998.

Table 4b
Regional electricity generation and consumption by 2010

(1) Network	(2) GDP- Growth p.a. (%)*	(3) Capacity 1997 (GW)	(4) Generation 1997 (TWh)	(5) Capacity 2010 (GW)	(6) Potential Generation (Supply) 2010 (TWh)**	(7) Required Generation (Demand) 2010 (TWh)	(8) Electricity surplus/ -deficit (TWh) 2010
Northeast PN (NEPN)	5,4	31	143,0	47,5	213,75	177,7	+36,1
North China PN (NCPN)	7,1	34	176,5	51,0	229,5	253,5	-24,0
East China PN (ECPN)	8,2	41,5	202,5	75,5	339,75	320,1	+19,7
Central China PN (CCPN)	7,9	36,2	159,0	67,4	303,3	245,4	+57,9
Northwest PN (NWPN)	5,1	15,7	70,0	21,4	96,3	84,9	+11,4
South China PN (SCPN)	6,8	43	164,3	63,4	285,3	228,1	+57,2
Fujian PG (FJPG)	8,8	7,3	29,0	12,4	55,8	48,1	+7,7
Shandong PG (SDPG)	7,3	16,5	83,9	25,0	112,5	123,4	-10,9
Sichuan & Chongqing PG (CYPG)	5,9	12,6	58,1	21,4	96,3	75,8	+20,5
Hainan Provincial Grid (HNPG)	2,8	15,7	3,4	1,7	7,65	3,4	+4,2
Xinjiang Autonomous Region (XJAR)	5,1	1,9	10,2	2,1	9,45	12,3	-2,9
Xizang Autonomous Region (XZAR)	8,5	0,2	0,3	0,2	0,9	0,4	+0,5
Hong Kong Administrative Region	2,8	10,6	36,4	11,0	49,5	36,2	+13,3
Total	6,5	266,2	1.137	400	1.800	1.609	191
* adjusted with provincial GDP-Growth and GDP-Share 1997; ** average power plant duration of 4500h/year.							

Sources: Electric Power Industry in China 1998; China Statistical Yearbook 1998; authors' calculations.

Figure 2
Regional electricity surplus and deficits to 2010



– as the difference between the two – likely overcapacities or shortfall of electricity in each of the 13 grids (column 8).¹⁴¹ The results are counter-intuitive at first sight: the large industrial areas in the East of the country are likely to have *overcapacities* in 2010 (Eastern China Power Network, South China Power Network, Fujian, and Hainan Provincial grids, Hong Kong). However, this result can be explained by the particularly ambitious generation development projects in the industrial and commercial heartland of China. Similarly, the resource-rich, but less developed regions (Northeastern Power Network, Central China) have an ample supply. By contrast, North China, including the belt from Shanxi through Beijing to Tianjin, is likely to face undersupply, and may require imports or additional capacity. Not too much significance should be given to the results for the autonomous regions of Xinjiang and Xizang (Tibet), due to their marginal share in GDP and electricity consumption.

14 The total gross electricity consumption in the regional scenario (table 4b: 1,609 TWh) differs from the one obtained in the aggregate scenario (table 2b: 1,499 TWh) for two reasons: the regional scenario is based upon 1997 data, efficiency gains are a lump-sum 5%. However, this difference does not change the message of the scenario.

7 Conclusions

The scenarios indicate that the trend of fast growing electricity demand in China may be slowing down. Modest macroeconomic growth coupled with significant price increases will contain the Chinese power sector within limits well below the current governmental plans. Even with higher economic growth, structural change towards less electricity-intensive activities will support slower consumption increases. The figures of the 9th five-year-plan seem to be overoptimistic. A revision of electricity demand projections seems necessary, including a critical analysis of future generation requirements and raw material consumption.

We have shown that under the current governmental development plans, some regions may face overcapacities by the year 2010. In particular, the industrial centres in the East of the country and along the seashore may be facing overcapacity. This is somewhat contradictory to other analyses implying that these regions may face power shortages in the medium-term. If our estimates are right, then the current projects for interconnection need to be revised: instead of creating high capacity AC- and DC-lines between Central China (Three Gorges, Ertan) and the coast, interconnection at the local level would suffice to increase supply security.

The great unknown is the future competition policy. If introduced at the level of electricity generation, competition is likely to imply an acceleration of the restructuring from older to modern power plans. However, a condition for this is that the government introduce measures to induce fair pricing, including capital costs for state enterprises and environmental (external) costs. High-cost coal producers and coal-based power plants stand to lose market shares. The social consequences have to be cushioned in order to ensure political support for reforms. A shift from quantitatively to more qualitatively oriented growth, including environmental aspects, is possible in China, but it requires a significant effort by the Central and Provincial governments to foster competition policies in the sector.

References

- Andrews-Speed, Philip / Dow, Stephen* (1999): Reform of China's Electric Power Industry. mimeo, University of Dundee.
- Andrews-Speed, Philip / Dow, Stephen / Wang, Aijuan / Mao, Jin / Wei, Bin* (1999): Do the Power Sector Reforms in China Reflect the Interests of Consumers? *The China Quarterly*, 158.
- Chan, Hing Lin / Shu Kam Lee* (1996): Forecasting the Demand for Energy in China. *The Energy Journal*, 17(1), 19-30.
- Dobozi, Istvan* (1988): An Empirical Estimation of the Price Responsiveness of the Hungarian Economy: The Case of Energy Demand. In: *Trends in World Economy*, Budapest, Hungarian Scientific Council for the World Economy.
- Gan, Lin* (1998): Energy Development and Environmental Constraints in China. *Energy Policy* 26(2), 119-128.

- Gao, Yan* (1999): Reform and Development of the State Power Corporation of China. Address to the 1999 China Business Summit, Beijing.
- Garbaccio, Richard F./ Ho, Mun S. / Jorgenson, Dale W.* (1999): Why Has the Energy-Output Ratio Fallen in China? *The Energy Journal*, 20(3), 63-91.
- Hirschhausen, Christian / Andres, Michael* (1999): The Chinese Energy Industry at the Eve of the 50th Anniversary of the People's Republic – The Great Flame Put on Hold. *Economic Bulletin*, 36(10), October.
- Ho, Mun S. / Jorgenson, Dale W. / Perkins, Dwight H.* (1998): China's Economic Growth and Carbon Emmissions. In: McElroy, Michael B., et al. (eds.) *Reconciling Environmental Protection and Economic Growth*, Cambridge, MA, Harvard University Press, 301-341.
- Horn, Manfred* (1998): *Energy Demand in Ukraine to 2010*, unpublished study, Berlin.
- Hollander, Jack* (1997): China and the New Asian Electricity Markets. *The ERPI Journal*, 22(5), 24-30 September/October.
- Lu, Yingzhong* (1993): *Fuelling One Billion – An Insider's Story of Chinese Energy Policy Development*, Washington, D.C., The Washington Institute.
- Maddison, Angus* (1998): *Chinese Economic Performance in the Long Run*. Paris, OECD Development Centre Studies.
- Pesaran, Hashem / Smith, Ron* (1993): *Alternative Approaches to Estimating Long-run Energy Demand Elasticities: An Application to Asian Developing Countries*. University of Cambridge, DAE Working Paper No. 9308.
- Sinton, Jonathan E / Levine, Mark D / Wang, Qingyi* (1998): Energy Efficiency in China: Accomplishments and Challenges. *Energy Policy* 26(11), 813-829.
- State Power Corporation* (1998): *Electric Power Industry in China*. Beijing; China Electric Power Information Center.
- Todd, Daniel* (1996): North-South Energy Resource Transfers in China and the Port Intermediary. *Tijdschrift voor economische en sociale geografie*, 87(3), 195-208.
- Wiesegart Kurt* (1998): *Die Stromversorgung in der VR China*. Hirschberg, Pacific Consult.
- World Bank (1993): *China: Energy Conservation Study*. Washington, D.C.; Report No. 10813-CHA.

WTO and the Kyoto process – possible effects on China's energy policy and trade

Andreas Oberheitmann*

1 Abstract

The United Nations Framework Convention on Climate Change and the Kyoto Protocol marked a big step towards a coordinated international climate change mitigation policy and quantitative greenhouse gas emission reduction obligation of the Annex-I Parties. The application of the provisions of these unilateral environmental agreements and especially the realisation of the Kyoto Protocol bring about possible trade conflicts for Annex-I countries and non Annex-I countries such as China, especially in the field of national policies and measures, emissions trading under the Kyoto Protocol as well as trade measures for compliance and enforcement. Being member of the WTO there might be requirements for a change in the current Chinese energy policy, especially in the field of coal and electricity. However, the Kyoto process might also have positive effects on China's international trade, especially through the attraction of CDM capital.

2 Introduction

International environmental policy currently is dominated by climate change mitigation policy. The 1992 UN Conference on Environment and Development (UNCED) was the big starting point of international climate negotiations. In its preamble, the United Nations Framework Convention on Climate Change (UNFCCC) made clear that climate change mitigation has always to be seen in the context of environment and sustainable development as it states that:

"the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs" and "that the global nature of climate change calls for the widest possible co-operation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions."¹

*Andreas Oberheitmann is senior research fellow at the Rheinisch-Westfälisches Institut für Wirtschaftsforschung, Hohenzollernstr. 1-3, 45128 Essen, Germany. E-mail: oberheit@rwi-essen.de

¹ United Nations Conference on Trade and Environment (1992).

Hence, the Convention mandates the states "to enact effective environmental legislation, that environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply, and that standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries."

The ultimate objective of the United Nations Convention on Climate Change is to stabilise atmospheric concentrations of greenhouse gases. China is one of the 178 signatories of the UNFCCC.

The Kyoto Protocol to the Convention is an important step in meeting the objective of the Convention. The Kyoto Protocol commits industrialised countries to elaborate domestic policies and measures to achieve their legally-binding targets for reduction of greenhouse gases. The Protocol also recognises economic instruments, including Joint Implementation, the Clean Development Mechanism and Emissions Trading – new market mechanisms – as a means to achieve emission limitation. The Protocol will build a comprehensive compliance system to ensure the confidence and credibility of the Kyoto Protocol. Article 3.5 of the Convention states that measures taken to combat climate change, including unilateral ones, should not constitute a means of discrimination on international trade. The Kyoto Protocol reaffirms this principle. No distinct trade measures are included in these agreements; implications for the trade regime may arise from the national implementation of trade related measures to meet commitments under the Convention and the Kyoto Protocol. Parties are in the process of developing principles, modalities, rules and guidelines for the mechanisms of the Kyoto Protocol. China as a developing country does not have a quantitative obligation to reduce the greenhouse gas emissions. However, the country could be touched by the implications of the realisation of the Kyoto Protocol. Furthermore it could be possible that China at some stage might take some quantitative obligation towards the Protocol. On 3 September 2002 China declared that it had ratified the Protocol. This might be a first step.

Following up, there is a brief introduction into the trade related provisions of the most important environmental agreements of international climate change policy, i.e. the UNFCCC and the Kyoto Protocol (Chapter 2). The application of these provisions and especially the realisation of the Kyoto Protocol brings about possible trade conflicts for Annex-I countries and non Annex-I countries such as China (Chapter 3). Chapter 4 examines the possible effects of China's WTO entry and the Kyoto process on China's energy policy and trade.

3 Trade related provisions in the Rio and Kyoto Process

The Rio Conference was a two-fold compromise between trade and environmental policy on the one side and the different interests of the industrialised and developing countries on the other side. In Rio de Janeiro, environmental concerns had not been taken more seriously than the aim of economic development. Trade liberalisation shall lead to a higher living standard and the reduction of environmental unfriendly production technologies. The UNCED mandate to trade policy is that

- "Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade." (Principle 12 of the Rio Declaration).
- A country should not try to gain artificial competitive advantage by reducing its environmental standards and start a "race to the bottom."
- Trade policy has to support environmental policy. Win-win options fulfil this aim. E.g., the introduction of environmental programmes to reduce the use of chemical fertilisers and pesticides as well as the liberalisation of the international agriculture markets is a win-win-situation as both trade political and environmental political goals are reached. An efficient environmental policy that tries to internalise the external environmental costs through the application of the polluter-pays-principle supports this process.
- Trade policy should not go against an environmental policy that is agreed upon by a large majority of countries. Thus, in severe cases, violations of international environmental agreements may be sanctioned with trade restrictions.
- Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing trans-boundary or global environmental problems should, as far as possible, be based on an international consensus.²

Based on these principles there are several trade related provisions in the UNFCCC and the Kyoto Protocol.

3.1 Provisions in the UNFCCC

The UNFCCC does not directly restrict trade, but actions of countries implementing the FCCC could have significant trade implications. The measures include promotion of energy efficiency, sustainable forest management, new and renewable forms of energy, progressive reduction or phasing out of market imperfections as well as measures to reduce emissions of greenhouse gases, including in the transport and waste management sectors. The requirement to adopt national policies and corresponding measures to mitigate climate change is laid down in Article 4.2(a.). There are a few trade related provisions in the UNFCCC. They are:

- Article 3.5. International trade is specifically mentioned in this article: " ... measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade." According to the UNFCCC Secretariat, the policies and measures adopted by Parties have not had any adverse impacts on international trade.
- Article 11. Establishes a financial mechanism (which is the GEF) to provide financial resources, including for the transfer of technology. GEF covers the difference (or "increment") between the costs of a project undertaken with global environmental objectives in mind, and the costs of an alternative project that the country would have implemented in the absence of global environmental concerns. Pursuant to Article 13 of the UNFCCC, COP 4 considered the adoption of a Multilateral Consultative Process (MCP) for the resolution of questions regarding the implementation of the

² See Wiemann, F. (1997), pp. 271.

UNFCCC. The proposed MCP is to be facilitative, non-judicial, transparent and co-operative.

- Article 14. The Parties concerned shall seek a settlement of the dispute through negotiation or any other peaceful means of their own choice. Parties may make a written submission at any time as to whether they recognise as compulsory the submission of the dispute to the ICJ, and/or arbitration. If Parties are unable to settle their dispute through the above means, the dispute is to be submitted, at the request of any of the Parties concerned to conciliation. A conciliation commission is to be created upon the request of one of the Parties to the dispute, composed of an equal number of members appointed by each Party concerned who in turn jointly choose a chair. The commission is to render a recommendatory award, which the Parties shall consider in good faith.

184 countries including China have ratified the UNFCCC. There are three WTO Members who are not Party to the UNFCCC: Brunei Darussalam, Tanzania and Turkey. No trade disputes have been arisen between Parties based on the provisions on the UNFCCC.

3.2 Provisions in the Kyoto Protocol

The Kyoto Protocol to the UNFCCC is a step towards achieving the objective of the Convention by reducing CO₂ and other emissions. The 1992 Earth Summit, the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, set the basic framework of international climate policy³, inter alia, by establishing the United Nations Framework Convention on Climate Change (UNFCCC) and formulating the mission to further elaborate rules and mechanisms for international climate policy in the follow-up Conferences of the Parties (COP). May aim of COP-3 in Kyoto 1997 was the realisation of the Berlin Mandate to agree on binding reductions or limitations of the relevant greenhouse gases and to establish suitable policies and measures to fulfil these obligations. The most important result of the Conference was the obligation of the contracting parties listed in Annex B of the Protocol (OECD countries and countries in transition in Middle and Eastern Europe) to reduce the greenhouse gases listed in Annex A of the Protocol, i.e.,

- carbon dioxide (CO₂),
- methane (CH₄),
- nitrous oxide (N₂O),
- hydrofluorocarbons (HFCs),
- perfluorocarbons (PFCs) and
- sulphur hexafluoride (SF₆)

in the budget period of 2008 to 2012 by an average of 5.2 % against 1990, resp. 1995 for the last three gases mentioned. With this obligation the contacting parties fulfilled Art,

³ The other important results of the Rio Conference are the Rio-Declaration, the Agenda 21, the Convention on Biodiversity, the Forest Principles and the establishment of the UN-Commission on Sustainable Development.

3,1 of the Kyoto-Protocol to agree to, individually or jointly,⁴ reduce the emissions of the countries listed in Annex-I of the UNFCCC by at least 5.0 %. The fulfilment of the obligation was distributed unequally over the contracting parties due to their abilities to reduce greenhouse gases and possibly due to their negotiation skills. Most of the Annex-B countries committed themselves to an 8 % reduction, some countries such as the Russian Federation to a stabilisation on the greenhouse gases, Iceland in 2008-12 even can emit 10 % more than in 1990.

China and other developing countries do not have quantitative obligations towards the Kyoto Protocol, but generally shall formulate and conduct national programmes to mitigate climate change and shall generally co-operate in the Kyoto process due to the specific development priorities (Art. 10).

For the flexibilization of the national fulfilment of the greenhouse gas emissions reduction obligation, the third Conference of the Parties in Kyoto developed several flexible instruments for the fulfilment of national obligations laid down in the Kyoto-Protocol (UNFCCC, 1998):

- Joint Implementation (Art. 6), the
- Clean Development Mechanism (Art. 12) as well as
- Emissions Trading (Art 17).

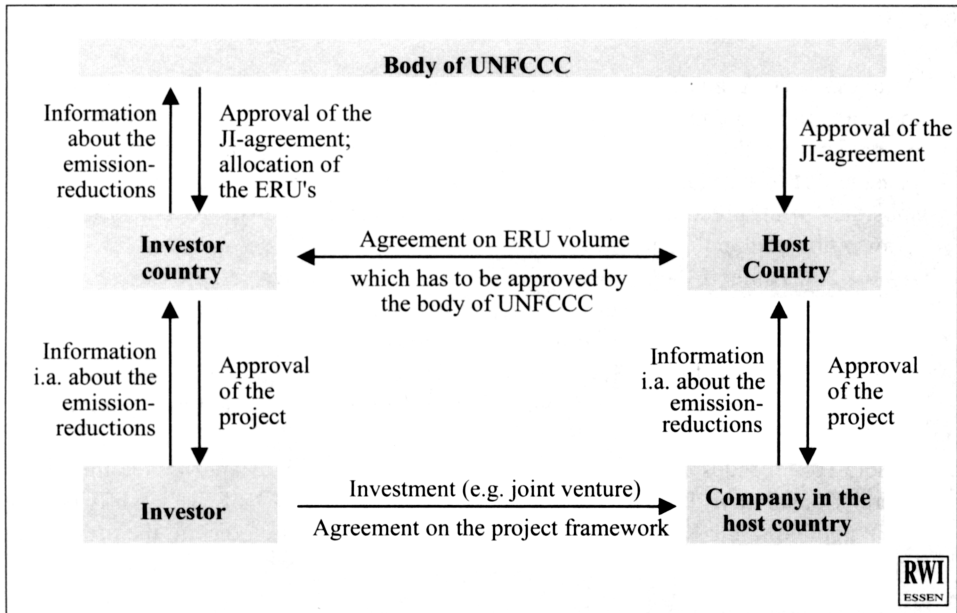
Joint Implementation (JI) and the Clean Development Mechanism (CDM) are project-based mechanisms which create emission credits through the reduction of greenhouse gases against a project baseline of a business-as-usual scenario. Whereas Joint Implementation will take place between Annex-I Parties, due to the words of the Kyoto Protocol, aim of the Clean Development Mechanism is

- to assist Non-Annex-I countries in achieving sustainable development and contributing to the mitigation of global climate change and simultaneously, and
- to assist Annex-I countries achieving their emission reduction targets committed to the UNFCCC (Art.12, 2).

Rationale behind the use of the instruments of Joint Implementation and the Clean Development Mechanism is the following: Since carbon dioxide is a global greenhouse gas, it is insignificant regarding the avoidance of possible climatic changes, in whatever region CO₂ or other greenhouse gases are emitted or saved. Therefore, a constellation becomes ecologically interesting, where in the investor and host country there are different marginal greenhouse gas reduction costs. The higher the marginal avoidance costs differences, the more economical GHG reductions can be credited onto the account of one's own obligations. Generally, the function mode of this instrument is as follows (see Figure 1):

⁴ Art. 4,1 allows for emission reductions within a bubble. The joint fulfilment of the European Union applies to this Article. Under this 8 % bubble there is an internal EU burden-sharing of the emission reduction.

Figure 1

Function mode of Joint Implementation

- In principle, once the giver and the recipient country have agreed to carry out common emission reduction measures, e.g. an enterprise implements the agreed upon measures for the pollutant reduction, for instance retrofitting a power station. The emission reductions were measured against the baseline without climate protection measures and certified.
- The investor enterprise announces the obtained certified emission reductions to its government. These are passed on, according to a solid report pattern, to the UNFCCC secretariat.
- The secretariat reports on the next Conference of the Parties on the accomplished projects and the experiences obtained in these projects. If the project is classified as successful, the enterprise respectively the investor (Annex-I) country receives an emission reduction certificate, which can be counted towards its own account for the obligations entered within or for the country. The investor company respectively the investing Annex-I country has to pay a fee for this crediting. This fee is charged (a) for the administrative costs and (b) for financing other environmental measures in Non-Annex-I countries.

On the seventh Conference of the Parties in Marrakesh, the CDM-fee was agreed on a two percent share of the proceeds from CDM. These share of proceeds are mainly used to support countries particularly vulnerable to the effects of climate change such as the small island states. If the Clean Development Mechanism comes into action, China can participate in this form of international co-operation in the energy sector and benefit from a further interaction with the international energy markets.

Art. 17 of the Kyoto Protocol describes an Emissions Trading generally of parts of the Assigned Amounts or emission reduction credits of an Annex-I-Country of UNFCCC. The Protocol do not have distinct provisions regulating trade policy. However, the following provisions are related to international trade:

- Article 2.1(a): Annex I Parties shall implement and/or further elaborate policies and measures in accordance with national circumstances, such as enhancement of energy efficiency in relevant sectors of the national economy and progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse emitting sectors that run counter to the objective of the Convention and application of market instruments.
- Article 2.3: Annex I Parties will strive to implement policies and measures in such a way as to minimise adverse effects, including effects on international trade.
- Article 11: Adopts the financial mechanism of the Convention, which is the GEF. A compliance system for the Kyoto Protocol is being developed. The Kyoto Protocol provides for procedures and mechanisms to determine and to address cases of non-compliance.
- Article 16: Provides that the COP can consider and modify as appropriate the Multilateral Consultative Process that is referred to in Article 13 of the UNFCCC. The MCP applied to the Kyoto Protocol shall operate without prejudice to the procedures and mechanisms established under Article 18 of the Protocol.

The Kyoto Protocol only comes into force, if it is ratified by 55 percent of the Parties and the Annex I countries amongst them represent 55 percent of the total Annex I country emission in 1990 (Art. 25,1). Until now, the Kyoto Protocol has not yet entered into force. As of 30 August 2001, 84 countries have signed, 89 Parties ratified or acceded the Protocol. Together they count for 37,1 % of the emissions in 1990. 72 WTO Members have not yet ratified the Protocol. 72 WTO Members, including China already have ratified, acceded, accepted or approved the Kyoto Protocol.

4 **Possible trade conflicts through the realisation of the Kyoto Protocol**

Currently, China does not have a quantitative obligation towards the Kyoto Protocol. However, it is likely that some newly industrialised economies to which China may belong to in the future also have to sign such specific obligations. Possibly having own quantitative obligations towards the Kyoto Protocol, the trade and environment considerations for Annex-I Parties also becomes important for China. In the Kyoto Protocol there are at least three areas that possibly lead to trade conflicts:

- National policies and measures,
- Emissions Trading under the Kyoto Protocol, and
- Trade measures for compliance and enforcement.⁵

As for environmental related trade conflicts, e.g. because of subsidies, after the entry into the WTO, China can make use of certain exceptions as a developing country. Following up, these areas will be examined.

⁵ See Cosbey, A. (1992), pp. 2.

4.1 National policies and measures

The heart of the climate change mitigation efforts of the Parties of the Kyoto Protocol are domestic policies and measures to reduce greenhouse gas emissions. The flexible Kyoto Mechanisms are only a supplement to these measures (Art. 6, 1 (d)); Art. 17) or can substitute a part of the domestic emission reduction and limitation commitments (Art. 12, 3 (b)).

National policies and measures may include energy or carbon taxes, standards, government procurement and subsidies relating to the promotion of the flexible mechanisms. These issues are addressed below.

4.1.1 Carbon taxes

One measure to internalise the external environmental costs into the economic calculus of the economic subject is to impose a tax on energy or better on the emission of greenhouse gases such as CO₂. The tax would raise the prices of energy and penalise energy-inefficient production and use of energy and energy-intensive products. Hence, it induces investments in energy efficiency and fuel switch to less carbon-intensive fuels. However, in a global economy single national measures may lead to a shift of the production from a high-tax region to a low-tax or no-tax region. Finally, the volume of global greenhouse gas emissions may be unaffected. Currently, China does not have carbon or energy taxes. Thus, environmental policies and measures in Annex-I countries may lead to investments of Annex-I Party companies in China. From the balance of payment point of view, this is an advantage for China as foreign investment is attracted. However, from a global environmental point of view, a shift of greenhouse gas emissions from Annex-I to non-Annex-I countries is detrimental to the process of reducing global emissions. Hence, from the economic and ecological point of view China and other developing countries should also try to internalise the external costs by imposing energy or emission taxes. Chinas competitive advantages of lower labour costs would remain untouched and still could be used to attract foreign investment. However, these measure has to be in line with Chinas development requirements. Here, the Clean Development Mechanisms of the Kyoto Protocol could help. The share of proceeds from the CDM measures could also be used to support the internalisation of the external costs, e.g. though creating new employment opportunities in environmental friendly sectors.

4.1.2 Standards

Annex-I Parties of the Kyoto Protocol may introduce environmental standards to reduce greenhouse gases and fulfil their obligation towards the Protocol. Generally, countries are free to adopt whatever standards they chose under the WTO rules. Their level of environmental protection is a social choice. If the standards are constructed to favour domestic industries, such standards regulations may violate WTO rules and may lead to trade disputes. If China at a certain stage also takes quantitative obligations towards the Kyoto Protocol, these issue may become important.

Currently, China as a non-Annex-I Party does not have quantitative obligations towards the Kyoto Protocol. Environmentalists fear that there is an inherent incentive for China to lower environmental standards to attract further foreign capital (so called "pollution havens"). A free trade world under the WTO then allows the export of the goods produced there into the countries with higher standards. From the environmental viewpoint this is detrimental for two reasons:

- The environment in the "pollution havens" gets worse and
- there is a chilling effect on environmental regulation because countries fear to raise their environmental standards as they fear a outflow of capital into other countries with lower standards.⁶

However, from an economic point of view lowering the environmental standards is not necessarily the interest of a large country and the first best solution for China and other developing countries in an imperfect competitive international market to shift foreign production to domestic producers.⁷ Just as "pollution havens" drive the regional environment worse and a subsidisation of exports to support domestic industries by developing countries is compatible with GATT (e.g. for infant industries), the latter option seems to be the better solution for China and other developing countries. By doing this, the danger could be encountered that the environmental standards would be sacrificed to global competition.

4.1.3 Government procurement

With 10 to 25 percent of GDP, governments in the OECD purchase a large amount of goods and services. Annex-I governments may use their purchases to achieve the Kyoto obligations, e.g. by giving preferences to goods that are produced with renewable energy sources. These measures – discriminations on the basis of the production nature – are reason for a large number of trade disputes (e.g. the dolphin-tuna case etc.). However, if government undertakes such measures, they will not be governed by the WTO Agreement on Technical Barriers, but the Agreement on Government Procurement. This Agreement does not seem to prohibit such measures⁸. It only provides in Article VI, 1 that

"Technical specifications laying down the characteristics of the products or services to be procured, such as quality, performance, safety and dimensions, symbols, terminology, packaging, marking and labelling, or the processes and methods for their production and requirements relating to conformity assessment procedures prescribed by procuring entities, shall not be prepared, adopted or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade ..."

This general phrase has yet to be further defined. Currently, this Agreement is only signed by a small number of countries. However, most of them are major traders.

⁶ See Neumayer, E. (2000), p. 142.

⁷ See Nordhaus, W. D. (1999), p. 190.

⁸ See Cosbey, A. (1999), p. 5.

Whether government procurement measures could be a possible area for trade conflict between China and other WTO Members should be subject to further examination.

4.1.4 Policies and measures concerning the promotion of JI and the CDM

All of the Annex-I Parties and most of the Non-Annex I Parties are contracting parties of the WTO. Currently, there are no specific provisions of the WTO agreements covering the flexible instruments of the UNFCCC. However, trade conflicts from JI and CDM can arise because of governmental project support in national programs. This support can have different faces. It can include direct public support or tax concessions to leverage investments, marketing and infrastructure support for project implementation, the provision of governmental services to reduce transaction costs including the certification and verification⁹. The above mentioned government actions under certain conditions can infringe principles (i.e. non-discrimination, reciprocity and fair trade) and provisions of the agreements governed by the WTO. The most important question in this context is, whether projects undertaken under the flexible mechanisms of the Kyoto Protocol are hidden domestic export subsidies of Annex-I countries or hidden import subsidies of Annex-I and non-Annex-I countries infringing the principle of fair trade. Exceptions for developing countries are an exception of the principle of non-discrimination.

By introducing Section B of Art. XVI in GATT in 1962, export subsidies are generally prohibited. Art. XVI, 4 of GATT 1994 requests the contracting parties "to cease to grant either directly or indirectly any form of subsidy on the export of any product other than a primary product which subsidy results in the sale of such product for export at a price lower than the comparable price charged for the like product to buyers in the domestic market". Exceptions may be allowed for primary products (Art. XVI, 3). Granted subsidies have to be reported to the CONTRACTING PARTIES (Art. XVI, 1). Detailed provisions are to be found in the specific agreements of the GATT/MTN System, now embodied in the WTO. The Agreement on Subsidies and Countervailing Measures laid down in the final act embodying the results of the Uruguay Round of multilateral trade negotiations defines the term of subsidy (Art. 1)¹⁰ and differentiates between prohibited subsidies (Art. 3), actionable subsidies (Art. 5) and non-actionable subsidies (Art. 8). A JI or CDM project run under a national program can be subsumed under this terms of Art. 1 as there may be

- direct transfers of funds,
- government revenue that is not collected (e.g. the compensation of an energy tax) and
- provision of governmental services to reduce transaction costs.

⁹ See Michaelowa, A. / Michaelowa, K. / Vaughan, S. (1998), p.576.

¹⁰ Art. 1 assumes a subsidy as existing, if "(a)(1) there is a financial contribution by a government or any public body within the territory of a Member, i.e. where: (i) a government practice involves a direct transfer of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees); (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits); (iii) a government provides goods or services other than general infrastructure, or purchases goods; (iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments; or (a)(2) there is any form of income or price support in the sense of Article XVI of GATT 1994; and (b) a benefit is thereby conferred".

For a part of the projects these principles of Art. I may not apply, because the financial contribution was not done within the territory of the contracting party (if the financial flows for an AIJ project are directly going to the host party and no other contribution is given to the investor company). But for JI and CDM projects compensating taxes, e.g. the CO₂-taxes are not collected, there will be net backflows into the company and the tax credits can be interpreted as an export subsidy, if the project in question is a no-regret measure.

Subsidies can only be prohibited or actionable, if they are specific to an enterprise or a group of enterprises or industries (Art. 2). Here the provision is defining specificity explicitly in terms of being within the jurisdiction of the granting government which clearly can cover actions outside the territory of the contracting party.

Prohibited subsidies are exemplarily listed in Annex I of the Agreement and are dependent on the export performance or upon the use of domestic over imported goods. JI or CDM projects could fall under this category, if they fit to the example (d)¹¹ or (g)¹² of the Annex I. Crucial point of example (d) is that the exported goods (i.e. the GHG emission reduction technology) have been made less expensive by the national program than for the domestic use. Example (g) explicitly recurs on indirect taxes such as energy taxes that are exempted when sold on the international market. A company that compensates a national CO₂-tax with GHG credits accruing from JI or CDM projects can cross-subsidize other technology exports with the CO₂-tax exemptions from the project.

Subsidies are actionable (Art. 5), if there is (a) an injury to the domestic industry of another Member; (b) a nullification or impairment of benefits accruing directly or indirectly to other Members under GATT 1994 in particular the benefits of concessions bound under Article II of GATT 1994; (c) a serious prejudice to the interests of another Member. Art. 6 provides a detailed definition of the term "serious prejudice". Prior to the approval of projects by the UNFCCC bodies these points have to be checked.

The Agreement mentions subsidies that are non-actionable, including the "assistance to promote adaptation of existing facilities to new environmental requirements imposed by law and/or regulations which result in greater constraints and financial burden on firms", provided, inter alia, that the assistance (i) is a one-time non-recurring measure; and (ii) is limited to 20 per cent of the cost of adaptation" (Art. VIII,2(c)). This provision seems not to be applicable to JI or CDM as its focus is the facility in the investor country. "Existing facilities" in this context moreover mean units which have been in operation for at least two years at the time when new environmental requirements are imposed (Art. VIII, 2(c), footnote 2).

11 Example (d) of Annex I of the Agreement on Subsidies and Countervailing Measures mentions "the provision by governments or their agencies either directly or indirectly through government-mandated schemes, of imported or domestic products or services for use in the production of exported goods, on terms or conditions more favourable than for provision of like or directly competitive products or services for use in the production of goods for domestic consumption, if (in the case of products) such terms or conditions are more favourable than those commercially available on world markets to their exporters".

12 Example (g) mentions "the exemption or remission, in respect of the production and distribution of exported products, of indirect taxes in excess of those levied in respect of the production and distribution of like products when sold for domestic consumption".

Developing countries such as China, however, can be exempted from the prohibition of granting subsidies. This applies generally to export subsidies of least developed countries listed in Annex VII of the Agreement on Subsidies¹³ (Art. XXVII, 2(a)). This applied as well – more importantly – to the import subsidies (e.g. the subsidisation of coal which may generate lower costs of possible CDM-projects in the electricity sector) of all other developing countries being contracting party of the WTO in the first eight years after the date of WTO coming into force (Art. XXVII, 2(a)), i.e. 1995. The countries mentioned in Art. XXVII, 2(a) are Non-Annex I countries. As the developing country status in WTO is given by self-determination, the countries mentioned in Art. XXVII, 2(b) are Non-Annex I countries as well as the economies in transition in Annex I of UNFCCC. As for JI and CDM, respectively AIJ projects developing countries are exempted from the prohibition of granting subsidies in two ways:

- The least developed non-Annex I Parties can grant import subsidies to attract CDM and AIJ projects compatible with the Agreement of WTO only until 2003.
- For other non-Annex I Parties to which China belongs and Parties with economies in transition, this possibility is still open for the CDM and AIJ until 2003, but for JI, which is only creditable as of 2008, granting subsidies then is not allowed under WTO-rules.¹⁴

In summary as for JI and CDM, national governments that run national programs with subsidy elements may have to be cautious that their programs do not interfere with the law set in the framework of the WTO. It is advisable that prior to the approval of projects by the UNFCCC bodies these points are carefully checked.

4.2 Emissions Trading under the Kyoto Protocol

Emissions Trading allows Annex I Parties to trade Assigned Amounts (allowed emissions) or parts of it among themselves. Emissions Trading may also be expanded to the direct trade of ERUs accruing from Joint Implementation and CERs accruing from the Clean Development Mechanism. Indirectly, it can be traded anyway as the ERUs respectively the CERs are added to the Assigned Amounts of the Annex-I Parties and can be traded then.

One set of issues is arising from the difficulty to define the nature of the emission credits as there are two alternatives. They can be

- goods or
- securities.

If the emission certificates are goods, then the exclusive right to trade them between Annex-I Parties may violate the principle of non-discrimination of the General Agree-

13 These are (a) the least developed countries, designated by the United Nations, and (b) the countries of Bolivia, Cameroon, Congo, Cote d'Ivoire, Dominican Republic, Egypt, Ghana, Guatemala, Guyana, India, Indonesia, Kenya, Morocco, Nicaragua, Nigeria, Pakistan, Philippines, Senegal, Sri Lanka and Zimbabwe for the time their GDP does not exceed 1000 US\$ per annum. Exceeding 1000 US\$, these countries are treated as the other developing countries in Art. XXVII,2 (a).

14 See Oberheitmann, A. (2000), p. 7.

ment on Tariffs and Trade (GATT)¹⁵, here the Most Favoured Nation provision of Art. I GATT through the discrimination of non-Annex-I trading parties such as China.

The analysis of the value chain of CERs and ERUs indicates that the majority of the processes involved are services rather than goods¹⁶. If the emission certificates are proved to be qualified as securities, i.e. transferable financial instruments, they are not governed by the provisions of GATT, but the General Agreement on Trade in Services (GATS). Currently, the trade of Assigned Amounts is still restricted to the governments. If they – in the function of selling and buying Assigned Amounts – can be seen as suppliers of services, a discrimination of non-Annex-I Parties from trade would be a violation of Art. II,1 GATS. It states that

"with respect to any measure covered by this Agreement, each Member shall accord immediately and unconditionally to services and service suppliers of any other Member treatment no less favourable than that it accords to like services and service suppliers of any other country."

If the certificates can be traded by private companies as well, which is possible for Joint Implementation (Art. 6, 3 of the Kyoto Protocol) and for the Clean Development Mechanisms (Art.12, 9), it may also violate the relevant Most Favoured Nation provision of GATS (Art. II,1). Hence, due to this provision all providers of financial services (brokers, traders etc.) from all countries – even those from non-Annex-I Parties – are free to handle trades of emission certificates accruing from JI and the CDM. Precondition for that, however, is that direct trade of ERUs and CERs will be allowed.

Currently, China being a non-Annex-I Party cannot participate in an international Emissions Trading. However, in a national context it may also be implemented in China to internalise the external environmental costs. If Emissions Trading is implemented within one country, other issues arise. The cost-free initial allocation of emission rights to private companies due to their past emissions (grandfathering) might be a subsidy under the WTO Agreement on Subsidies and Countervailing Measures. If they are prohibited or actionable under this Agreement, they have to be

- (a) specific, i.e. granted to a specific enterprise, industry or sector, and not generally available, or
- (b) export promoting or to harm a foreign competitor.

If the conceivable allocation goes to a small group of industries with a few companies getting a huge part, the allocation of initial certificates may be seen as specific. An export promotion though the allocation of certificates seems unlikely if they are only traded domestically. It could harm foreign competitors, if they would be excluded from an Emissions Trading. Thus, China and other Parties to the Protocol should take this into consideration when designing the allocation system.

¹⁵ See Oberheitmann, A. (1994), p. 23.

¹⁶ See Springer, U. (2000), pp. 71.

4.3 Trade measures for compliance and enforcement

On the seventh Conference of the Parties in Marrakesh agreements were reached on specific procedures for compliance and enforcement of the obligations towards the Kyoto Protocol due to the provision of Art. 18 of the Protocol. These issue only becomes important to China if the country has own quantitative obligations towards the Kyoto Protocol. Possibly there will be a penalty level per tonne carbon emitted more than allowed. Trade measures may take at least three forms:

- bans on trade with non-parties,
- trade restrictions, and
- prohibitions on emissions trading with non-complying parties and with non-parties.¹⁷

The non-compliance procedures of the Montreal Protocol on Substances that Deplete the Ozone Layer bans parties from trading restricted goods with non-parties. For the Kyoto-Protocol, however, the list of goods that are produced with the emissions of greenhouse gases is so large that it seems unpracticable to apply this non compliance measure. Moreover, such a measure is likely to violate the Most-Favourate-Nation provision of Art. I GATT.

Art. 2 of the Kyoto Protocol mentions a set of possible policies and measures to be implemented to achieve the Kyoto obligations. Parties may argue that they have imposed trade restricting measures under the mandate of Art.2 though non of them are not specifically mandated. Whether another country complaints about such measures to the WTO dispute settlement bodies is still open. But if there were complaints, it would open up a long further dispute on the compatibility of trade and environment conflicts.

5 **Possible effects of China's WTO entry and the Kyoto process on China's energy policy and trade**

Possibly this year the People's Republic of China will entry the WTO and has full obligations and rights as a Member of this international organisation. Currently, China's main contribution to the Kyoto process is

- a national climate change mitigation policy which is to a large extent is energy policy as well as
- hosting potential CDM projects.

Following up there is a brief examination of the possible effects of China's WTO entry on the current Chinese energy policy and the effects of the Kyoto process on China's international trade.

¹⁷ See Cosbey, A. (1999), pp. 5.

5.1 Possible effects of China's WTO entry on the current Chinese energy policy

With an annual output greater than 1,400 million tonnes, China is the largest coal producer in the world. Coal accounts for about two-thirds of China's primary energy supply and demand (including non-commercial sources of energy). Domestic supply exceeds demand, permitting China to be a modest net exporter of coal. China has significant reserves of oil, both onshore and offshore. Domestic production is currently around 160 million tonnes per year, but has failed to keep pace with demand during the last few years. China has been a net importer of oil since 1993.

Natural gas at present only accounts for some 2% of primary energy supply. Most of current production is located in Sichuan Province in the south-west and in Heilongjiang Province in the north-east.

With an installed capacity of about 280 GW and an annual output of 1200 TWh China's electrical power industry is the second largest in the world after the USA. Thermal power accounts for 80% of output (of which 90% is from coal), and most of the rest is hydro-electricity. China has the largest potential for hydro-electricity in the world. This is mostly located in south-west and south-central China. The country has considerable potential for the development of wind, solar and tidal energy. The nuclear power industry is growing rapidly but only accounts for 1.5% of generation to date. Electricity is becoming increasingly important in final energy consumption in the industrial, service and household sectors. Climate change mitigation policy in China to a large extent is connected with the efficient use of coal and electricity. Following up, these two areas will be examined in view of possible trade conflicts after China's WTO entry.

5.1.1 Coal

A large part of the coal sector is widely liberalised with a high degree of competition and the use of market mechanisms on the supply and the demand side. A smaller remaining part of the coal market is still regulated by the plan. In 1997, the plan market still made up to 40 % of total coal. Up to 2000 this situation has changed. However, coal producers and the big coal consumers such as the power industry are powerful industry sectors and try to resist the price reforms of the government through a very slow implementation within the companies. They fear to lose many advantages out of the old system as the price reforms imply more competition and possibly a cut-down of subsidies. Now, the Chinese government tries to reorganise the coal sector by promoting mergers and acquisitions as well as initial public offerings (IPOs) at the stock markets.

Generally, price subsidies on the supply side by bearing the losses of the large state-owned coal mines lead to a shift of the responsibility for profits and losses from the coal mines to the state. Main goal of the coal mines is to meet the plan target and the quota. The lack of price incentives for the coal mining companies causes an inefficient production. Price subsidies on the demand side hamper the investment in a more efficient use of coal such as co-generation of heat and power. This would also contribute to the achievement of environmental goals and hence would be a win-win situation for China.

From the WTO point of view, price subsidies for coal in China are falling under the definition of a subsidy in Art. 1 and 2 of the Agreement on Subsidies and Countervailing Measures, if there are

- specific direct transfers of funds to coal mines to lower the coal price for exports or
- to subsidise the coal price to lower the production costs of coal-intensive export products.

The Chinese WTO entry may have implications for the coal policy as the subsidies might be GATT-inconsistent, if they are likely to establish a subsidy of the export coal price and injures the domestic industry of an import country of Chinese coal or is a serious prejudice to the interests of an other WTO Member (Art. 5 (c)) of the Agreement on Subsidies and Countervailing Measures. Due to Art. 6,1 a serious prejudice of a subsidy is deemed to exist, if

"(a) the total ad valorem subsidization of a product exceeding 5 per cent", or if the payments are

"(b) subsidies to cover operating losses sustained by an industry, [...]."

This seems to be the case in China. However, these subsidies to cover operating losses sustained by an enterprise are not generally prohibited. They have to be subsidies

"other than one-time measures which are non-recurrent and cannot be repeated for that enterprise and which are given merely to provide time for the development of long-term solutions and to avoid acute social problems" (Art. 6.1 (c)).

In 1997, only 2 percent of the total Chinese coal production was exported.¹⁸ In this case, Chinas TO entry may not have large impact on the national coal policy. The subsidisation of the coal price to lower the production costs of coal-intensive export products may be more important as many products are produced with coal or coke (such as steel). With almost 1.1 billion tons in 1997, China is the worlds biggest producer of crude steel¹⁹. However, in 1997 only 4.6 million tons of rolled steel had been exported. To give more valid information about possible trade conflicts in this area, there should be more intense research on the basis of more disaggregated data.

Apart from possible trade conflicts there are negative economic implications of the subsidisation of coal in China. Where coal prices in China do not reflect the real scarcities on the coal market, the allocation of resources in an economy will be at least beyond optimum, if not mislead. The most striking deficiencies of the coal pricing system are as following:

- *Wrong signals to the supply side.* As the coal prices do not give the right signals to the coal suppliers, the mining companies do not have consistent incentives to reduce their marginal production costs. As the coal prices in some cases do not cover the mining operation costs and do not include depreciations, less capital is available for the companies to invest in the improvement of production efficiency through invest-

¹⁸ See State Statistical Bureau (ed.) (1999), p. 249.

¹⁹ See State Statistical Bureau (ed.) (1999), p. 897.

- ments in advanced technology and management methods or in the construction of new mining capacities and coal washing capacities. Against the background of a growing coal demand, especially in East and Central-South China, this leads to further supply shortages.
- *Wrong signals to the demand side.* Without a sufficient allocation function of the price, demand for coal is higher as if it was with higher prices. One consequence is an imbalanced composition of the fuel mix in China. Low coal prices hamper the utilisation of other energy sources such as hydropower and other renewable energy sources, nuclear energy or natural gas and oil. Possible losses through the underdevelopment especially of renewable energy sources and natural gas do not only touch the economy but the ecology as well. Low coal prices through price subsidies do not provide sufficient incentives to the coal consumers to invest as much in energy efficiency as it was needed, e.g. in the power sector to lower the electricity production costs. So the coal price is a barrier for the improvement of productivity and economic development. A severe problem through the adjustments of price arose in the power sector which did not want to accept the higher coal prices. Consequence of this quarrel were black-out in power production for the coal industry which lead to break-downs in production and processing heavily re-affecting the power industry other economic sectors. The central government intervened in this quarrel and handled out a compromise that coal prices for the power industry will be still controlled by SPC and is increasing lower than the average.²⁰

An other trade-related issue concerning coal could be subsidies of the highly utilised coal transports which may constitute a GATT inconsistent measure to subsidise the coal price for the export. The high intensity of freight utilisation is consequence of low freight tariffs combined with both regional dispersion and preponderance of heavy industry. Currently, more than 60 % of the industrial GDP in China is produced in North-East, East and Central-South China.²¹ The heavy industry in China consumes a lot of raw materials including coal, much of it has to be imported from remote provinces.

Table 1
Development of Railway Freight Tariff
(1980-1996)

Year	1980	1988	1990	1993	1996
Freight Tariff (RMB/km)	0.010	0.021	0.026	0.053	0.068

Source: Zhou, S. (1998), p. 151; UB/TIB Hannover (Ed.), p. 23.

Though railway freight tariffs almost septupled over the past 15 years (especially in the past six years), the prices for transportation are still very low (see table 1). In 1996, railway freight tariffs increased to a level of 0.068 RMB/km, but are still well below international standard. In Germany at that time the freight tariff for hard coal (converted into

²⁰ See Zhong, M. (1995), p. 134.

²¹ See Zhong, M. (1995), p. 32.

Chinese currency) was more than 0.6 RMB/tkm.²² In some cases freight tariffs in China still even do not cover the full operating costs.²³ The losses are borne by the government.

The Chinese WTO entry may have implications for the coal transport, as the subsidies of the losses might be GATT-inconsistent, if they are likely to establish a subsidy of the export coal price. The same provisions of the Agreement on Subsidies and Countervailing Measures apply as for the direct subsidisation of coal.

Apart from possible trade disputes in the WTO context, the subsidisation of coal transport has negative domestic economic implications. As freight tariffs are too low, wrong price signal were given to the market and leading to a wrong allocation of resources as many of this transport is done inefficiently and inadequately splitted in transportation mode. Thus, there are only little cost incentives for

- the *coal suppliers* to lower the freight volume through coal washing to utilise the transport facilities in a more efficient way. Because of low freight tariffs, coal is transported across large distances as transport of coal with a high share of ashes and other unused contents as it is still cheaper than washing the coal. There is also little incentive for
- the *transport sector* to upgrade the value of freight to realise higher profits and invest in the development of the transportation network as well as in the transport facilities. Little incentive is also for
- the *coal consumers* in the industrial and other sectors of the economy to source and use their coal inputs and other raw material more efficiently. As coal transport is very cheap, in some cases the import of coal from remote locations is preferred to the use of domestic coal. These price deficiencies lead to a misallocation of short transport capacities which can be utilised much more efficiently in other parts of the country.

Thus, as in coal industry, the removal of subsidies is a win-win situation for China.

5.1.2 Electricity

The electricity sector has undergone a relatively slow liberalisation. The industry is dominated by a single state corporation, and the highly controlled power tariffs are mostly too low despite significant increases in recent years. The technical deficiencies in this sector are the result of either under-investment or of inappropriate investment. In particular the transmission and distribution infrastructure requires major upgrading. A major reform of the energy sector was announced in 1998. The key components of the reform affecting the electricity sector were

- the abolition of the Ministry of Electrical power.
- the transfer of the government role of this Ministry to the State Economic and Trade Commission.

²² See Hillebrand, B / Storchmann, K.H. (1996).

²³ See UB/TIB Hannover (1994), p. 23.

- The State Power Corporation (SPC, created in 1997) retained responsibility for the commercial operation of most of China's power sector.

Transmission and distribution networks remained state-owned monopolies. Consumer prices are still controlled by the Pricing Bureaus at the national and provincial level, but the main priority of this price regulation seems to have more to restrain prices than to ensure that enough funds are available for investment in generation and transmission capacity. Currently, there are attempts to introduce competition in the Guangdong power market as well as more theoretical in the electricity sectors of five other pilot provinces. As a result of this pilot phase, in 2002, most of the SPC generating assets will be split into five new generation companies. A new grid company will be established as a SPC subsidiary.

Still existing subsidies and cross-subsidies in the end-user tariffs for electricity do not only result in allocative inefficiencies, but may also be violating WTO-rules. If the electricity tariffs are subsidised for social reasons, e.g. to make electricity available for low-income families, there seems not to be a contradiction to Art. 6.1 (c) of the Agreement on Subsidies and Countervailing Measures. The proof in this provision that the social problems of existing a large number of low-income families is acute is likely to be made in China. Currently, there are still about 70 million people that do not have access to electricity.²⁴ If the subsidies on electricity, however, are utilised to subsidise the goods produced, there might be a possible area for a trade conflict. However, as almost every good is produced with a high or low share of electricity input, it is not very likely that there would be many potential fields of a successful intervention to the WTO Appellate Bodies. But electricity-intensive goods such as aluminium or cement should be examined closer as China e.g. with 512 million tons is the world's biggest producer of cement in 1997. 11.7 million tons or 2.3 percent had been exported.²⁵

Additionally to the international trade issues, the reduction or abolition of subsidies of electricity tariffs have positive domestic economic effects. As the subsidised tariffs for electricity in China do not reflect the real scarcities of demand and supply, resources are not allocated in the optimal way which has negative impacts on economy and ecology. For this the reform of the electricity tariffs should be one focus of reforms in the energy sector in China. From the theoretical point of view, tariffs (of the natural monopolist) should be equal to the long-term marginal costs resp. returns. In short terms this goal can be achieved by making a price that meets several requirements or objectives:

- Users with the same characteristics pay the same tariff.
- Cross-subsidisation of certain end-users should be abolished, at least reduced substantially.
- Transparency of tariffs should be improved allowing for rational decision on the utilisation of electricity.
- Power companies should be enabled to realise returns that make possible investments in the efficiency of generation, transmission and distribution. More specifically, issues to be dealt with are capacity charges for all or at least most end-users, the use of

²⁴ See SETC (1998), p. 69.

²⁵ See State Statistical Bureau (ed.) (1999), p. 587.

price differentiations regarding the time and the voltage as well as the introduction of lifeline-tariffs.²⁶

In terms of a structural reform of the electricity markets, stress should be laid on (a) the introduction of competition at the level of generation and (b) the introduction of a wholesale market for electricity between the provinces.

5.2 Effects of the Kyoto process on Chinas international trade

One of the most difficult issues in the debate on trade and environment in the WTO is the application of trade restrictions to avoid transboundary environmental risks. The GATT only has provisions on exceptions on the applications of trade restrictions on the basis of meritory goods (health, safety, exhaustable resources) within the borders of a Member State (Art. XX). Currently, there is no distinct GATT-exception on the basis of transboundary meritory goods. The Montreal Protocol on Substances that Deplete the Ozone Layer includes such measures. It restricts the trade with non-Member States inter alia with the obligation to prohibit the import of goods that are produced with ozone depleting substances, but which do not contain this substance (Art. IV, 4). The Kyoto Protocol on the reduction of greenhouse gases does not include such provisions. However, the WTO Appellate Body in the shrimps-turtle case made clear that import restrictions on the basis of foreign production technologies are consistent with the general exception of Art. XX (g) GATT, provided the introductory section of Art. XX ("arbitrary or unjustifiable discrimination between countries where the same conditions prevail") is not violated. Moreover, Art. XX (g) is to also applicable to the protection of exhaustable resources outside the jurisdiction of the importing country. Due to this decision there is no clear distinction possible between the environmental impacts of the methods of fishing and the regional or even global impacts of environmental unfriendly production technology in a country such as China.

Thus, a justification of trade restrictions on the basis that there are products that have been produced with electricity that has been produced inefficiently but there are transboundary emissions that violate the environment in neighbour states or even of the global environment seems to be possible under WTO legislation. E.g. Japan could argue that the SO₂ and other Chinese emissions during the production of export goods to Japan are detrimental to the Japanese environment or even to the global environment and could justify trade restrictions on these Chinese export goods. On the basis of the Kyoto Protocol Japan could argue that through an import ban of goods from China that have been produced environmentally unfriendly and are substituted by Japanese production could be seen as a domestic measure to reduce global greenhouse gas emissions.

De facto this decision could lead to a situation that China has to accept the production standards set by the big trade national in order not to lose its export markets. This however would impose massive investments on China which is lacking in other sectors of the economy that from the Chinese point of view is more important for the country's development. This policy decision however is violating the principles of the Rio Declaration (see above).

²⁶ See Andrews-Speed, P. / Dow, S. (1998), p. 10.

Thus, here is demand for the reform of the WTO system. One possible option is the adoption of interpretations of the Agreement. Art. IX of the Agreement establishing the WTO provides that

"The Ministerial Conference and the General Council shall have the exclusive authority to adopt interpretations of this Agreement and of the Multilateral Trade Agreements. In the case of an interpretation of a Multilateral Trade Agreement in Annex 1, they shall exercise their authority on the basis of a recommendation by the Council overseeing the functioning of that Agreement. The decision to adopt an interpretation shall be taken by a three-fourths majority of the Members. ... [...]."

The Ministerial conference should make clear which international Agreements are going before the WTO-rules and which are not. As a three-fourths majority of the Members is required, the interests of the developing countries may be taken more seriously as they have the majority in the WTO Ministerial Conference. Maybe there could be a quantitative criterion when a multilateral Environmental Agreement is GATT compatible, e.g. it must have been ratified by a certain percentage of WTO Members.²⁷ This may be a first recommendation which should be subject to further research.

Table 2
Market potential for CDM in China
(2010, in percent and mill. US\$)

	No limits	50 % from BAU emissions	EU ceilings	No hot air
Total CDM Market	2795,6	797,4	456,9	4512,8
China (%)	60,3	59,9	59,6	60,4
China (absolute)	1685	477	272	2724

Source: Zhang, Z.X. (2000) p. 511.

One of China's contribution to the Kyoto process is being a host for potential projects under the Clean Development Mechanism. Due to Zhang (2000) the market potential for CDM measures in China is between 272 mill US\$ (under the EU ceiling) and 2724 mill US\$ (if no hot air is allowed). Based on a very simple econometric model, Zhang argues from the demand and supply side. If the EU ceiling for a maximum of GHG credits to offset national emissions will be realised,²⁸ the demand for CDM measures in China will be relatively small. If there is no supply of hot air (from Russia and the Ukraine), the Chinese supply market under the CER price assumptions is very large.

²⁷ See Biermann, F. (1999), p. 475.

²⁸ "5 percent of (the baseyear emissions multiplied by 5 plus ist assigned amounts)/2" or "50 percent of: the difference between the actual emissions in any year between 1994 and 2002 multiplied by 5 plus the assigned amount".

Thus, it can be seen that different outcomes of the climate change mitigation negotiations may have a tremendous impact on China's international trade of emission certificates. Thus, after COP 8, detailed econometric estimations on the market potential and further research on this topic is vital.

References

- Andrews-Speed*, Philip / *Dow*, Stephen (1998): China's Electric Power Industry: Challenges Facing the Government, Draft CEPMLP Paper, Dundee.
- Biermann*, Frank (1999): Internationale Umweltverträge im Welthandelsrecht: zur ökologischen Reform der Welthandelsorganisation anlässlich der geplanten "Millenniumsrunde" / von Frank Biermann. Berlin: WZB, Forschungsschwerpunkt Technik, Arbeit, Umwelt.
- Cosbey*, Aaron (1999): The Kyoto Protocol and the WTO. Note of a seminar on the Kyoto Protocol and the WTO organised by the Royal Institute of International Affairs and the International Institute for Sustainable Development, Seattle.
- Hillebrand*, Bernhard / *Storchmann*, Karl-Heinz (1996): Ein Güterverkehrsmodell für die Deutsche Bahn AG, Abschlußbericht zum Forschungsvorhaben der Deutschen Bahn AG, Essen.
- Michaelowa*, Axel / *Michaelowa*, Katharina / *Vaughan*, Scott (1998): Joint implementation and trade policy. In: *Aussenwirtschaft: schweizerische Zeitschrift für internationale Wirtschaftsbeziehungen*. – Vol. 53, No. 4, p. 573-589.
- Neumayer*, Eric (2000): Trade and the Environment: A Critical Assessment and some Suggestions for Reconciliation. In: *Journal of Environment & Development*, Vol. 9, No. 2, p. 138-159.
- Nordhaus*, William D. (1999): Local Competition and the Environment: Should Countries harmonize their Environmental policy? Cowles Foundation Discussion Paper No. 1079; cited in Cole, Matthew A.: Examining the environmental case against free trade. In: *Journal of world trade* – Vol. 33, No. 5, p. 183-196.
- Oberheitmann*, Andreas (1994): Die VR China und das GATT – Anpassungsbedarf der Außenhandelspolitik im Spiegelbild der nationalen und internationalen Interessensphären, Mitteilungen des Instituts für Asienkunde Nr. 233, Hamburg.
- (2000): Possible conflicts of AIJ, JI and CDM projects in national programmes with provisions governed by the WTO; *Joint Implementation Quarterly*, Vol. 6 (2000), No. 1, Paterswolde, p. 7.
- Ranné*, Omar (2000): More Leeway for Unilateral Trade Measures – The Report of the Appellate Body in the Shrimps-Turtle Case. In: *Intereconomics*. Vol. March/April 2000, p. 72-83. Rao, P. K.: *World Trade Organization and the environment* / P. K. Rao. Basingstoke, Hampshire (u.a.): Macmillan (u.a.).
- SETC (State Economic and Trade Commission of the People's Republic of China), Department of Resources Conservation & Comprehensive Utilization (Ed.) (1998), *China Energy Annual Report 1997*, Beijing.
- Springer*, Urs (2000): GATS and the Kyoto Mechanisms: Open Markets for Climate Change Mitigation Services. In: *Aussenwirtschaft*, Vol. 55, No. 1, p. 65-84.

- State Statistical Bureau (ed.) (1999): 1999 China Statistical Yearbook, Beijing.
- UB/TIB Hannover (Ed.) (1994), Chinese Coal Prospects to 2010, IEA Coal Research (IEAPER/11), Hannover.
- United Nations Conference on Trade and Environment (1992): United Nations Framework Convention on Climate Change, Rio de Janeiro.
- Wiemann, Jürgen* (1997): Handel und Umwelt oder Handel und nachhaltige Entwicklung?: Wie die Handelspolitik den Rio-Auftrag umgesetzt hat. In: Nord-Süd aktuell: Vierteljahreszeitschrift für Nord-Süd- und Süd-Süd-Entwicklungen, Vol. 11, No. 2, p. 268-283.
- Zhang, Zhongxiang* (2000): Estimating the Size of the Potential Market for the Kyoto Flexible Mechanisms. In: Weltwirtschaftliches Archiv, Vol. 136, No. 3, p. 491-521.
- Zhou, Shuqin* (1998): Die Einsatzmöglichkeit der Kernenergie in den Entwicklungsländern – Exemplarische Studie für die VR China unter den Gesichtspunkten der Notwendigkeit und Wirtschaftlichkeit, Frankfurt a.M.
- Zhong, Mo* (1995): Probleme der Kohleversorgung in der VR China – Eine empirische Untersuchung mittels eines Transportmodells, Idstein.