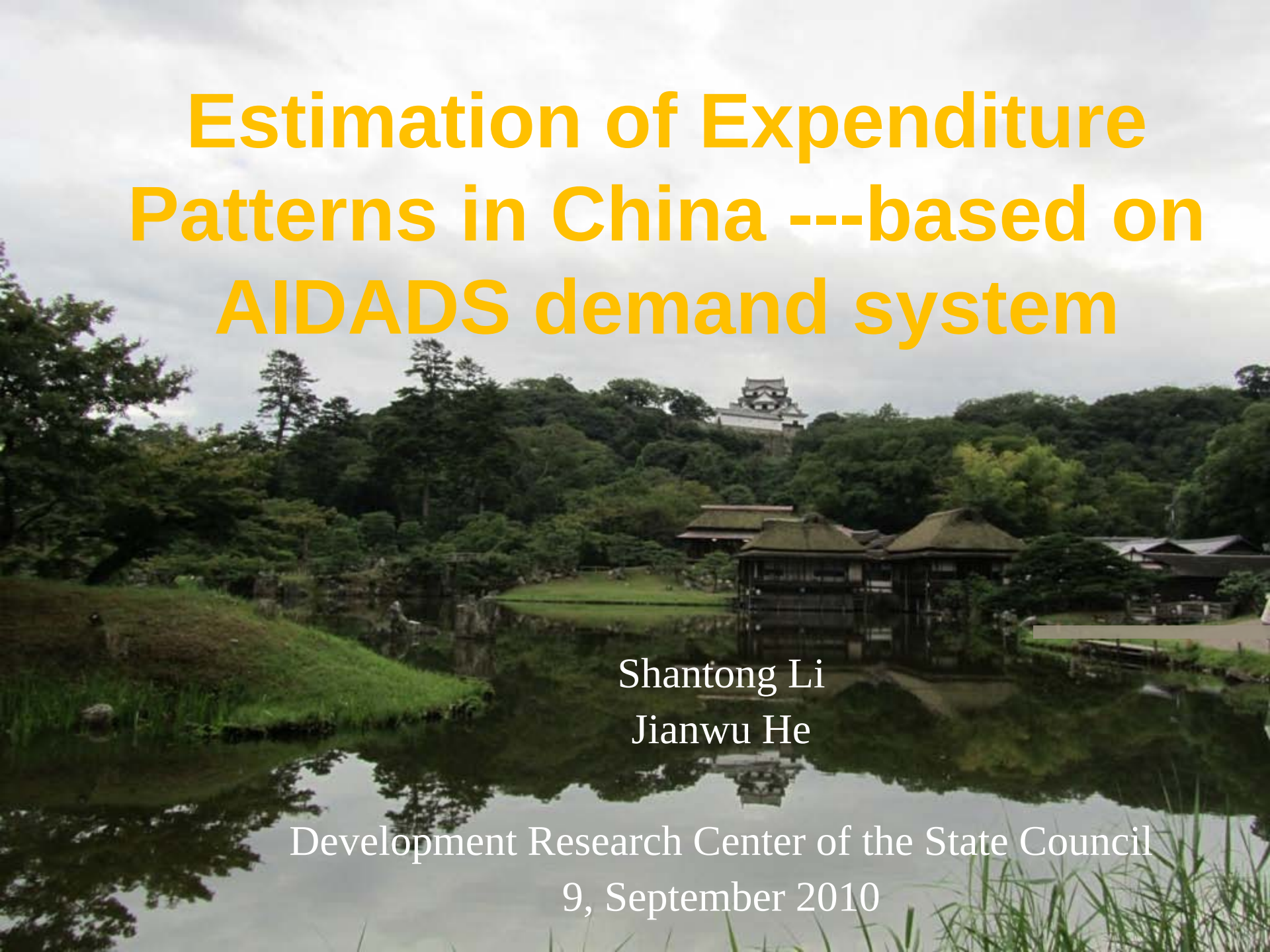
Estimation of Expenditure Patterns in China ---based on AIDADS demand system



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9, September 2010

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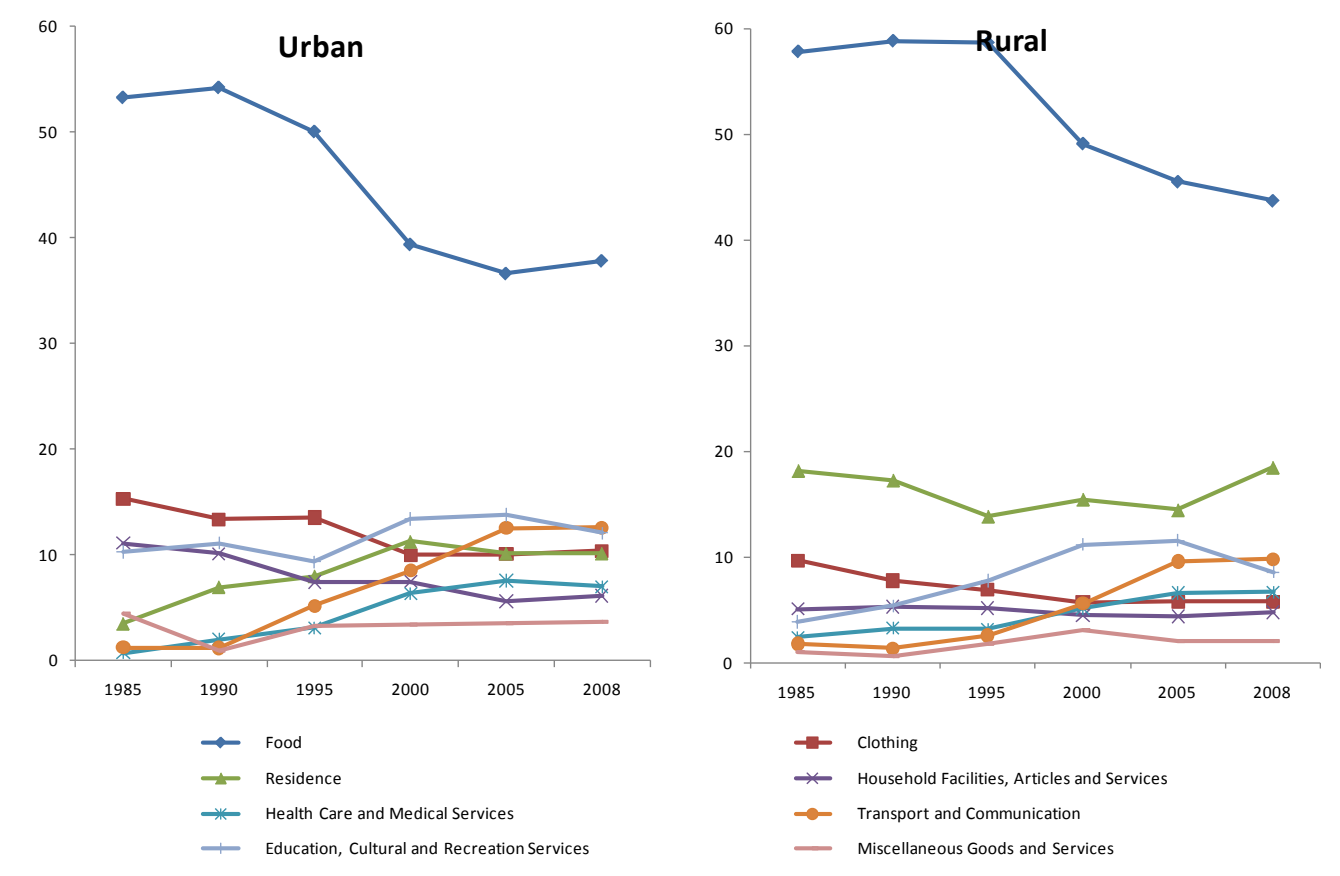
Motivation

- structure of expenditure has changed dramatically



Motivation

- Using international cross section data / national aggregate data
- One of the world's largest countries, with high income inequality

AIDADS demand system

- AIDADS --An Implicitly Directly Additive Demand System
- LES/ELES, CDE,CD, AIDS/QUAIDS, AIDADS
- Yu et al. (2000) compared three different demand specifications (LES, CD and AIDADS)
- Cranfield et al. (2003) assesses the ability of five structural demand systems to predict demand

AIDADS

$$\min \sum_{i}^{n} p_i x_i$$

$s.t$

$$\sum_{i=1}^{n}\left(\mu_i \ln\left(\frac{x_i-\gamma_i}{Ae^u}\right)\right)=1$$

$$\mu_i=\frac{\alpha_i+\beta_i e^u}{1+e^u}$$

$$\sum_{i=1}^{n}\alpha_i=\sum_{i=1}^{n}\beta_i=1$$

$$0\le\alpha_i,\beta_i\le 1$$

$$x_i=\gamma_i+\frac{\alpha_i+\beta_i e^u}{1+e^u}\frac{1}{p_i}\left(y-\sum_{i=1}^{n}p_i\gamma_i\right)$$

$$x_i=\gamma_i+\frac{\mu_i}{p_i}\left(y-\sum_{i=1}^{n}p_i\gamma_i\right)$$

LES

Follow the Maximum Likelihood estimation used in Cranfield et al.(2002)

$$\min \sum_{i}^{n-1} r_{ii}^{2}$$

$$s.t$$

$$T^{-1}\sum_{t=1}^{T} v_{it}v_{jt} = \sum_{k}^{n-1} r_{ki}r_{kj}, \quad \forall i \neq n,\ j \neq n, r_{kl} = 0 \ for\ all\ k > l$$

$$v_{it} = s_{it} - \hat{s}_{it}$$

$$\hat{s}_{it} = \frac{p_{it}\gamma_i}{y_t} + \frac{1}{y_t}\left(\frac{\alpha_i + \beta_i e^{u_t}}{1+e^{u_t}}\right)\left(y_t - \sum_{i=1}^{n} p_{it}\gamma_i\right)$$

Data Description

- ***China Household Income Project (CHIP)-2002***.
  - 6835 urban households samples from 12 provinces, including 3 eastern, 3 central and 3 western provinces of China.
  - Eight broad expenditure categories (food, clothes, home equipment, facilities and services, Health and medical expenditure, transportation and communication, entertainment, education and culture services, housing and the related and miscellaneous goods and services.)

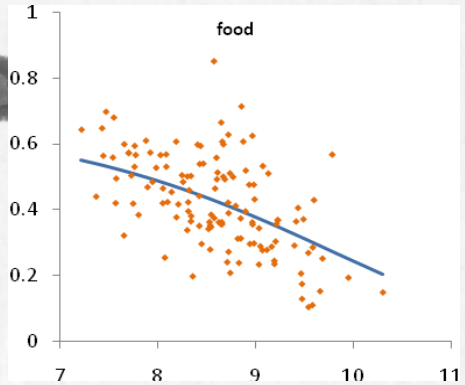
Data

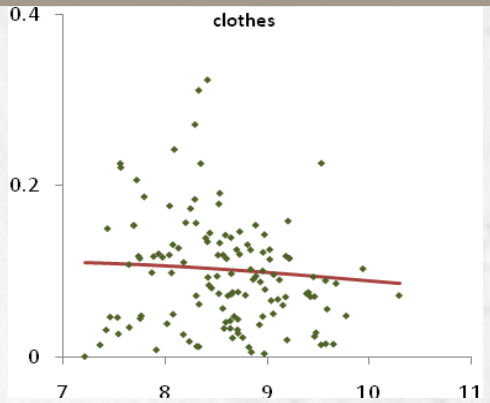
	consumptive expenditure (yuan)	food	clothes	home equipment, facilities and services	Health and medical expenditure	transportation and communication	education	housing and the related	entertainment, culture services and others
mean	6,279	0.425	0.102	0.056	0.067	0.092	0.133	0.095	0.030
st.dev	*4,479*	*0.139*	*0.068*	*0.065*	*0.089*	*0.068*	*0.122*	*0.085*	*0.034*
max	70,638	1.000	0.615	0.566	0.809	0.829	0.847	0.853	0.692
min	395	0.023	-	-	-	-	-	-	-

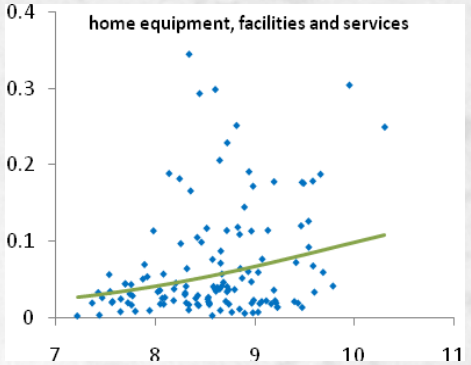
AIDADS estimation

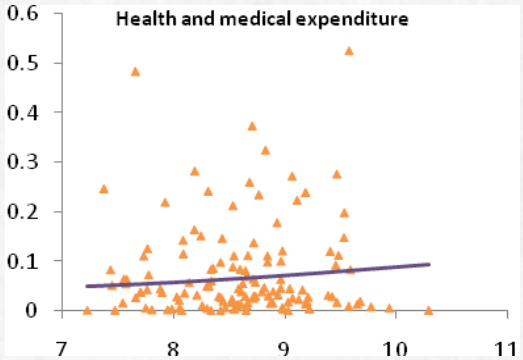
	food	clothes	home equipment, facilities and services	Health and medical expenditure	transportation and communication	education	housing and the related	entertainment, culture services and others
α	0.635	0.117	0.006	0.041	0.047	0.065	0.089	0.000
β	0.000	0.071	0.156	0.121	0.182	0.105	0.108	0.258
γ	15.626	0.000	0.000	0.000	0.000	0.000	1.500	0.000
η	0.714	0.918	1.472	1.216	1.268	1.097	1.036	1.528

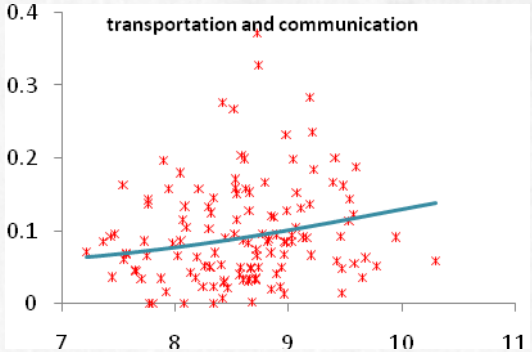
Observed and fitted budget share

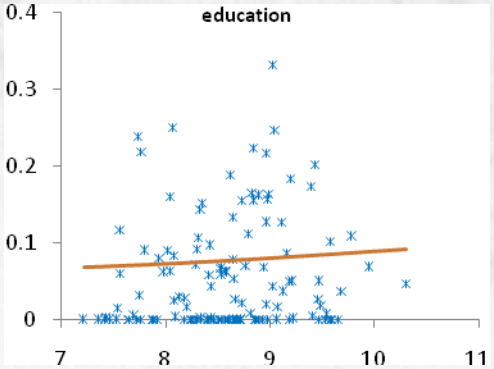


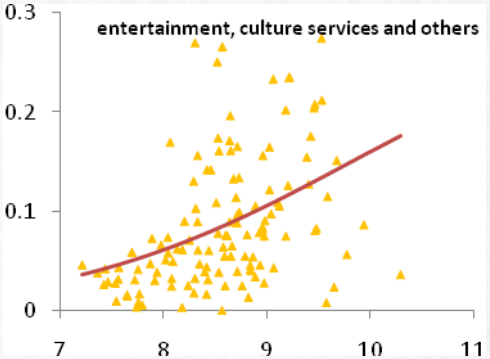




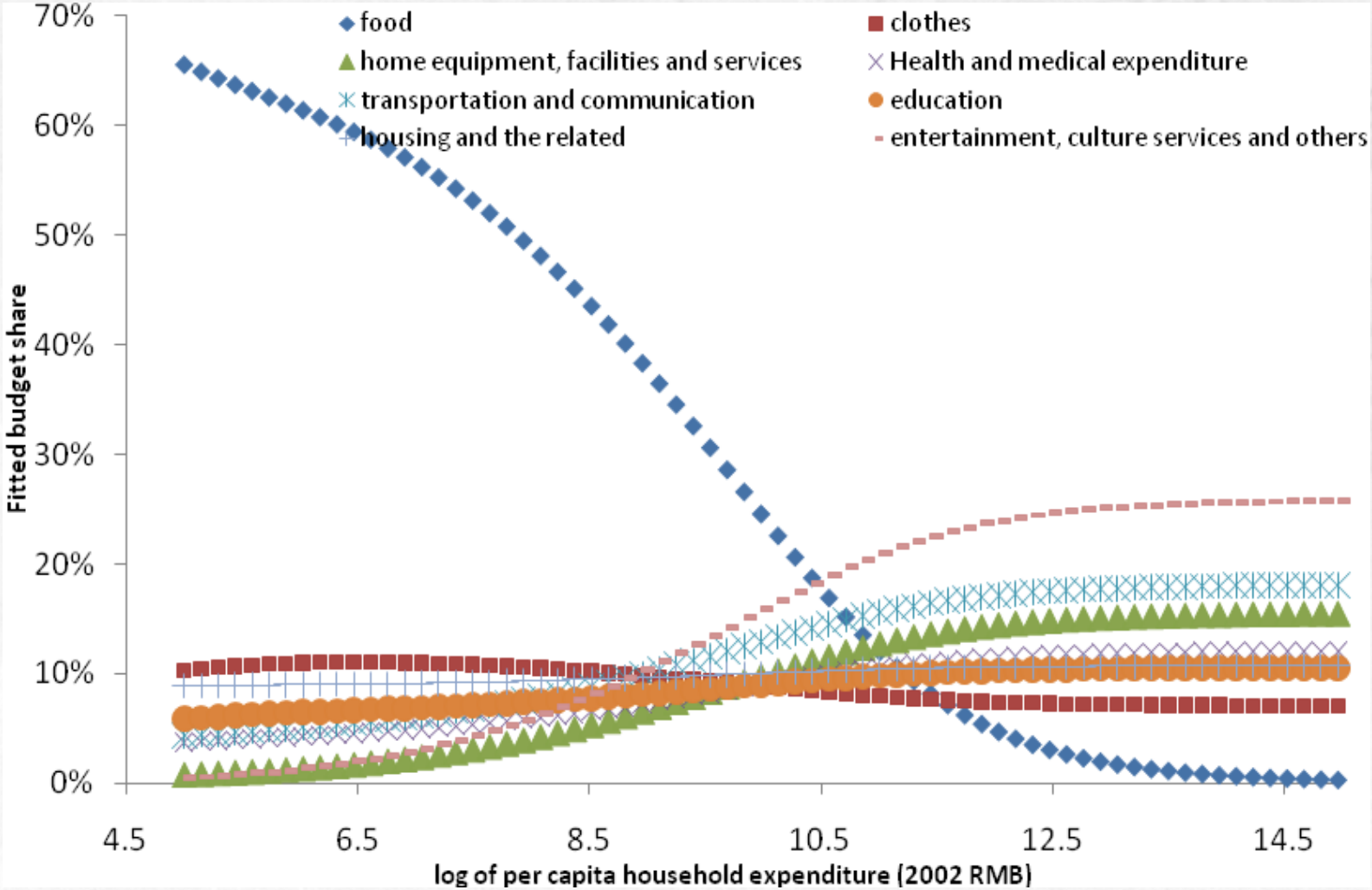








Fitted AIDADS budget share



Expenditure Elasticities

	food	clothes	home equipment, facilities and services	Health and medical expenditure	transportation and communication	education	housing and the related	entertainment, culture services and others
National Average	0.714	0.918	1.472	1.216	1.268	1.097	1.036	1.528
Beijing	0.618	0.901	1.418	1.216	1.260	1.102	1.039	1.456
Tianjin	0.685	0.912	1.455	1.217	1.267	1.100	1.037	1.504
Hebei	0.740	0.924	1.488	1.214	1.267	1.095	1.034	1.551
Shanxi	0.751	0.926	1.495	1.213	1.266	1.094	1.033	1.561
Inner Mongolia	0.746	0.925	1.492	1.213	1.267	1.094	1.034	1.557
Liaoning	0.733	0.922	1.483	1.215	1.267	1.096	1.035	1.544
Jilin	0.743	0.924	1.490	1.214	1.267	1.094	1.034	1.554
Heilongjiang	0.758	0.928	1.499	1.212	1.265	1.093	1.033	1.569
Shanghai	0.615	0.901	1.416	1.215	1.260	1.103	1.039	1.453
Jiangsu	0.714	0.918	1.472	1.216	1.268	1.097	1.036	1.527
Zhejiang	0.651	0.906	1.435	1.217	1.264	1.101	1.038	1.478
Anhui	0.750	0.926	1.494	1.213	1.266	1.094	1.033	1.560
Fujian	0.699	0.915	1.463	1.217	1.267	1.099	1.036	1.515
Jiangxi	0.756	0.928	1.498	1.212	1.266	1.093	1.033	1.566
Shandong	0.726	0.920	1.479	1.215	1.267	1.096	1.035	1.538
Henan	0.757	0.928	1.498	1.212	1.266	1.093	1.033	1.567
Hubei	0.725	0.920	1.479	1.215	1.267	1.096	1.035	1.537
Hunan	0.726	0.921	1.479	1.215	1.267	1.096	1.035	1.538
Guangdong	0.645	0.905	1.432	1.217	1.263	1.102	1.039	1.474
Guangxi	0.731	0.922	1.482	1.215	1.267	1.096	1.035	1.542
Hainan	0.730	0.921	1.481	1.215	1.267	1.096	1.035	1.541
Chongqing	0.706	0.916	1.467	1.217	1.267	1.098	1.036	1.520
Sichuan	0.731	0.922	1.482	1.215	1.267	1.096	1.035	1.542
Guizhou	0.754	0.927	1.497	1.212	1.266	1.093	1.033	1.564
Yunnan	0.720	0.919	1.475	1.216	1.267	1.097	1.035	1.532
Tibet	0.691	0.913	1.458	1.217	1.267	1.099	1.037	1.508
Shaanxi	0.732	0.922	1.483	1.215	1.267	1.096	1.035	1.543
Gansu	0.741	0.924	1.488	1.214	1.267	1.095	1.034	1.551
Qinghai	0.741	0.924	1.489	1.214	1.267	1.095	1.034	1.552
Ningxia	0.739	0.924	1.487	1.214	1.267	1.095	1.034	1.550
Xinjiang	0.725	0.920	1.478	1.215	1.267	1.096	1.035	1.537


Thanks!