MuDan:

A China Model for Multisectoral Development Analysis

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I Introduction

Since its creation in 1992, MuDan[2] has undergone two major revisions and is now in its third version. The initial model was based on China's 33 sector I-O table for 1987. Soon after the release of the first model, a major revision was underway. In 1994, MuDan II was built, and it was based on the 117 sector version of China's 1987 I-O table. Preparation for another revision of MuDan began in 1996 when China's 1992 I-O table was released. The third version of MuDan, the MuDan III, is based on the 1992 I-O table. Obviously, efforts of modeling the Chinese economy have been significantly influenced by the availability of data. While it may seem to be rather peculiar to have so many versions of a model in just five years since 1992, it becomes less so if one considers the actual changes the Chinese economy is experiencing and the ever-changing statistical system a model builder has to face. Field(1997) describes how Chinese statistics has evolved over time, therefore provides some insight on the evolution of MuDan from data point of view. This paper describes the work in progress on the current version of the model, with emphasis on the real side of the model. As a progress report, the results presented here are preliminary. Comments and suggestions are especially welcome.

II The Framework of MuDan

MuDan is a long-term interindustry model. It traces the industrial development of China from 1980 to 2010. Its construction started in 1992 by Clopper Almon in a collaboration with

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[2] MuDan, pronounced as moo-dan, means peony, especially the red peony in Chinese. It is the national blossom of China and symbolizes prosperity. MuDan is used here to stand for Multisectoral Development Analysis for the Chinese economy.

INFORUM's Chinese partners[3]. The first version of MUDAN was based on the 33-sector input-output table for the Chinese economy in 1987. In 1994, it was expanded to 63 output sectors based on the 117-sector input-output table of 1987. Construction of MUDAN III started in 1997.

The framework on which MUDAN works is the same as the one used by other typical INFORUM type models. That is, MUDAN is based on the dual pair of input-output equations:

$$q = A * q + B * f \qquad \textbf{(1)}$$

$$p = p * A + v \qquad \textbf{(2)}$$

where q is a column vector of product outputs, A is a product-to-product input coefficient matrix, f is a column vector of final demand by category, B is a bridge matrix to convert final demand by category to final demand by product; p is a row vector of prices, and v is a row vector value added per unit of output of each product.

The basic accounting identity, corresponding to Eq. (1) of the dual equation system, of the real activities for MUDAN III is

$$q = A * q + B_{mcr} * h_{cr} + B_{mcu} * h_{cu} + c_s + B_{\text{minv}} * i_{nv} + i_{vn} + x - m + o_{thdm} \qquad \textbf{(3)}$$

where vectors

q = gross output

h_{cr} = household consumption of rural residents

h_{cu} = household consumption of urban residents

c_s = social or public consumption

i_{nv} = investment in fixed-assets by purchasing sectors

i_{vn} = inventory changes

x = exports

m = imports

o_{thdm} = other final demand, an error term

A is the I-O A-matrix; B_{mcr}, B_{mcu}, and B_{minv} are bridge matrices of proper dimensions. In MUDAN III, B_{mcr}, B_{mcu}, and B_{minv} have dimensions of 59×19, 59×10, and 59×58, respectively.

The price-income side of MUDAN is modeled with four components of value added: depreciation, profits, labor income and taxes. Regressions are made for each component, in

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current prices, by aggregate sectors. Value added per unit of real output is then computed and a Seidel procedure is applied to compute prices according to Eq. (2) of the dual-equation, whose matrix form for MUDAN is:

$$p = p^{*} A + B_{v} * (d + p + w + t) \qquad \textbf{(4)}$$

where vectors

p	=	domestic prices
d	=	depreciation per unit of real output
π	=	profits per unit of real output
w	=	profits per unit of real output
t	=	taxes per unit of real output

B_v is a bridge matrix to convert value added by aggregate sectors into I-O sectors. In MUDAN III, B_v is of dimension 59×52.

III MUDAN: THE REAL SIDE

This section describes the real side of the MUDAN. The functional forms and regression results are presented. The components of the real side of MUDAN include consumption, investment, import, export and other final demand. The labor productivity function is also described in this section. Before go into the detail, a summary of real side components of MUDAN may be helpful. Figure 1 presents a summary of the real side of MUDAN among different versions.

Figure 1. SUMMARY OF MUDAN -- THE REAL SIDE

	MUDAN	MUDAN II	MUDAN III
Number of sectors	33	63	59
Base I-O table	33 sector 1987 table	117 sector 1987 table	118 sector 1992 table
Private consumption: Data	19 urban categories 12 rural categories 2 bridge matrices	19 urban categories 12 rural categories 2 bridge matrices	19 urban categories 10 rural categories 2 bridge matrices
Functions	2 linear systems: income, relative prices	2 linear systems: income, relative prices	2 PAD systems: income, relative prices, groups of consumption goods
Public consumption: Data	33	63	59
Functions	Exogenous	Exogenous	Linear: GDP last period and sectoral prices
Fixed-asset investment: Data	33 sector	51 SOU investment 13 urban COU investment 5 rural COU investment 1 bridge matrix	1 aggregate investment 58 investing sectors 1 bridge matrix
Functions:	Exogenous	Exogenous	Aggregate: money supply, GDP last period. Sectoral: accelerator model -- change in output, capital stock Sectoral investment is scaled to the aggregate
Inventory investment: Data	33 sectors	63 sectors	59 sectors
Function	Constant inventory/output ratio: same as in base year	Constant inventory/output ratio: same as in base year	Constant inventory/output ratio: same as in base year
Exports and imports: Data	33 sectors	63 sectors	59 sectors derived from 4 digit SITC trade series
Functions:	Imports: linear -- domestic demand and time trend Exports: linear -- time trend	Imports share: log linear -- import share-weighted time trend, relative foreign & domestic prices Exports: linear -- time trend	Imports share: log linear – import share-weighted time trend, relative foreign & domestic prices Exports: log linear – export-share weighted time trend, foreign and domestic prices
Productivity: Data	33 sectors	49 sectors	52 sectors
Function:	no	Log linear: time trend	Log linear: time trend, ratio of output to its previous peak, capital-labor ratio

CONSUMPTION EXPENDITURES

Three components of consumption expenditures are modeled separately in MUDAN: private consumption by rural household, private consumption by urban household, and public consumption or consumption by government and enterprises. Data on per capita rural and urban consumption expenditures are from household income and expenditure survey published by the State Statistical Bureau (SSB) of China. Expenditures on public consumption are calculated in the balanced I-O tables. While balancing the I-O tables, the national total of public consumption expenditures from Gross Domestic Expenditures (GDE) account in current prices was served as the control total.

MUDAN is probably the only INFORUM model at present that has two consumption equation systems in one model: one for rural and the other for urban household. Each system is estimated independently by using the PAD system. Because household surveys in China are conducted separately with different sets of categories for rural and urban residents, it is natural that two, rather than one, consumption systems are estimated in order to utilize as much information as possible from the small pool of the published Chinese statistics. While that is indeed an important consideration, it is not the only reason. For instance, there are significant inequalities between rural and urban residents in terms of their income and consumption expenditures. A typical Chinese living in urban area earns and consumes 2.5 to 3 times as much as one in rural area. Furthermore, rural and urban residents are faced with different consumption choices. For example, urban residents are often entitled to subsidized housing, education and medical insurance while their rural counterparts are not. Clearly, we need more than one consumption system to properly account for the significant differences among rural and urban consumers.

MUDAN's rural household consumption is divided by 10 categories and estimated with a PAD system. The urban counterpart is distinguished by 19 categories and also is estimated with a PAD system. The general form of the demand for product i in a PAD system can be expressed as

$$x_i = (a_i + b_i(y / P)) \prod p_k{}^{c_{ik}} \qquad \textbf{(5)}$$

where x_i is the consumption demand per capita for product i, y is nominal income per capita, p_k is the price index for product k, and P is an overall price level defined by

$$P = \prod_{k=1}^{n} p_k^{s_k} \quad \textbf{(6)}$$

where s_k is the budget share of product k in the period in which the price indexes are all 1, and the c_{ik} are constants satisfying the constraint

$$\sum_{k=1}^{n} c_{ik} = 0 \quad \textbf{(7)}$$

A complete description of the PAD system is provided by Almon(1996). A summary of regression results for MUDAN are shown in Table 1.

It is amazing that the two PADs can be estimated with such success with almost all coefficients having desired signs and often sensible magnitudes. It must be pointed out, however, that in order to get the desired signs and magnitudes, soft constraints have to be applied to all but 2 of the 19 categories in estimating consumption expenditures of urban residents. For rural consumption, only 2 out of the 10 equations need to be softly constrained. One category, the "Other goods" in urban consumption had a negative sign, so it was dropped from the price sensitive group. For that particular sector, it appears that it is the data to blame. That sector has included goods not elsewhere classified, so its coverage has varied over time. More information regarding the estimation of the two PAD systems is presented in Appendix B. It appears from the regression that price elasticities in general are too small while the coefficients on the time trend are often too large. In particular, "Books, newspapers and magazines" and "Recreational activities" for urban residents are problematic for the forecasting period. They were arguably declining in the historical period. As a result, equation estimations for the two categories are come up with significantly negative time trend, negative price elasticities and insignificant income elasticities. Unless high income growth and low inflation can be somehow maintained in the future, demand for the two categories may become negative.

Table 1 Regression Results of Private Consumption Expenditures

nsec	title	G	S	I	lamb	share	IncEl	DInc	time%	PrEl	Err%	rho
I.	Urban Consumption											
1	Grains and grain prod	1	1	1	-0.41	0.08	0.20	3.88	-0.49	-0.19	2.26	0.35
2	Meat and vegetables	1	0	1	0.66	0.31	0.81	-0.32	1.72	-0.70	1.27	0.13
3	Tobacco, liquor, tea a	1	1	1	0.13	0.06	0.53	-0.11	3.40	-0.67	2.89	0.17
4	Prepared foods	1	1	1	-0.49	0.09	0.60	0.63	1.22	-0.12	3.29	-0.30
5	Clothing	2	0	1	1.58	0.14	0.18	8.51	-0.01	-0.49	3.17	0.38
6	Daily used articles	2	0	1	1.85	0.10	0.90	0.55	0.00	-0.29	5.54	0.05
7	Audio and video equip	5	0	1	0.24	0.04	0.55	-1.24	3.54	-0.44	12.15	0.31
8	Books, newspapers and	5	0	1	1.18	0.01	0.08	12.46	-9.56	-0.30	9.93	0.21
9	Medical and health rel	0	0	1	1.06	0.02	1.90	0.16	1.94	-1.54	13.69	0.55
10	Fuels	3	0	1	-0.56	0.02	0.14	-2.71	4.38	-0.74	5.12	0.07
11	Other goods	0	0	0	-5.00	0.02	2.01	-1.72	0.09	0.00	40.43	0.72
12	Rent	3	0	1	-0.97	0.01	0.33	1.24	1.45	-0.50	8.74	0.51
13	Water, gas and electri	3	2	1	0.73	0.02	0.34	5.00	3.39	-1.99	6.09	0.27
14	Education	4	0	1	-0.83	0.03	2.07	-0.82	0.10	-0.08	5.40	0.05
15	Child care	4	0	1	-0.02	0.01	0.25	1.95	-0.18	-2.07	8.18	0.21
16	Transportation	3	0	1	-1.16	0.01	1.04	-0.73	-0.01	-0.24	3.50	-0.25
17	Postal and communicati	4	0	1	-0.58	0.00	1.61	2.33	-0.91	-1.63	21.38	0.40
18	Recreational activity	0	0	1	-0.48	0.01	0.10	15.93	-4.31	-0.05	13.35	0.64
19	Other Services	0	0	1	-0.18	0.04	1.77	-0.13	0.02	-0.36	5.71	0.66
II	Rural Consumption											
1	Grains and products	1	0	1	-0.21	0.21	0.57	3.09	-0.37	-0.49	3.70	0.23
2	Meat and vegetables	1	0	1	-0.35	0.25	0.94	-0.27	0.52	-0.42	0.88	-0.14
3	Other food	1	0	1	-0.61	0.11	1.13	-0.36	2.62	-0.15	1.70	0.44
4	Clothing	2	0	1	1.02	0.08	0.95	-0.09	-2.73	-0.89	2.62	-0.13
5	Residence including fu	2	0	1	2.22	0.16	1.34	-0.57	-0.82	-1.72	1.97	-0.15
6	Household facilities,	2	0	1	1.38	0.06	2.09	-0.78	-3.24	-1.21	5.33	0.17
7	Medicines and medical	3	0	1	0.37	0.04	1.26	-0.48	0.66	-0.15	5.48	0.57
8	Traffic and communinca	3	0	1	1.91	0.02	0.17	5.67	4.20	-1.51	9.00	-0.15
9	Cultural, educational,	3	0	1	1.22	0.07	0.24	-1.93	5.28	-1.09	3.67	-0.03
10	Other commodity and se	3	0	1	7.87	0.01	0.58	2.60	-5.80	-7.34	17.83	-0.18

Note: The abbreviations in the heading are: G and S - Group and Subgroup numbers; I - whether or not a sector is included in the price sensitive group (1 = yes); share - budget shares; IncEl and PrEl- income and price elasticities; Dinc - the coefficient on the change in income divided by the income coefficient; time% - the annual change due to the time trend expressed as a percentage of the base year; Err% - standard error of estimate as a percentage of the base year value; rho - autocorrelation coefficient of the residuals

Public consumption in MUDAN includes consumption expenditures by government and enterprises. Historically, only the total public consumption is published. More detailed data are not available except in the I-O tables. So the estimation of public consumption expenditures relies on series derived from the balanced historical I-O tables. Regressions are based on the following log-linear form:

$$\log c_{s_{i,t}} = a_0 + a_1 * \log gdpR_{t-1} + a_2 * (p_{i,t} - p_{i,t-1}) / p_{i,t-1} \qquad \textbf{(8)}$$

where $c_{si,t}$ = public consumption for good i in time t

$gdpR_t$ = real GDP in time t

$p_{i,t}$ = domestic price index for good i in time t

Regressions based on Eq (8) are conducted without soft constraints for each of the 34 MUDAN sectors that show non-zero public consumption in the 1992 I-O table. According to the regression results, public consumption expenditures are strongly positively influenced by the lagged value of real GDP, with elasticities with respect to the lagged GDP ranging from 1.3 to 2.7, except "Health care, sports and social welfare" for which a negative elasticity is obtained with the unconstrained regression. Price elasticities of public consumption for most sectors are negative as desired,. More detailed results of the public consumption equations are presented in Table 2.

INVESTMENT EXPENDITURES

Investment plays a key role in economic models, just as its role in the actual economy. The capital accumulated through investment determines a country's growth potential. But investment is volatile, and therefore difficult to model for any economy. China is no exception. Although the heavy investment has contributed greatly to China's high growth in recent years, it is often associated with inflation and business cycles. To build a dynamic growth model such as MUDAN and to properly account for the role of investment, it is ultra important to have a sensible investment function in the model, albeit it is not an easy job.

The first difficulty came from the construction of the investment time series. Because the majority of investment statistics in China only covers investment by the state-owned units (SOUs). Investment data for collective-owned units (COUs) , private enterprises and individuals are scarce and only available for some aggregate totals without industrial detail. The only exception is urban COU investment between 1985-91 for which there are some details. Based on SOU investment by industry and the urban COU investment series that are published, we constructed time series of investment by 52 investing sectors for SOU and urban COU investment. Although the SOU and COU share in the national total of fixed asset investment has declined from over 80% in early 1980s to about 55% in 1995, investment by SOUs and COUs still accounts for the majority of non-residential investment. In addition to the 52 sectors, six time series for the remaining investment expenditures in fixed assets were constructed:

commodity housing investment by SOUs, investment by rural COUs, urban individual investment, rural individual investment, investment by units of joint-ownership, and other fixed-asset investment. That brings a total of 58 types of investment.

Once investment series are constructed, behavioral equations for each of the 58 types of investment are estimated. Estimation of fixed-asset investment functions in MUDAN is a two step business. The first step is to estimate sectoral investment expenditures. The accelerator model is used to estimate the sectoral investment. We use this model because of its simplicity of estimation and forecasting, reasonable fit, and impressive track record in INFORUM type models. The basic version of the investment function I used is

$$I_{it} = a_0 + a_1 * a_1 * dq_{it} + a_2 * a_2 * dq_{i,t-1} + a_3 * a_3 * dq_{i,t-2} + a_4 * k_{i,t-1} \qquad \textbf{(9)}$$

where I_{it} = investment expenditure of sector i in time t

dq_{it} = difference between real output of sector i in t and its previous peak

k_{it} = capital stock of sector i in t

a_0, a_1, a_2, a_3 and a_4 are sector-specific coefficients to be estimated with non-linear regression so that coefficients of *dq*'s will be non-negative as expected. The coefficient of capital can be either positive or negative depending on how we should interpret what the capital term represents. If the capital term represents replacement need, its coefficient should undoubtedly be positive. But if the capital term represents capacity build-up, a negative coefficient seems reasonable. A summary of the regression is shown in Table 3.

In addition to the sectoral investment function, MUDAN also has an aggregate investment function. In the simulation program, sectoral investment and the aggregate investment are estimated separately. However, the total of sectoral investment will be forced to equal the aggregate by scaling. The rational behind having the aggregate function is as follows. First, because reform of public ownership has lagged behind overall economic reform, SOUs and many COUs are still subject to soft budget constraints. Investment rush emerges whenever government loosens money supply. Therefore, there lacks a strong market force that keeps investment on check. Government intervention or control over investment decisions remains the major force that prevents investment from over-expanding. Second, it reflects how the economy actually works. In China, the government maintains investment controls at the aggregate level. It also directly or indirectly involves in business decision making of enterprises, SOUs and COUs in

particular. For example, investment projects need government approval and are subject to government planning or macro control. When the economy overheats, the government can apply the brake by disapproving certain projects or forcing some investment projects to stop. Scaling sectoral investment by an aggregate total is intended to be an imitation of that process. Third, it is easier for the aggregate investment to respond to the macroeconomic conditions such as inflation and money supply whose impact on sectoral investment may not easily be caught by the sectoral investment functions.

The factors that determine the aggregate investment in MUDAN include real GDP and inflation in the last period and money supply in the current period. The estimated functions is

$$ginvR_t = 1.03\,ggdpRma_{t1} + 0.29\,gm2_t + 1.30\,m2g_{t-1} + 1.35\,m2g_{t-2} - 0.68\,ggdpD_t - 0.99\,ggdpD_{t-1} \qquad \textbf{(10)}$$

where *ginvR* is the growth rate of total fixed asset investment, in constant price, for the whole country, *ggdpRma* is the growth rate of two period moving average of real GDP, *gm2* is the growth rate of M2, *m2g* is the ratio of the two period moving average of gm2 over the lag value of two period moving average of ggdpRma, that is,

$$m2g_t = (gm2_t + gm2_{t-1}) / (ggdpRma_{t-1} + ggdpRma_{t-2})$$

ggdpD is the annual percentage change of GDP deflator, or the inflation rate. More detailed regression results are presented in Figure 2.

The result from the regression on aggregate investment seems to suggest that real investment grows faster than the real GDP did in the past. Credit availability or money supply conditions have positive influences on the investment growth which is adversely affected by inflation rates. The larger coefficient of $ggdpD_{t-1}$ than that of $ggdpD_t$ probably reflects the time lag between inflation and the government's anti-inflationary policy, which is often a sudden brake on approval of investment projects.

Figure 2 Regression of Aggregate Investment

```
lim 85 95
con 10 0=a4-a3
con 10 0=a5-a6
r ginvRtot=!ggdpRma[1],gm2,m2g[1],m2g[2],ggdpD[1],ggdpD

SEE   =       3.69 RSQ   = 0.8740 RHO =  -0.59 Obser  =   11 from 1985.000
SEE+1 =       2.89 RBSQ  = 0.7481 DW  =   3.17 DoFree =    5 to   1995.000
MAPE  =      33.30
    Variable name     Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 ginvRtot        - - - - - - - - - - - - - - - - - - - - -     10.42
  1 ggdpRma[1]         1.03304    29.6   1.907   1.01    8.34     10.18
  2 gm2                0.28452    15.2   1.323   0.70    6.58     25.80
  3 m2g[1]             1.30145    51.8   2.643   0.44    5.67      3.51
  4 m2g[2]             1.34602    60.9   2.915   0.45    3.21      3.48
  5 ggdpD[1]          -0.98999    72.2  -3.244  -0.88    1.88      9.27
  6 ggdpD             -0.68315    37.2  -2.172  -0.71    1.00     10.8
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IMPORTS AND EXPORTS

Foreign trade data in MUDAN III are derived from bilateral trade data from Statistical Canada's World Trade Database (WTD), which are comparable to the data from the United Nations. The bilateral trade data in WTD are balanced and based on import (c.i.f.) values in US dollars: country A's export value to country B, in US dollars, is the same as country B's import values from country A. The WTD trade data are classified in over 700 commodities based on SITC revision 2. China data in the WTD are from 1980 to 1995.

To use the WTD data in MUDAN, a concordance between the modified SITC codes and MUDAN sectors is constructed based on China's 1994 classification. Historical import and export series are created in terms of US dollars, then converted into RMB yuan by official exchange rates and linked with the 1992 I-O values. The so derived data are further balanced in the process of balancing historical I-O tables, and then used in import and export function estimation.

Imports and exports are estimated by two sets of equations. Import functions are estimated in the form of import shares which are fitted by logistic curves in the following form:

$$imshare_{it} = \frac{\exp(a_0 + a_1 * imptime_{i,t-1} + a_2 * \log(rpim_{it}))}{1 + \exp(a_0 + a_1 * imptime_{i,t-1} + a_2 * \log(rpim_{it}))} \qquad \textbf{(11)}$$

where $imptime_{it}$ is a import share-weighted time trend with

$$imptime_{i,t} = imptime_{i,t-1} + (1 - share_{tt})$$

and $rpim_{it}$ is the ratio of foreign to domestic prices of sector i. Parameters a_0, a_1, and a_2 are sector specific and their subscript *i* is omitted without confusion. Regression results of import share functions are shown in Table 4.

Exports in MUDAN are estimated by log-linear functions whose basic form is

$$\log ex_{it} = a_0 + a_1 * extime_{it} + a_2 * \log price_{it} + a_3 * \log imprice_{it} \qquad \textbf{(12)}$$

where export ex_{it} is export of sector *i;* $price_{it}$ and $imprice_{it}$ are domestic and international prices of sector *i;* $extime_{it}$ is an export share weighted time trend,

$$extime_{i,t} = extime_{i,t-1} + (1 - exshare_{tt})$$

Parameters a_0,, a_1, a_2 and a_3 are sector specific. For some sectors, a more restricting form of Eq.(13) is used with restriction to be a_2=-a_3. Detailed results are shown in Table 5.

LABOR PRODUCTIVITY

Sectoral labor productivity in MUDAN is simply annual output in constant price divided by total employment. Again, lack of data make it impossible to adopt more refined concept of labor productivity such as real output per worker per hour. However, since our primary concern on labor productivity in MUDAN is to estimate the amount of labor required in each industry, the labor productivity as defined in MUDAN is the variable modeled.

The basic form of labor productivity for each industry is:

$$\log \frac{q_{it}}{L_{it}} = a_i + b_i * T_{80} + c_i * \log \frac{q_{it}}{qpk_{i,t-1}} + d_i * \log \frac{K_{i,t-1}}{L_{i,t-1}} \qquad \textbf{(13)}$$

where:

$q_{i,t}$ = real gross output of industry i in period t

$L_{i,t}$ = total employment in industry i in period t

T_{80} = a time trend with 0 in 1980

$qpk_{i,t}$ = $q_{i,t}$ if $q_{i,t} >= (1 - s_i) * qpk_{i,t-1}$

= $(1 - s_i) * qpk_{i,t-1}$ if $q_{i,t} < (1 - s_i) * qpk_{i,t-1}$

$K_{i,t}$ = capital stock of sector i at the end of period t

a_i , b_i , c_i , and d_i are parameters to be estimated.

The output term $q_{i,t}$ / $qpk_{i,t-1}$ is designed to capture the behavior of productivity over the business cycle. Its coefficient is expected to be positive. The is a variation of typical INFORUM approach where positive and negative deviations of output from preceding peak output are

identified separately in labor productivity function. Such deviations are intended to capture labor hoarding during recessions and overtime production during expansions. The Chinese data for most industries, however, show output growth even though the economy as a whole is in recession. Therefore, our output term $q_{i,t}/qpk_{i,t-1}$ is meant to reflect the assumption that there is a symmetric impact on labor production of deviation of real output from preceding peak output. A summary table of regression results is presented in Table 6.

VI THE PRICE-INCOME SIDE AND FURTHER WORK IN MUDAN

So far, I have shied away from describing the computation logic of MUDAN. The very reason is that I do not have one, a satisfactory one. Several holes in the computation cycle need to be filled. One of which is related to how the real and the price-income sides of the model should be linked. More specifically, what are nominal and real anchors of the model remains an open question.

In a typical INFORUM type model, money supply and the total labor force are nominal and real anchors of the model. With money supply fixed and labor productivity at certain level, the labor market condition or the unemployment rate will affect price level through some form of Phillips curve; prices will then affect final demand and output which in turn will affect labor market condition among others. The interaction of market forces will eventually drive the model to reach an equilibrium. In MUDAN, or rather in the Chinese economy, it is still not clear as to whether such kind of autonomous adjustment mechanism exists. Even if there is such a mechanism, how strong it is or whether it is strong enough to drive the economy toward equilibrium is not without question, at least from historical data point of view. Furthermore, because there is no official statistics on unemployment rates and the interest rate does not work the way it works in a market economy, we have to find some alternatives to the traditional approach anyway.

Another issue related to the anchoring problem is price sensitivity of final demand. Initial results seem to suggest that final demand such as consumption and investment expenditures is not very sensitive to price changes. It is yet to find out what to blame: the data problems or faulty estimations of final demand. If neither to blame, then it may be a reflection of the real world in which the government exercises controls and frequent interventions in the markets. If the latter is

the case, we again face with devising alternatives to balance supply and demand. So irregularities in the market mechanism may require non-traditional approaches in the modeling process. MUDAN probably has not gone far enough in that direction.

TABLE 2. REGRESSION RESULTS OF PUBLIC CONSUMPTION

SecNo.	Const.	log(gdpR[1])	PriceTerm	SEE	Rbsq	Rho
1	-11.92	1.299	-0.5064			
	(4.49)	(4.69)	(0.534)	0.1766	0.7945	0.7445
3	-23.31	1.53	-0.4846			
	(10.5)	(6.68)	(0.798)	0.1862	0.8397	0.7759
11	-15.72	1.852	-1.927			
	(6.16)	(7.01)	(1.51)	0.1972	0.8588	0.7701
12	-19.73	2.385	-2.243			
	(9.11)	(10.7)	(1.81)	0.1743	0.9321	0.6517
13	-12.7	1.658	-2.118			
	(6.04)	(7.61)	(1.79)	0.1629	0.8759	0.6749
14	-18.7	2.026	-1.858			
	(10.1)	(10.6)	(3.3)	0.1516	0.927	0.6141
15	-25.37	2.308	-3.029			
	(10.5)	(9.32)	(2.87)	0.2074	0.9064	0.3991
16	-21.11	2.227	-2.695			
	(9.24)	(9.55)	(2.36)	0.2004	0.9114	0.5599
17	-22.32	1.69	-0.8659			
	(7.29)	(5.44)	(1.27)	0.2667	0.7882	0.7079
19	-16.82	1.859	-2.001			
	(8.9)	(9.66)	(2.87)	0.1666	0.9183	0.5453
21	-17.89	2.086	-2.325			
	(9.72)	(11.1)	(2.65)	0.162	0.9342	0.3147
23	-19.92	2.025	-2.353			
	(10.4)	(10.3)	(2.95)	0.1677	0.9228	0.5746
26	-26.72	2.295	-2.474			
	(10.7)	(9.07)	(2.88)	0.2188	0.9117	0.6268
27	-25.29	2.237	-2.561			
	(12.8)	(11.1)	(3.33)	0.1743	0.9381	0.5702
28	-23.5	2.021	-0.8429			
	(8.93)	(7.54)	(0.834)	0.2317	0.8635	0.7253
31	-23.04	2.048	-2.637			
	(10.9)	(9.53)	(2.65)	0.1857	0.9181	0.4088
32	-24.86	2.418	-0.865			
	(11)	(10.5)	(0.781)	0.1973	0.9246	0.532
37	-21.84	2.248	-1.929			
	(6.41)	(6.43)	(1.18)	0.2927	0.8221	0.3913
38	-27.58	2.4	-1.908			
	(13.1)	(11.2)	(1.94)	0.1854	0.9352	0.3783
39	-24.17	2.506	-1.684			
	(9.24)	(9.43)	(1.77)	0.2279	0.9161	0.459
40	-18.65	1.839	-1.085			
	(8.06)	(7.82)	(1.03)	0.2033	0.8755	0.2993
41	-17.3	2.119	-2.889			
	(10.1)	(12.1)	(3.42)	0.151	0.9469	0.3052
46	-16.45	1.727	-1.125			
	(12.6)	(12.8)	(2.37)	0.1052	0.9514	0.5603

TABLE 2. REGRESSION RESULTS OF PUBLIC CONSUMPTION

(CONTINUED)

SecNo.	Const.	log(gdpR[1])	PriceTerm	SEE	Rbsq	Rho
47	-18.36	1.889	-0.8567			
	(14.9)	(14.8)	(1.91)	0.09926	0.9646	0.5646
48	-20.49	1.816	-1.126			
	(15.1)	(13)	(2.29)	0.109	0.953	0.6062
49	-29.2	2.718	-1.345			
	(15.5)	(14)	(1.96)	0.1516	0.96	0.3534
52	-10.6	1.441	-0.08716			
	(5.26)	(7.05)	(0.321)	0.1753	0.8509	0.7687
53	-6.507	1.283	-0.2555			
	(13.1)	(24.9)	(1.09)	0.04031	0.9878	0.2684
54	-19.24	1.731	-0.06516			
	(8.94)	(7.74)	(0.0643)	0.1749	0.8901	0.7705
55	-12.74	1.809	0.6008			
	(8.5)	(11.6)	(0.851)	0.1218	0.9515	0.4599
56	9.572	-0.3945	-0.3544			
	(13.2)	(5.21)	(1.03)	0.05913	0.8175	-0.384
57	-1.115	0.7172	-0.4434			
	(1.76)	(10.9)	(1.49)	0.05147	0.9358	0.374
58	-4.767	1.058	-0.1353			
	(3.81)	(8.14)	(0.23)	0.1016	0.8981	0.6807
59	2.157	0.4979	-0.1625			
	(4.39)	(9.74)	(0.702)	0.03994	0.9242	0.6072

Note:

1. The t-statistics are enclosed in parenthesis
2. gdpR is the real GDP
3. The prices term is the lag value of the percentage change of sectoral prices

TABLE 3 REGRESSION RESULTS FOR THE INVESTMENT FUNCTION

Sec#	Const.	a1	a2	a3	SEE
1	161.6	0.0957	0.1022	-3.271	
	(3.00)	(2.41)	(2.21)	(2.32)	3.922
2	138.6			0.03153	
	(6.51)			(1.56)	14.07
3	188.2			0.06339	
	(7.39)			(3.57)	22.76
4	25.43	-0.3614	0.5873	-0.1355	
	(5.01)	(1.30)	(2.26)	(2.36)	2.32
5	24.46			0.02423	
	(14.10)			(0.00)	4.498
6	8.052	0.04366		0.1132	
	(2.77)	(0.29)		(3.68)	1.619
7	42.52			-0.2134	
	(2.65)			(1.79)	3.66
8	61.77	0.1623	-0.07377	0.0181	
	(3.74)	(1.79)	(0.33)	(0.37)	12.09
9	54.95	-0.3277	0.2113	-0.09168	
	(3.56)	(1.69)	(0.56)	(1.21)	12.52
10	-1.622	0.4022	0.3994	0.1379	
	(0.35)	(4.53)	(3.14)	(3.27)	3.145
11	124.5		0.1257	0.01079	
	(2.60)		(0.46)	(0.16)	35.46
12	6.543	0.1569	-0.02361	0.03632	
	(2.51)	(4.50)	(0.09)	(0.59)	1.721
13	4.746	-0.08663	0.02558	0.06303	
	(1.42)	(1.05)	(0.06)	(0.76)	2.148
14	5.222	0.1324	0.1935	0.07333	
	(1.51)	(0.77)	(1.17)	(1.14)	1.659
15	5.057			-0.05986	
	(1.89)			(0.54)	1.011
16	15.84	0.2476		0.09279	
	(2.14)	(1.97)		(1.70)	6.437
17	10.8	0.2703	-0.3009	-0.0628	
	(3.23)	(4.46)	(4.85)	(1.00)	1.803
18	4.617		0.1865	-0.03228	
	(2.03)		(1.59)	(0.38)	0.8423
19	10.3	0.3302	-0.1972	0.1708	
	(1.64)	(3.21)	(1.07)	(5.40)	6.931
20	102.1	0.0975	0.3083	0.08826	
	(2.68)	(0.15)	(1.38)	(1.81)	27.98
21	11.08	0.2679		0.1123	
	(2.14)	(2.62)		(1.70)	5.072
22	17.74		0.6969	0.04972	
	(3.30)		(7.20)	(1.38)	3.327
23	8.856	0.2411	0.1601	0.05918	
	(1.93)	(2.51)	(1.06)	(0.82)	3.291
24	22.81	0.1722	0.179	-0.04856	
	(4.42)	(3.42)	(3.42)	(0.94)	3.5
25	107.7	0.2507	0.2798	-0.04759	
	(3.80)	(3.19)	(3.36)	(0.90)	16.99
26	74.55	0.1014	0.411	0.07941	
	(2.15)	(0.27)	(4.26)	(1.87)	23.95

TABLE 3 REGRESSION RESULTS FOR THE INVESTMENT FUNCTION(CONTINUED)

Sec#	Const.	a1	a2	a3	SEE
27	38.16	0.2527	0.2859	0.01701	
	(2.51)	(1.39)	(1.40)	(0.27)	9.626
28	15.04	0.115	0.1552	0.03526	
	(2.80)	(2.95)	(4.79)	(0.78)	3.123
29	70.38	0.1673	0.06662	0.04752	
	(1.72)	(3.99)	(0.61)	(0.91)	17.35
30	-11.78	-0.1351	-0.2746	0.2126	
	(0.78)	(1.19)	(4.81)	(4.36)	10.87
31	41.44	0.1927	0.1508	-0.02459	
	(3.67)	(4.66)	(2.67)	(0.48)	7.37
32	27.56	0.04678	0.03798	0.1044	
	(2.69)	(0.20)	(0.10)	(2.54)	7.391
33	0.6012		-0.0407	0.1603	
	(0.14)		(0.09)	(2.31)	2.545
34	15.91	0.1699	0.1368	-0.07851	
	(3.22)	(10.96)	(4.68)	(1.22)	2.981
35	100.9	-0.5989	0.00303	0.1538	
	(2.96)	(4.57)	(0.00)	(4.89)	32.34
36	5.719	-0.09449	-0.2882	0.1935	
	(0.71)	(0.04)	(0.18)	(0.99)	5.331
37	-1.049	0.3287	0.4383	0.2716	
	(0.23)	(0.47)	(0.78)	(4.70)	5.485
38	-25.48	0.1905	0.1566	1.718	
	(0.63)	(5.02)	(2.93)	(1.39)	17.35
39	39.91			1.392	
	(0.38)			(1.53)	62.15
40	-46.42	0.5353		2.374	
	(2.84)	(5.88)		(11.39)	11.87
41	-14	0.8579	0.4335	1.708	
	(0.33)	(2.06)	(0.50)	(3.46)	21.8
42	-9.354	0.8553	-1.078	1.685	
	(0.90)	(2.98)	(4.07)	(1.95)	12.43
43	6.449	0.3064	1.241	-1.087	
	(1.12)	(0.09)	(1.69)	(0.64)	2.433
44	-47.24	0.8748	1.114	3.24	
	(1.75)	(2.28)	(3.06)	(1.91)	23.83
45	-170.2	0.3228	0.07013	2.727	
	(3.12)	(8.33)	(0.40)	(6.32)	25.83
46	-1.131	0.1578	0.01265	1.252	
	(0.30)	(7.21)	(0.03)	(0.93)	0.9608
47	-12.98	0.24	-0.2567	1.8	
	(1.54)	(4.00)	(4.41)	(2.43)	7.174
48	-143.1	0.5586	0.442	2.757	
	(1.40)	(5.01)	(3.37)	(4.06)	74.8
49	29.99	0.09551		0.663	
	(2.05)	(0.28)		(1.46)	7.534
50	119.7	0.5264	0.3789	0.1573	
	(5.03)	(3.94)	(1.65)	(0.71)	12.93
51	22.84			1.127	
	(0.67)			(2.39)	12.82
52	-35.6			1.776	
	(0.27)			(2.25)	54.06

TABLE 4. REGRESSION OF IMPORT SHARES

Sec#	Constant	imptime	log(rpim)	SEE
1	-2.761	-0.1212	-0.01804	
	(5.33)	(2.41)	(0.02)	0.009978
2	-4.319	0.1214	-3.015	
	(6.20)	(1.93)	(2.61)	0.01481
3	-4.378	-0.05243	-0.4096	
	(15.49)	(1.83)	(0.51)	0.003077
4	-4.378	-0.05243	-0.4096	
	(15.49)	(1.83)	(0.51)	0.003077
5	-4.667	-0.0523	1.704	
	(4.74)	(0.53)	(0.57)	0.003843
6	-6.268	0.343	0.4971	
	(8.48)	(5.21)	(1.34)	0.01274
7	-1.429	0.03879	0.9906	
	(3.68)	(0.81)	(1.09)	0.04946
8	-2.096	-0.06234	-0.2904	
	(4.35)	(1.18)	(0.44)	0.02077
9	-4.179	0.0221	-1.118	
	(11.83)	(0.73)	(2.36)	0.003781
10	-2.364	0.06921	-1.506	
	(6.42)	(1.88)	(2.66)	0.03854
11	-2.854	-0.02244	0.5683	
	(5.13)	(0.44)	(0.73)	0.01243
12	-4.438	0.04862	-0.2994	
	(9.88)	(1.23)	(0.56)	0.00328
13	-2.432	-0.08731	1.58	
	(1.99)	(0.75)	(0.73)	0.01837
14	-2.642	0.06907	-0.08363	
	(9.02)	(2.38)	(0.30)	0.01254
15	-7.313	0.3817	-1.925	
	(1.24)	(0.75)	(0.50)	0.05138
16	-0.4167	-0.09138	1.971	
	(0.33)	(0.67)	(1.47)	0.07075
17	-2.361	0.1159	-1.206	
	(4.63)	(2.01)	(1.83)	0.06967
18	-4.948	0.1906	-1.746	
	(14.46)	(6.21)	(5.63)	0.009188
19	-1.186	-0.06218	1.201	
	(3.45)	(1.65)	(2.52)	0.02149
20	-3.206	-0.03032	-0.136	
	(3.36)	(0.34)	(0.15)	0.01025
21	-3.871	0.2232	-1.397	
	(4.71)	(2.74)	(1.99)	0.03498
22	-3.97	0.1508	-1.114	
	(10.43)	(3.96)	(2.11)	0.01847
23	-1.861	0.04495	-0.3398	
	(4.69)	(1.03)	(0.67)	0.02917
24	-5.025	0.1954	-1.516	
	(5.37)	(2.31)	(1.76)	0.01315

TABLE 4. REGRESSION OF IMPORT SHARES (CONTINUED)

Sec#	Constant	imptime	log(rpim)	SEE
25	-0.7809	-0.1259	-0.2221	
	(0.97)	(1.35)	(0.22)	0.05573
26	-1.956	-0.2012	1.809	
	(2.05)	(2.10)	(2.08)	0.00669
27	-1.956	-0.2012	1.809	
	(2.05)	(2.10)	(2.08)	0.00669
28	-4.699	0.04275	-0.4984	
	(9.30)	(0.95)	(0.88)	0.003446
29	-1.585	-0.0293	-0.5355	
	(4.49)	(0.64)	(0.60)	0.05728
30	-2.342	0.009468	-0.1786	
	(3.86)	(0.15)	(0.12)	0.0381
31	-2.776	-0.04208	0.4898	
	(5.23)	(0.80)	(0.59)	0.01166
32	-0.5526	-0.08072	1.124	
	(0.69)	(0.94)	(1.44)	0.04331
33	-2.689	0.05722	-1.037	
	(1.35)	(0.29)	(0.41)	0.09067
34	-0.4221	-0.121	1.248	
	(0.28)	(0.76)	(0.83)	0.07907
35	-2.625	0.08646	-2.19	
	(2.52)	(0.76)	(1.92)	0.06623
36	-1.335	0.1822	0.5597	
	(1.35)	(1.42)	(0.54)	0.1003
37	7.696	-1.168	12.05	
	(4.75)	(5.54)	(6.05)	0.026
38	-2.483	0.05879	-0.1234	
	(3.91)	(0.94)	(0.23)	0.02616
39	-1.87	0.1467	-0.8476	
	(3.50)	(2.11)	(1.36)	0.0647
40	-0.8787	0.00573	-0.2524	
	(0.98)	(0.05)	(0.27)	0.08208
41	-2.635	0.0906	-0.7175	
	(5.07)	(1.75)	(1.62)	0.02419
42	-5.047	0.007646	0.6099	
	(10.30)	(0.17)	(0.86)	0.001932

TABLE 5.1 REGRESSION RESULTS OF EXPORTS, PART 1

	Constant	exptime	log(pim)	log(p)	SEE	Rbsq	Rho
1	3.098	0.2004	2.498	-4.338			
	(4.64)	(3.34)	(3.49)	(4.46)	0.1572	0.9329	0.4777
2	-0.3764	0.2275	1.055	-3.674			
	(0.22)	(1.50)	(1.25)	(2.16)	0.2125	0.523	0.5063
3	2.623	0.1036	0.2316	-0.828			
	(3.80)	(1.65)	(0.56)	(1.33)	0.1572	0.6282	0.4629
5	0.5846	0.2859	1.637	-4.066			
	(1.23)	(6.49)	(3.44)	(5.96)	0.1192	0.9639	0.2506
6	3.165	0.2456	0.476	-1.933			
	(6.05)	(3.37)	(1.31)	(4.34)	0.1997	0.6689	0.3813
11	3.187	0.2357	0.5492	-2.048			
	(4.97)	(3.85)	(1.34)	(2.08)	0.1569	0.9386	0.4832
12	0.8462	0.2597	0.3948	-2.758			
	(0.82)	(2.75)	(0.66)	(2.61)	0.1792	0.8916	0.635
13	-0.1386	0.2514	1.072	-0.01966			
	(0.14)	(2.84)	(1.50)	(0.02)	0.1961	0.9827	0.07339
14	5.534	0.1178	1.057	-1.223			
	(13.53)	(2.87)	(4.60)	(5.12)	0.08552	0.9874	0.2015
15	4.967	0.13	1.532	-1.032			
	(6.76)	(1.59)	(3.62)	(1.62)	0.1783	0.9723	0.09852
18	3.241	0.06854	1.791	-1.078			
	(1.96)	(0.44)	(2.19)	(1.52)	0.2935	0.903	0.6198
19	1.474	0.2396	1.368	-2.236			
	(1.35)	(2.43)	(2.00)	(2.96)	0.2065	0.9588	0.406
22	3.644	0.07767	0.7177	-1.367			
	(7.07)	(1.35)	(1.52)	(2.43)	0.1827	0.4231	0.3476
33	-8.648	0.8013	0.1013	-9.751			
	(1.48)	(1.54)	(0.03)	(1.64)	1.085	0.3897	0.05124
37	0.1711	0.2735	2.851	-5.264			
	(0.10)	(1.62)	(3.36)	(3.90)	0.2656	0.955	-0.1501
42	3.503	-0.3024	6.124	-0.7219			
	(1.23)	(1.30)	(2.25)	(0.29)	0.4998	0.838	0.06176

TABLE 5.2 REGRESSION RESULTS OF EXPORTS, PART 2

	Constant	exptime	log(exrate)	SEE	Rbsq	Rho
4	2.01	0.09279	0.4897			
	(15.87)	(6.85)	(1.18)	0.1654	0.8428	0.3621
8	3.783	-0.1718	3.318			
	(5.12)	(2.22)	(3.17)	0.3843	0.5316	0.2833
9	2.511	0.1037	0.6502			
	(12.06)	(5.21)	(2.46)	0.09493	0.9712	0.3081
16	3.894	0.1647	1.972			
	(5.82)	(2.12)	(2.78)	0.2482	0.9509	0.6187
17	-0.2638	0.2167	1.072			
		(0.89)	(7.41)	(2.21)	0.3032	0.9192	0.3804

TABLE 5.2 REGRESSION RESULTS OF EXPORTS, PART 2 (CONTINUED)

	Constant	exptime	log(exrate)	SEE	Rbsq	Rho
20	-1.697	0.2625	0.3684			
	(2.03)	(3.47)	(0.46)	0.2971	0.941	0.5164
21	2.401	0.1956	1.397			
	(5.28)	(3.87)	(3.48)	0.1899	0.9718	0.3577
23	3.965	0.1227	1.055			
	(18.69)	(5.96)	(3.77)	0.1067	0.9796	0.5474
24	1.939	0.1771	0.5866			
	(9.21)	(8.93)	(2.68)	0.09546	0.9877	0.3184
26	0.9	0.1978	0.9232			
	(3.00)	(7.06)	(3.48)	0.1288	0.9874	-0.08365
27	1.206	0.2655	0.9037			
	(3.77)	(8.83)	(2.68)	0.1619	0.9851	0.6619
28	2.69	0.1454	0.883			
	(5.35)	(3.16)	(1.55)	0.2477	0.9199	0.629
29	2.525	0.1306	1.763			
	(5.99)	(2.83)	(1.68)	0.5197	0.6575	0.7004
30	2.628	0.1005	2.65			
	(7.30)	(2.73)	(2.98)	0.2638	0.8962	0.2312
31	3.197	0.1448	1.09			
	(16.37)	(7.57)	(3.64)	0.1112	0.9806	0.3831
32	2.31	0.2572	0.5134			
	(3.34)	(4.18)	(0.74)	0.2476	0.9577	0.2289
35	-0.1785	0.2502	0.5937			
	(0.13)	(1.91)	(0.40)	0.5506	0.7993	-0.145
36	-0.2575	0.1657	3.475			
	(0.16)	(1.08)	(1.77)	0.8156	0.8006	0.1631
38	2.044	0.2636	0.9802			
	(2.37)	(3.32)	(1.30)	0.3559	0.9389	0.8135
39	0.7969	0.4363	1.173			
	(2.00)	(10.41)	(2.27)	0.2712	0.9796	-0.2394
40	0.6944	0.2836	1.008			
	(1.05)	(4.23)	(1.43)	0.315	0.945	0.6632
41	4.769	0.07578	1.05			
	(4.11)	(0.63)	(1.03)	0.4404	0.6979	0.3963
46	1.827	0.1484	0.365			
	(19.31)	(13.87)	(1.65)	0.1045	0.973	0.1397
47	1.067	0.1281	0.7338			
	(13.12)	(13.70)	(3.85)	0.07696	0.9853	0.07247
48	2.532	0.1565	0.5246			
	(28.76)	(14.66)	(2.63)	0.08985	0.98	0.2432
49	2.75	0.2916	0.9644			
	(30.56)	(11.50)	(5.39)	0.06627	0.9891	-0.2478
54	1.017	0.112	0.1235			
	(21.59)	(19.89)	(1.06)	0.04756	0.9898	0.1989
55	3.131	0.09467	1.415			
	(13.14)	(3.82)	(2.36)	0.2099	0.8772	0.4125
57	0.8968	0.05953	0.1266			
	(22.64)	(14.77)	(1.34)	0.04757	0.9649	0.4624
58	1.018	0.01485	0.3073			
	(12.89)	(1.85)	(1.63)	0.09488	0.5054	0.4321

TABLE 5.3 REGRESSION RESULTS OF EXPORTS, PART 3

	Constant	exptime	SEE	Rbsq	Rho
10	-1.66	0.285			
	(6.05)	(8.75)	0.4467	0.8646	0.5935
25	-3.207	0.2437			
	(9.24)	(5.97)	0.5691	0.7479	0.4878

34	-1.799	0.5059			
	(2.20)	(5.00)	1.293	0.6758	0.09737
51	0.5643	0.1669			
	(5.83)	(14.08)	0.1578	0.9429	0.768
7	-6.787	0.2533			
	(3.90)	(1.34)	2.07	0.1513	0.006141
52	47.3	-0.05324			
	(0.74)	(3.66)	55.58	0.5732	0.4762

TABLE 6. REGRESSION RESULTS OF PRODUCTIVITY

Sec#	Constant	T80	log(qrat)	See	Rbsq	Rho
1	7.374	0.04036	0.7486			
	(163.5)	(10.96)	(1.571)	0.03294	0.9388	0.6134
2	8.415	0.06934	0.2305			
	(172.4)	(12.04)	(0.5555)	0.04481	0.9617	0.4749
3	11.28	-0.0134	0.3222			
	(80.76)	(-0.9666)	(0.4979)	0.1237	0.1364	0.3178
4	8.531	0.09285	1.37			
	(76.82)	(5.003)	(2.5)	0.09624	0.9505	0.4301
5	8.486	0.1095	0.5508			
	(110.1)	(12.59)	(2.077)	0.07161	0.9644	0.3589
6	8.597	0.09311	0.8578			
	(39.93)	(3.159)	(1.389)	0.1678	0.852	0.6815
8	9.915	0.07264	0.7923			
	(157.2)	(9.416)	(2.406)	0.05915	0.9525	0.4855
9	9.579	0.08481	0.6363			
	(121.2)	(9.723)	(1.636)	0.07082	0.9437	0.5695
10	11.44	0.06135	0.6581			
	(498.4)	(38.34)	(4.306)	0.0143	0.9946	0.3312
11	9.805	0.04338	1.513			
	(84.18)	(3.195)	(2.4)	0.1088	0.7802	0.5877
12	8.966	0.09012	1.327			
	(59.12)	(3.7)	(2.002)	0.1298	0.9124	0.5344
13	9.047	0.0938	1.151			
	(57.56)	(4.314)	(2.817)	0.1377	0.9159	0.3153
14	9.107	0.002213	1.693			
	(44.76)	(0.08682)	(4.383)	0.1474	0.8554	0.3202
15	9.928	0.03119	1.815			
	(64.65)	(1.646)	(5.512)	0.1186	0.9216	0.5311
16	9.669	0.04977	1.024			
	(97.88)	(4.145)	(2)	0.09256	0.8327	0.5644
17	9.08	0.08432	0.973			
	(93.34)	(6.861)	(2.169)	0.09121	0.9255	0.5967
18	9.097	0.05245	1.396			
	(74.42)	(2.906)	(2.944)	0.1104	0.8878	0.2695
19	11.44	0.02126	-0.3627			
	(236)	(3.699)	(-1.313)	0.04533	0.6351	0.3921
20	9.994	0.05598	1.141			
	(129.7)	(4.702)	(1.816)	0.0721	0.9119	0.5815
21	9.722	0.1081	0.135			
	(103.5)	(9.424)	(0.4042)	0.08805	0.9403	0.5634
22	9.981	0.08043	1.19			
	(151.4)	(11.96)	(3.338)	0.05313	0.9685	0.3513
23	9.945	0.04111	1.322			
	(70)	(2.074)	(1.799)	0.1273	0.7554	0.6228
24	9.18	0.1097	0.5747			
	(80.57)	(8.544)	(1.89)	0.1068	0.9274	0.5785
25	8.877	0.07348	1.307			
	(65.56)	(4.137)	(2.606)	0.1218	0.8893	0.5311

TABLE 6. REGRESSION RESULTS OF PRODUCTIVITY (CONTINUED)

Sec#	Constant	T80	log(qrat)	See	Rbsq	Rho
26	10.53	0.03578	0.5704			
	(236.9)	(6.793)	(2.351)	0.04166	0.9141	0.4445
27	10.52	0.04128	1.142			
	(133.3)	(3.63)	(2.53)	0.07149	0.892	0.544
28	9.325	0.08233	1.123			
	(62.63)	(4.243)	(2.45)	0.1332	0.8879	0.509
29	9.247	0.09447	0.9076			
	(55.06)	(5.021)	(2.224)	0.1571	0.8455	0.5639
30	9.14	0.09998	0.6741			
	(89.05)	(8.473)	(2.794)	0.09566	0.9381	0.6156
31	9.486	0.1008	0.6609			
	(88.93)	(8.667)	(2.31)	0.09928	0.9268	0.5131
32	9.316	0.1241	0.8027			
	(65.42)	(7.393)	(2.656)	0.1331	0.9269	0.4449
33	8.567	0.08393	0.7192			
	(120.7)	(11.33)	(5.925)	0.06617	0.9552	0.06737
34	8.976	0.1288	0.798			
	(43.94)	(6.013)	(26.38)	0.1916	0.8298	0.5714
35	10.2	0.06281	0.7316			
	(273.2)	(13.9)	(4.039)	0.03497	0.978	0.4706
36	8.629	0.1598	0.7983			
	(47.1)	(8.316)	(29.41)	0.1718	0.9163	0.7944
37	9.571	0.04191	0.6912			
	(121.8)	(4.354)	(1.808)	0.0737	0.8382	0.647
38	9.326	0.04478	0.3686			
	(131.5)	(6.545)	(2.248)	0.05997	0.8454	0.4381
39	10.54	-0.02716	1.379			
	(289.7)	(-6.375)	(3.853)	0.03352	0.9272	0.414
42	10.23	0.1386	0.4663			
	(88.45)	(14.22)	(1.859)	0.08274	0.9633	0.2565
43	11.03	0.003426	1.782			
	(76.29)	(0.2293)	(1.276)	0.08391	0.2798	-0.1339
44	8.25	0.1488	0.6118			
	(85.9)	(11.19)	(1.6)	0.08963	0.9709	0.5466
47	10.74	0.03348	0.6562			
	(168.9)	(5.602)	(2.423)	0.05334	0.8306	0.3179
48	9.932	0.03049	0.4413			
	(78.42)	(2.502)	(2.655)	0.08376	0.5716	0.1703
49	9.53	0.004216	1.072			
	(116.6)	(0.485)	(2.716)	0.07625	0.4798	0.1243
50	8.189	0.04078	0.9649			
	(127.5)	(6.298)	(2.156)	0.05744	0.8587	-0.1728
51	10.08	0.007358	0.936			
	(209.9)	(1.44)	(4.037)	0.0448	0.6766	-0.05912
52	10.28	-0.03765	0.7625			
	(150.9)	(-5.453)	(1.847)	0.06035	0.7908	0.7515

TABLE 6. REGRESSION RESULTS OF PRODUCTIVITY, PART 2

Sec#	Constant	T80	SEE	Rbsq	Rho
40	8.846	0.05167			
	(162.8)	(9.07)	0.05405	0.9014	0.5762
41	9.122	0.02304			
	(498.5)	(12.01)	0.0182	0.9413	-0.0656
46	9.403	0.03766			
	(160.8)	(6.143)	0.05817	0.8074	0.5874

TABLE 6. REGRESSION RESULTS OF PRODUCTIVITY, PART 3

Sec#	Constant	T80	log(qrat)	log(K/L)[1]	SEE	Rbsq	Rho
45	10.09	-0.02112	0.3493	0.8			
	(146.4)	(-3.298)	(2.293)	(122)	0.02934	0.7997	0.03882

TABLE 6. REGRESSION RESULTS OF PRODUCTIVITY, PART 4

Sec#	Constant	T80	SEE	Rbsq	Rho
7	9.265	0.009281			
	(57.89)	(0.5532)	0.1592	0.03288	0.7025

APPENDIX A. BALANCE OF HISTORICAL I-O TABLES

MUDAN uses published data for most cases. Should there be a real need for unpublished data, efforts will be made to request the data from SSB. However, such request has been kept at minimal in order to ease the future maintenance of the model.

MUDAN is based on the 1992 I-O table. Historical data are balanced based on the 1992 table. Subsequently, a series of I-O tables are created. If one considers that the published national accounts of China consists of scarcely a dozen series, one can imagine the work which had to be done to build the time-series data bank to support such a model as MUDAN. With statistical series and classification systems have been frequently and substantially revised in China, the data work easily eats out most of the time that one spends on modeling MUDAN. The work is rewarding and several by-products are produced.

One important by-product is the development of a detailed product-side national account which has never been officially published. Official measures of GDP, as stated in the statistical yearbooks, are based on a mixture of production and income approaches, both are from supply-side. More precisely, it appears, GDP related to agriculture, mining, manufacturing and utility production is based on the production approach while GDP related to the tertiary industry is based on the income approach. GDP computed from demand side is published in China as GDE, the gross domestic expenditures. GDE was not available from the SSB until 1995. It is composed of consumption of rural and urban residents, investment, net exports (not exports and imports), and consumption of government and enterprises. GDE and GDP, both without industrial detail, do not agree with each other due to statistical discrepancies. While the figures for total private consumption and investment are the same for 1992 in the 1992 I-O table and in the GDE account, net exports and government expenditures are not. Nevertheless, GDE components provide valuable control totals for balancing historical I-O tables. The key identities in balancing the I-O tables are

$$GDE = c_u + c_r + c_s + I_{fa} + I_{vn} + x - m \qquad \textbf{(A-1)}$$

$$GDP = c_u + c_r + c_s + I_{fa} + I_{vn} + x - m + o_{thdm} \qquad \textbf{(A-2)}$$

ADJUSTMENT TO THE 1992 I-O TABLE

Because the total final demand in the 1992 I-O table equals neither GDP nor GDE of 1992, the above two identities can not be forced to hold without changing total output or total final demand for some sectors. But changing sectoral total output or final demand will cause the whole table to be re-balanced, which is the last thing we want to do if it is not absolutely necessary. So for 1992, special efforts are made to re-arrange the final demand so that neither total output nor total final demand of any sector is changed, this is warranted by re-computing the residual column vector o_{thdm} by

$$o_{thdm} = q - (A * q + c_u + c_r + c_s + I_{fa} + I_{vn} + x - m) \qquad \textbf{(A-3)}$$

However, the distribution of final demand of some sectors have been adjusted so that column sums of the I-O table are equal to the corresponding GDE components. Specifically, columns C_s, X and M are adjusted for 1992. Table A.1 gives a summary of the process.

TABLE A.1 GDE AND FINAL DEMAND COMPONENTS IN THE I-O TABLE OF 1992

	GDE in 1992 (100 mil. yuan)	1992 I-O Table (100 mil. yuan)	Actions taken to the I-O column
1. Sum of C_r	6571.6	6572.00	No
2. Sum of C_u	5888.2	5888.00	No
3. Sum of C_s	3492.3	4131.08	639 of sector 59 Public administration is moved from C_s into O_{thdm}
4. Sum of I_{fa}	8317.0	8317.01	No
5. Sum of I_{vn}	1319.0	1319.01	No
6. Sum of (x-m)	275.6	250.76	Sum of net exports (x-m) is forced to equal net exports of GDE by right direction scale of sectoral exports
7. Sum of x	N/A	N/A	Right-direction scale sectoral exports if sum of net exports in the I-O is less than the net exports of GDE
8. Sum of m	N/A	N/A	Right-direction scale sectoral imports if sum of net exports in the I-O is less than the net exports of GDE
9. Sum of o_{thdm}	N/A	166.44	Re-computed by sector, $o_{thdm} = q - (A * q + c_u + c_r + c_s + I_{fa} + I_{vn} + x - m)$
Sum of 1-6	25863.7	26477.85	Note: **GDP**=26651.9

BALANCE OF HISTORICAL I-O TABLES

For any year other than 1992, identities (A-1) and (A-2) hold exactly. The balancing process is sketched as follows:

1. GDE components of C^r, C^u, C^s, I^{fa}, I^{vn} are used as control totals to guide final demand columns C_r, C_u, C_s, I_{fa} and I_{vn}.
2. Columns C_r, C_u, and I_{fa} are served as row sums to balance consumption and investment bridge matrices.
3. The net exports of GDE are served as controls, and the scaling procedure is that:
    - If the difference of total exports and total imports is less than the net exports of GDE, only exports will be scaled
    - If the difference of total exports and total imports is greater than the net exports of GDE, only imports will be scaled

    In either case, the difference between the total exports and total imports is forced to equal the net exports.
4. O_{thdm} is right-direction scaled by the difference between GDE and GDP

Now the rows of the I-O table can be balanced by

$$q - m = A*q + c_r + c_u + c_s + I_{fa} + I_{vn} + x \qquad \text{(A-4)}$$

The Value added rows are scaled to match final demand, and rows and columns are continued to be scaled until the table balanced. At the end, the I-O table is perfectly balanced, and (A-1) and (A-2) holds exactly.

APPENDIX B. ESTIMATION OF PAD SYSTEMS

There are two PAD systems in MUDAN, one for rural residents and the other for urban. Neither uses cross-sectional data. A simple time trend and a total population, rural and urban respectively, along with soft constraints are used in both systems.

TABLE B.1 SOFT CONSTRAINTS

#sec	Title	Incom		Dincome		Time		lamda	
I	**URBAN CONSUMPTION**								
1	Grains and grain products	0.2	0.7	0	0	-0.5	0.5	0	0
2	Meat and vegetables	0	0	0	0	0	0	0.1	0
3	Tobacco, liquor, tea and others	0	0	0	0	0	0	0	0
4	Prepared foods	0	0	0	0	0	0	0	0
5	Clothing	0	0	-5	0	0	0.5	0.1	0
6	Daily used articles	0.8	0.6	0	0	0	0.7	0	0
7	Audio and video equipment, pa	1.6	0	0	0	4	0	0.6	0.7
8	Books, newspapers and magazin	0.2	0.8	5	0	-8	0.7	0.9	0.5
9	Medical and health related go	0	0	0	0	2	0.4	0	0
10	Fuels	0.1	0.8	0	0	-2	0	-1	0
11	Other goods	2	0.7	0	0	-5	0	-5	0
12	Rent	0.2	0.9	0.4	0.8	1	0.9	0.1	0
13	Water, gas and electricity	0.1	0.7	0	0	3	0.8	0	0
14	Education	0.1	0	0	0	0	0.8	0	0
15	Child care	0.2	0.8	0	0	0	0.9	0	0
16	Transportation	0.1	0	0	0	0	0.9	0	0
17	Postal and communication	0	0	0	0	0	0.9	0.1	0.5
18	Recreational activities	0.1	0.9	5	0	-2	0.9	0.1	0
19	Other Services	0	0	0	0	0	0.9	0.1	0.5
II	**RURAL CONSUMPTION**								
1	Grains and products	0	0	0	0	0	0	0	0
2	Meat and vegetables	0	0	0	0	0	0	0	0
3	Other food	0	0	0	0	0	0	0	0
4	Clothing	0	0	0	0	0	0	0	0
5	Residence including fu	0	0	0	0	0	0	0	0
6	Household facilities,	0	0	0	0	0	0	0	0
7	Medicines and medical	0	0	0	0	0	0	0	0
8	Traffic and communinca	0.2	0.6	0	0	-2	0	0	0
9	Cultural, educational,	0	0	0	0	0	0	0	0
10	Other commodity and se	0	0	0	0	-5	0.9	0	0

TABLE B.2 REGRESSION RESULT FOR URBAN CONSUMPTION

The value of L is 0.52
The mu: -0.19 -2.89 1.09 1.79 -1.69
The nu: 0.26 0.00

nsec	title	G	S	P	C	T	I	lamb	share	IncEl	DInc	time%	PrEl	Err%	rho
1	Grains and grain produ	1	1	1	1	1	1	-0.41	0.081	0.20	3.88	-0.49	-0.19	2.26	0.35
2	Meat and vegetables	1	0	1	1	1	1	0.66	0.306	0.81	-0.32	1.72	-0.70	1.27	0.13
3	Tobacco, liquor, tea a	1	1	1	1	1	1	0.13	0.055	0.53	-0.11	3.40	-0.67	2.89	0.17
4	Prepared foods	1	1	1	1	1	1	-0.49	0.087	0.60	0.63	1.22	-0.12	3.29	-0.30
5	Clothing	2	0	1	1	1	1	1.58	0.144	0.18	8.51	-0.01	-0.49	3.17	0.38
6	Daily used articles	2	0	1	1	1	1	1.85	0.097	0.90	0.55	0.00	-0.29	5.54	0.05
7	Audio and video equipm	5	0	1	1	1	1	0.24	0.044	0.55	-1.24	3.54	-0.44	12.15	0.31
8	Books, newspapers and	5	0	1	1	1	1	1.18	0.010	0.08	12.46	-9.56	-0.30	9.93	0.21
9	Medical and health rel	0	0	1	1	1	1	1.06	0.018	1.90	0.16	1.94	-1.54	13.69	0.55
10	Fuels	3	0	1	1	1	1	-0.56	0.017	0.14	-2.71	4.38	-0.74	5.12	0.07
11	Other goods	0	0	1	1	1	0	-5.00	0.018	2.01	-1.72	0.09	0.00	40.43	0.72
12	Rent	3	0	1	1	1	1	-0.97	0.009	0.33	1.24	1.45	-0.50	8.74	0.51
13	Water, gas and electri	3	2	1	1	1	1	0.73	0.017	0.34	5.00	3.39	-1.99	6.09	0.27
14	Education	4	0	1	1	1	1	-0.83	0.030	2.07	-0.82	0.10	-0.08	5.40	0.05
15	Child care	4	0	1	1	1	1	-0.02	0.005	0.25	1.95	-0.18	-2.07	8.18	0.21
16	Transportation	3	0	1	1	1	1	-1.16	0.012	1.04	-0.73	-0.01	-0.24	3.50	-0.25
17	Postal and communicati	4	0	1	1	1	1	-0.58	0.002	1.61	2.33	-0.91	-1.63	21.38	0.40
18	Recreational activitie	0	0	1	1	1	1	-0.48	0.005	0.10	15.93	-4.31	-0.05	13.35	0.64
19	Other Services	0	0	1	1	1	1	-0.18	0.042	1.77	-0.13	0.02	-0.36	5.71	0.66

PRICE ELASTICITIES

The number in row i and column j is the elasticity of product i with respect to the price of product j.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	-0.19	0.17	0.04	-0.09	0.17	0.14	-0.01	0.01	0.01	-0.02	-0.01	-0.01	0.01	-0.04	0.00	-0.02	0.00	0.00	-0.02
2	-0.04	-0.70	0.03	-0.06	0.32	0.24	0.04	0.02	0.03	0.00	0.01	0.00	0.02	-0.01	0.00	-0.01	0.00	0.00	0.02
3	-0.02	0.33	-0.67	-0.05	0.25	0.19	0.02	0.01	0.02	-0.01	0.00	-0.01	0.01	-0.02	0.00	-0.01	0.00	0.00	0.00
4	-0.07	0.14	0.04	-0.12	0.16	0.13	-0.01	0.01	0.01	-0.02	-0.01	-0.01	0.00	-0.04	0.00	-0.02	0.00	0.00	-0.03
5	0.10	0.69	0.09	0.10	-0.49	-0.65	0.08	0.03	0.05	0.02	0.03	0.01	0.04	0.02	0.01	0.01	0.00	0.01	0.06
6	0.12	0.77	0.11	0.12	-1.00	-0.29	0.09	0.03	0.05	0.02	0.03	0.01	0.04	0.03	0.01	0.01	0.00	0.01	0.07
7	-0.01	0.27	0.02	-0.02	0.26	0.20	-0.44	-0.28	0.02	-0.01	0.00	-0.01	0.02	-0.02	0.00	-0.01	0.00	0.00	0.00
8	0.06	0.56	0.07	0.06	0.40	0.29	-1.31	-0.30	0.04	0.01	0.02	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.04
9	0.05	0.52	0.07	0.05	0.38	0.28	0.06	0.02	-1.54	0.01	0.02	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.04
10	-0.08	0.03	-0.02	-0.09	0.15	0.12	-0.01	0.01	0.01	-0.74	-0.01	0.15	0.35	-0.04	0.00	0.21	0.00	-0.01	-0.03
11	-0.44	-1.33	-0.27	-0.48	-0.49	-0.31	-0.21	-0.04	-0.07	-0.10	0.00	-0.05	-0.07	-0.18	-0.02	-0.08	-0.01	-0.03	-0.22
12	-0.11	-0.09	-0.05	-0.13	0.09	0.09	-0.03	0.00	0.00	0.30	-0.02	-0.50	0.35	-0.05	0.00	0.20	0.00	-0.01	-0.05
13	0.03	0.43	0.05	0.02	0.33	0.25	0.04	0.02	0.03	0.33	0.01	0.16	-1.99	0.00	0.00	0.22	0.00	0.00	0.02
14	-0.10	-0.05	-0.04	-0.11	0.11	0.10	-0.03	0.00	0.00	-0.02	-0.02	-0.02	0.00	-0.08	0.22	-0.02	0.11	-0.01	-0.04
15	-0.03	0.20	0.01	-0.04	0.23	0.18	0.01	0.01	0.02	-0.01	0.00	-0.01	0.01	1.40	-2.07	-0.01	0.11	0.00	-0.01
16	-0.13	-0.16	-0.06	-0.14	0.06	0.07	-0.04	0.00	0.00	0.30	-0.02	0.14	0.34	-0.06	-0.01	-0.24	0.00	-0.01	-0.06
17	-0.08	0.02	-0.02	-0.09	0.14	0.12	-0.01	0.01	0.01	-0.02	-0.01	-0.01	0.00	1.38	0.22	-0.02	-1.63	-0.01	-0.03
18	-0.07	0.05	-0.02	-0.08	0.16	0.13	-0.01	0.01	0.01	-0.02	-0.01	-0.01	0.00	-0.04	0.00	-0.02	0.00	-0.05	-0.03
19	-0.05	0.15	0.00	-0.06	0.20	0.16	0.00	0.01	0.02	-0.01	0.00	-0.01	0.01	-0.03	0.00	-0.02	0.00	0.00	-0.36

TABLE B.3 REGRESSION RESULTS FOR RURAL CONSUMPTION

The value of L is 0.51
The mu: 0.16 -0.65 -0.97
The nu:

nsec	title	G	S	P	C	T	I	lamb	share	IncEl	DInc	time%	PrEl	Err%	rho
1	Grains and products	1	0	1	1	1	1	-0.21	0.212	0.57	3.09	-0.37	-0.49	3.70	0.23
2	Meat and vegetables	1	0	1	1	1	1	-0.35	0.253	0.94	-0.27	0.52	-0.42	0.88	-0.14
3	Other food	1	0	1	1	1	1	-0.61	0.110	1.13	-0.36	2.62	-0.15	1.70	0.44
4	Clothing	2	0	1	1	1	1	1.02	0.080	0.95	-0.09	-2.73	-0.89	2.62	-0.13
5	Residence including fu	2	0	1	1	1	1	2.22	0.159	1.34	-0.57	-0.82	-1.72	1.97	-0.15
6	Household facilities,	2	0	1	1	1	1	1.38	0.056	2.09	-0.78	-3.24	-1.21	5.33	0.17
7	Medicines and medical	3	0	1	1	1	1	0.37	0.037	1.26	-0.48	0.66	-0.15	5.48	0.57
8	Traffic and communinca	3	0	1	1	1	1	1.91	0.019	0.17	5.67	4.20	-1.51	9.00	-0.15
9	Cultural, educational,	3	0	1	1	1	1	1.22	0.066	0.24	-1.93	5.28	-1.09	3.67	-0.03
10	Other commodity and se	3	0	1	1	1	1	7.87	0.008	0.58	2.60	-5.80	-7.34	17.83	-0.18

PRICE ELASTICITIES

The number in row i and column j is the elasticity of product i with respect to the price of product j.

	1	2	3	4	5	6	7	8	9	10
1	-0.49	-0.16	-0.13	0.06	0.32	0.07	0.01	0.03	0.07	0.06
2	-0.10	-0.42	-0.14	0.05	0.30	0.06	0.00	0.03	0.06	0.06
3	-0.16	-0.26	-0.15	0.03	0.26	0.04	-0.01	0.02	0.04	0.06
4	0.17	0.17	0.04	-0.89	0.52	0.09	0.05	0.05	0.15	0.07
5	0.43	0.47	0.18	0.16	-1.72	0.16	0.09	0.08	0.23	0.08
6	0.25	0.26	0.08	0.10	0.58	-1.21	0.06	0.06	0.17	0.08
7	0.03	0.00	-0.03	0.11	0.41	0.10	-0.15	-0.06	-0.31	0.07
8	0.36	0.39	0.14	0.23	0.66	0.18	-0.18	-1.51	-0.21	0.09
9	0.21	0.22	0.07	0.18	0.55	0.14	-0.20	-0.04	-1.09	0.08
10	1.62	1.91	0.80	0.71	1.61	0.51	0.04	0.08	0.19	-7.34

APPENDIX C. MUDAN SECTOR TITLES

59 I-O SECTORS

1	Farming
2	Forestry
3	Livestock
4	Fishing
5	Coal mining
6	Crude petroleum and natural gas production
7	Ferrous ore mining
8	Non-ferrous ore mining
9	Non-metal minerals, and mining n.e.c.
10	Logging and transport of timber and bamboo
11	Food process & manufacturing
12	Beverages
13	Tobacco manufacture
14	Textiles
15	Wearing apparel
16	Leather, fur and their products
17	Sawmills and bamboo etc. products
18	Furniture
19	Paper and paper products
20	Printing industries
21	Cultural, education, sports articles
22	Petroleum refineries and cooking products
23	Chemical industries
24	Medicines
25	Chemical fibbers
26	Rubber products
27	Plastic products
28	Building materials and other non-metallic mineral products
29	Primary iron and steel manufacturing
30	Primary non-ferrous metals manufacturing
31	Metal products
32	Machinery
33	Manufacturing and repair of railroad equipment
34	Manufacturing and repair of motor vehicles
35	Shipbuilding and repair of ships
36	Manufacturing and repair of aircraft
37	Manufacturing and repair of transportation equipment n.e.c.
38	Electric machinery and instrument
39	Electronic and communication equipment
40	Instrument, meters and other measuring equipment
41	Industries n.e.c
42	Electricity, steam and hot water production and supply
43	Gas production and supply
44	Production and supply of water
45	Construction
46	Railway transportation
47	Highway transportation
48	Water transportation
49	Air transportation
50	Pipeline transportation
51	Communications
52	Commerce
53	Restaurants
54	Finance and insurance
55	Real estate and social services
56	Health care, sports and social welfare
57	Education, culture, arts, radio, film and television
58	Scientific research and polytechnic services
59	Public administration and others

URBAN CONSUMPTION CATEGORIES

1 Grains and grain products
2 Meat and vegetables
3 Tobacco, liquor, tea and other beverages
4 Prepared foods
5 Clothing
6 Daily used articles
7 Audio and video equipment, paper, pen, etc.
8 Books, newspapers and magazines
9 Medical and health related goods
10 Fuels
11 Other goods
12 Rent
13 Water, gas and electricity
14 Education
15 Child care
16 Transportation
17 Postal and communication
18 Recreational activities
19 Other Services

RURAL CONSUMPTION CATEGORIES

1 Grains and grain products
2 Meat and vegetables
3 Other food
4 Clothing
5 Residence including fuel, rent, etc.
6 Household facilities, articles and services
7 Medicines and medical services
8 Traffic and communications
9 Cultural, educational, and recreational goods and services
10 Other commodity and services

INVESTMENT SECTORS

1 Agriculture
2 Coal mining
3 Crude petroleum and natural gas production
4 Ferrous ore mining
5 Non-ferrous ore mining
6 Non-metal minerals, and mining n.e.c.
7 Logging and transport of timber and bamboo
8 Food process & manufacturing
9 Beverages
10 Tobacco manufacture
11 Textiles
12 Wearing apparel
13 Leather, fur and their products
14 Sawmills and bamboo etc. products
15 Furniture
16 Paper and paper products
17 Printing industries
18 Cultural, education, sports articles
19 Petroleum refineries and cooking products
20 Chemical industries
21 Medicines
22 Chemical fibbers
23 Rubber products
24 Plastic products
25 Building materials and other non-metallic mineral products
26 Primary iron and steel manufacturing
27 Primary non-ferrous metals manufacturing
28 Metal products
29 Machinery
30 Transportation equipment
31 Electric machinery and instrument
32 Electronic and communication equipment
33 Instrument, meters and other measuring equip.
34 Industries n.e.c
35 Electricity, steam and hot water production and supply
36 Gas production and supply
37 Production and supply of water
38 Construction
39 Railway transportation
40 Highway transportation
41 Water transportation
42 Air transportation
43 Pipeline transportation
44 Communications
45 Commerce
46 Restaurants
47 Finance and insurance
48 Real estate management and social services
49 Health care, sports and social welfare
50 Education, culture, arts, radio, film and television
51 Scientific research and polytechnic services
52 Public administration and others
53 Commodity housing by SOUs
54 Investment by rural COUs
55 Urban individual investment
56 Rural individual investment
57 Investment by units of joint-ownership
58 Other fixed-asset investment

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