Appendix[1]

A.1. Data source for estimates of real GDP

The data source for real GDP calculated using EKS and GK methods is the ICP 1996 data set. The real income analysis was conducted on a set of 117 countries (ICP countries + imputed values for China and India).We detected some irregularities in the ICP data, namely zero or negative PPPs for some countries, which would prevent the calculation of real quantities. As documented below, adjustments were made to the ICP PPPs to correct for these problems. Any adjustment to a PPP was matched by an adjustment to the corresponding ICP quantities to ensure that expenditure for the item was unchanged (except when the ICP quantity was zero).

Consumption PPPs

1. Negative PPPs were found for the item "Restaurants, Cafes and Hotels" for Egypt and Morocco. We assigned a positive sign to the original ICP PPPs (implicitly assuming the negative sign was an error). In general, the item "Restaurants, Cafes and Hotels" displays a peculiar pattern. All Caribbean countries have PPPs for this item that are close to zero, yielding extravagantly high real quantities. The same problem is found for some Middle East, African and Former Soviet Union countries (albeit, to a lesser extent). We decided to proxy this irregular data with the PPP for the item "Other Goods and Services" and readjust raw quantities.

2. PPPs for the item "Alcoholic beverages" were zero for the following 10 countries: Egypt, Lebanon, Yemen, Syria, Qatar, Jordan, Oman, Pakistan, Bahrain, Iran. These zero PPPs were replaced by the PPPs for the item "Other Food", which was deemed to be more consistent with "Alcoholic beverages" than "Non-Alcoholic Beverages". The same 10 countries also exhibit infinitesimally small quantity data for this item. Although one would expect low numbers for such countries, the close proximity of the quantities to zero was deemed suspicious. The quantity data was thus set to zero for these 10 countries.

3. PPPs for the item "Communication" were zero for the following 4 countries: Antigua & Barbuda, Grenada, St. Kitts & Nevis, St.Vincent & Grenadines. Since the ratio of the PPP for "Communication" to the nominal GDP PPP is approximately equal to 1 for most countries, we used nominal GDP PPP as a proxy for this item. Since the ICP quantity for this item for these countries was already zero, no corresponding quantity adjustment was made.

4. PPPs for the items "Personal Transport", "Operation of Transportation Equipment" and "Machinery and Equipment" were zero for Mongolia. They were replaced by the PPPs for the items "Purchased Transport Services" and "Construction", respectively. Since raw quantities were also zero, no corresponding quantity adjustment was made.

[1]This is the data appendix to "Measuring Global Poverty: Why PPP Methods Matter", by Robert Ackland, Steve Dowrick and Benoit Freyens. Version: 7th July, 2007

Investment PPPs

PPPs for position "Changes in Stocks" were zero for the following 6 countries: Cameroon, Gabon, Madagascar, Mali, Senegal, Sierra Leone. They were replaced by the PPPs for the item "Machinery and Equipment". Since raw quantities were also zero, no quantity adjustment was made.

Nominal GDP Expenditures

It is recognised that the quantities for some GDP expenditure items such as "Net Foreign Balance" often take a negative value.[2] This poses a problem for the calculation of Geary-Khamis index numbers; since the GK system of equations assumes positive quantities, the solution of the system can only be computed over the positive orthant. Another problem is that we cannot take the log of negative expenditure data. We resolve this issue by removing the "Net Foreign Balance" data and apportioning the NFB quantity data over the other expenditures categories of GDP using relative budget share of other expenditure items as a weight (ie. adjusting all other expenditure categories so that GDP remains the same).

A.2. Income Distribution data

The income distribution data (Table A2) is from the Deininger-Squire 1996 (DS) income inequality database[3], updated where possible by the income quintiles published by the World Bank in the World Development Indicators 2003 (WDI)[4]. Since the reference year in the study is 1996 (the most recent year for which ICP data is available), the quintile data was selected to be as close to 1996 as possible. For instance, for Bulgaria, the 1993 DS data was preferred to the 2001 WDI data. Starting from the original 115 ICP countries plus India and China; 14 countries (Congo, Antigua & Barbuda, Belize, Bermuda, Dominica, Grenada, St. Kitts & Nevis, St.Vincent & Grenadines, Bahrain, Oman, Qatar, Syria, Iceland and Albania) had to be dropped out of the analysis because no quintile information was provided in either data set. Six more countries (Benin, Gabon, Fiji, Barbados, Argentina and Lebanon) were dropped as their quintile information was considered either too old (Gabon 1977, Barbados 1979) to be a reasonable proxy for 1996 distribution or because the data was marked as unreliable in the DS database (Argentina: estimate based on surveys of less than full national coverage, Benin, Fiji and Lebanon: unclear sources) or both.

The poverty analysis was therefore conducted on a reduced set of 97 countries. The WDI data usually provides a better 1996 proxy for most of the 97 countries. The countries not covered by WDI data (and hence covered by DS data) are: Mauritius, Tanzania, Bahamas, Bulgaria, Moldova, Estonia, Lithuania, Georgia, Kazakhstan and the Kyrgyz Republic. Finally, for Estonia, Mauritius and Tanzania, the quintile data is for expenditure rather than income.

[2]Handbook of the International Comparison Program, Annex II: Methods of Aggregation, United Nations, 2003. `http://unstats.un.org/unsd/methods/icp/ipc7_htm.htm`

[3]Deininger, K. and L. Squire (1996), "A New Data Set Measuring Income Inequality," *World Bank Economic Review*, 10(3), pp. 565-91.

[4]World Bank (2003), *World Development Indicators (WDI): 2003*, CD-ROM.

Table A1: Estimates of Real GDP *per capita* and Bias relative to the EKS index

	EKS	GK	PWT	GK Bias (%)	PWT Bias (%)
Tanzania	466	506	471	9	1
Yemen	580	860	802	48	38
Malawi	635	847	718	33	13
Mali	740	962	812	30	10
Sierra Leone	758	1217	921	61	21
Madagascar	782	913	799	17	2
Nigeria	814	956	926	17	14
Zambia	834	924	838	11	1
Tajikistan	875	1215	986	39	13
Benin*	935	1144	1107	22	18
Nepal	1100	1501	1272	36	16
Kenya	1139	1381	1269	21	11
Mongolia	1231	1300	1268	6	3
Congo, Republic of*	1304	1540	1729	18	33
Bangladesh	1381	1525	1506	10	9
Senegal	1415	1753	1478	24	4
Vietnam	1459	1734	1652	19	13
Moldova	1599	2214	2264	38	42
Azerbaijan	1755	2193	2047	25	17
Cameroon	1771	2468	1895	39	7
Armenia	1852	2410	2393	30	29
Cote d'Ivoire	1858	2499	1959	35	5
Pakistan	1859	2021	1952	9	5
Kyrgyzstan	1915	2453	2596	28	36
Uzbekistan	2064	2813	2804	36	36
Guinea	2071	3088	2708	49	31
Bolivia	2399	2704	2642	13	10
Albania*	2639	2996	3071	14	16
Jordan	2773	3594	3748	30	35
Syria*	2803	3501	3971	25	42
Sri Lanka	3039	3401	3201	12	5
Zimbabwe	3062	3768	2860	23	-7
Georgia	3078	4197	4479	36	46
Ukraine	3261	4310	4403	32	35
Ecuador	3341	3681	3863	10	16
Lebanon*	3420	5187	4927	52	44
Jamaica	3449	4278	3804	24	10
Egypt	3538	4591	3700	30	5
Philippines	3551	3841	3122	8	-12
Turkmenistan	3571	4395	4533	23	27
Indonesia	3668	4461	3891	22	6
Macedonia	3834	4251	4571	11	19
Morocco	3923	4846	3808	24	-3
St.Vincent & Grenadines*	3934	5614	6432	43	63
Swaziland	4479	5756	5175	28	16

Table A1: (cont.)

	EKS	GK	PWT	GK Bias (%)	PWT Bias (%)
Kazakhstan	4557	5804	5882	27	29
Dominica*	4570	6594	6904	44	51
Bulgaria	4763	5774	5893	21	24
Belize*	4817	5834	6199	21	29
Peru	4859	5287	4434	9	-9
Fiji*	4883	5452	5282	12	8
Belarus	4947	6308	5667	28	15
Grenada*	5148	6914	5016	34	-3
Latvia	5154	6208	6194	20	20
St. Lucia	5283	6360	6268	20	19
Iran	5538	6039	5333	9	-4
Lithuania	5771	6637	6495	15	13
Panama	5799	6174	5671	6	-2
Romania	5857	6572	4984	12	-15
Croatia	6094	6926	7428	14	22
Tunisia	6185	8351	5830	35	-6
Venezuela	6221	7467	6916	20	11
Turkey	6443	6837	6424	6	0
Russia	6669	7729	7107	16	7
Estonia	6856	7635	7510	11	10
Gabon*	6951	10056	8860	45	27
Botswana	6981	7741	6071	11	-13
Thailand	7144	8247	7094	15	-1
Brazil	7301	8320	6881	14	-6
Poland	7411	8245	7713	11	4
Trinidad & Tobago	7578	9853	9482	30	25
Mexico	7640	8020	7344	5	-4
Antigua*	8744	11049	12923	26	48
Chile	8849	9489	8972	7	1
Uruguay	8859	10116	9285	14	5
St. Kitts & Nevis*	8926	10725	11662	20	31
Slovak Republic	9307	10109	9993	9	7
Hungary	9877	10778	8708	9	-12
Oman*	10168	14493	16668	43	64
Bahrain *	10387	12900	13261	24	28
Mauritius	10978	15190	11808	38	8
Argentina*	11053	12052	10672	9	-3
Barbados*	12543	21798	14608	74	16
Czech Republic	13261	14129	13458	7	1
Slovenia	13747	13920	13152	1	-4
Greece	14166	14522	12751	3	-10
Portugal	14451	14641	13523	1	-6
Bahamas	15023	18512	16527	23	10
Korea, Republic of	15616	16915	14320	8	-8
Qatar*	16142	20380	19844	26	23
Spain	16532	16977	15535	3	-6
Israel	17927	18241	16464	2	-8

Table A1: (cont.)

	EKS	GK	PWT	GK Bias (%)	PWT Bias (%)
New Zealand	18252	18080	17707	-1	-3
Ireland	20159	20397	18494	1	-8
Finland	20416	20508	19489	0	-5
Sweden	20873	21039	20865	1	0
United Kingdom	20916	20966	20066	0	-4
Bermuda*	21066	25345	18793	20	-11
France	21627	21950	20228	1	-6
Italy	22244	22910	20475	3	-8
Netherlands	22569	22685	21431	1	-5
Germany	22599	22897	21119	1	-7
Australia	23402	23348	22835	0	-2
Canada	23508	24062	23091	2	-2
Belgium	23589	23764	21101	1	-11
Austria	23787	23836	21399	0	-10
Iceland*	25070	25411	21476	1	-14
Japan	25808	26710	24047	3	-7
Denmark	26331	26619	24087	1	-9
Switzerland	26661	27359	24460	3	-8
Hong Kong	26739	30998	25994	16	-3
Norway	27537	27890	24937	1	-9
Singapore	27774	31660	24939	14	-10
USA	29194	29194	29194	0	0
Luxembourg	35926	36501	35144	2	-2

Source: Real GDP and population are from the Penn World Table 6.1 (`http://pwt.econ.upenn.edu/`). * - dropped from poverty analysis because of either missing or unreliable quintile data.

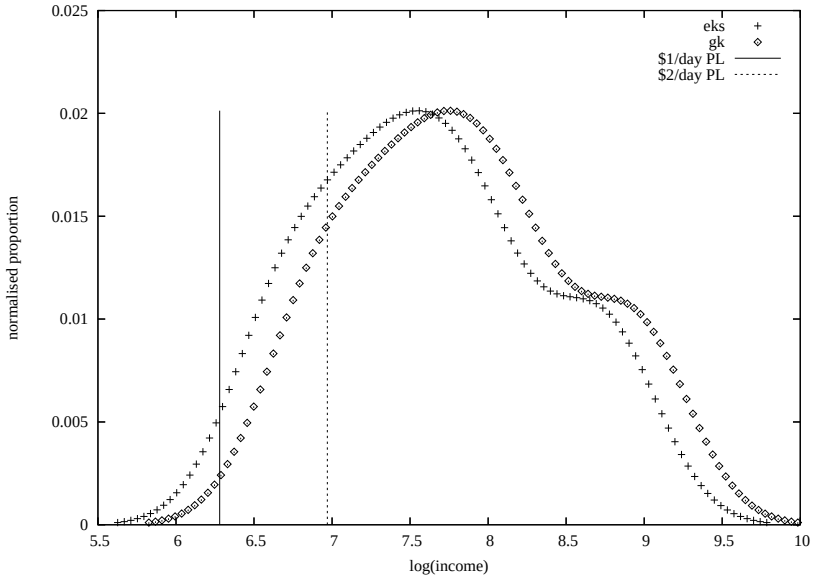

Figure A.1: Estimated income density function, China

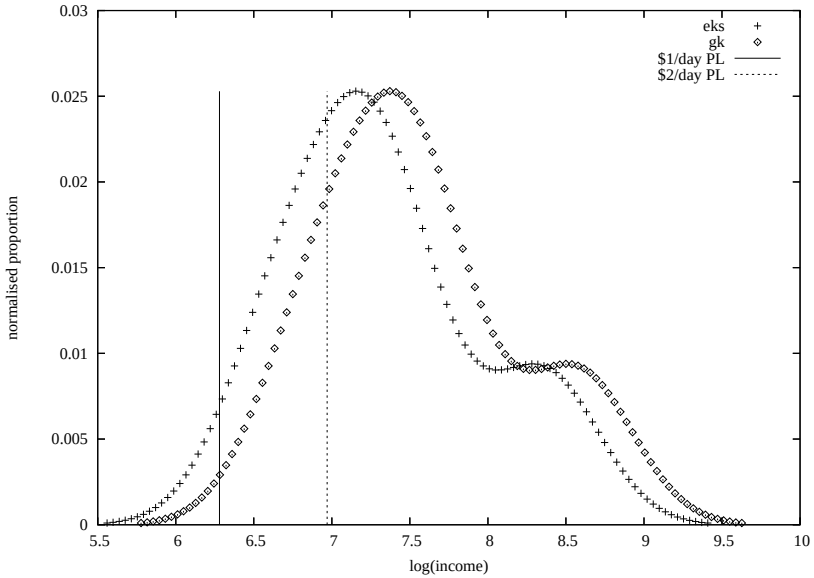

Figure A.2: Estimated income density function, India

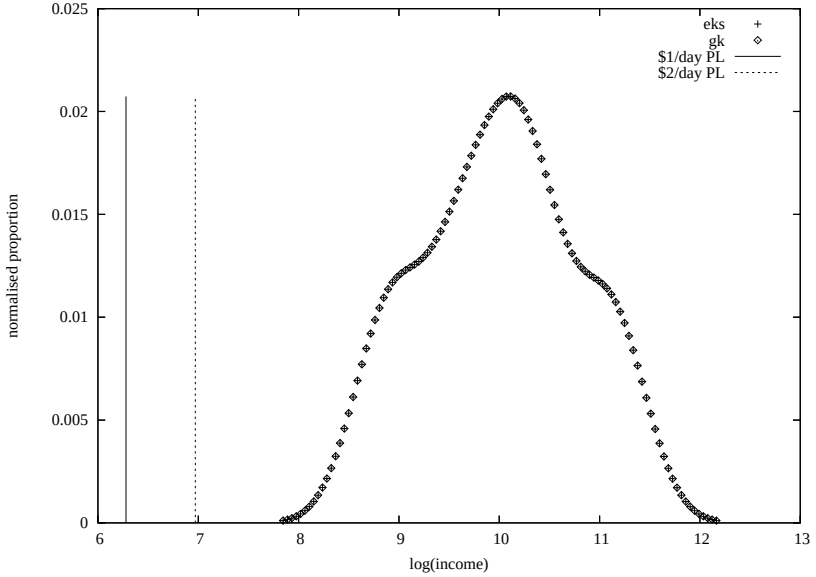

Figure A.3: Estimated income density function, USA

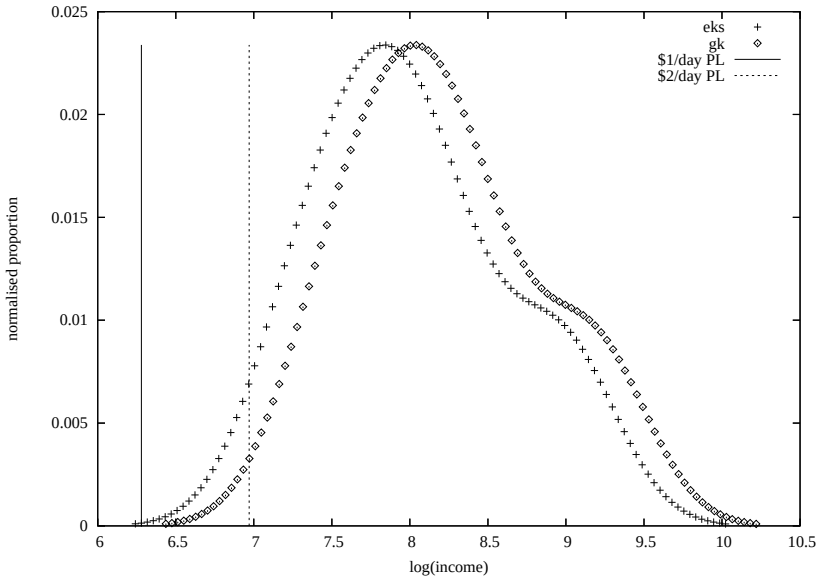

Figure A.4: Estimated income density function, Indonesia

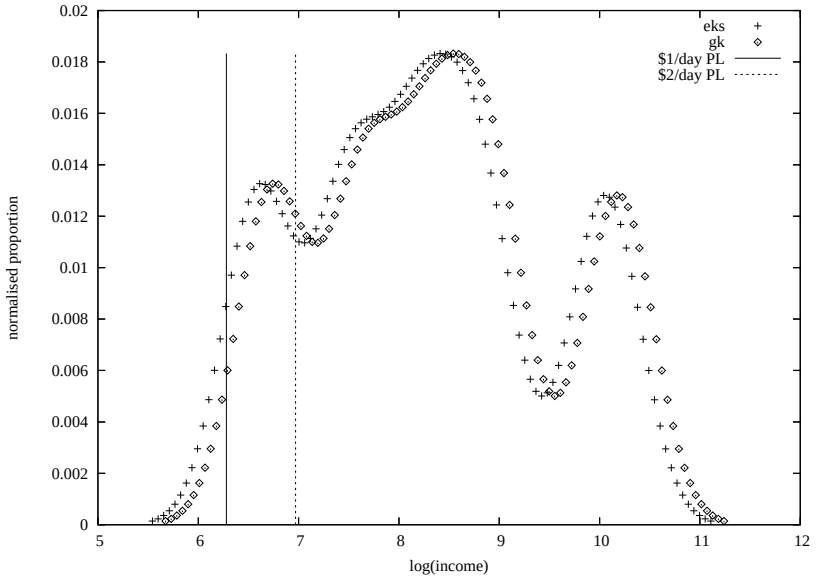

Figure A.5: Estimated income density function, Brazil

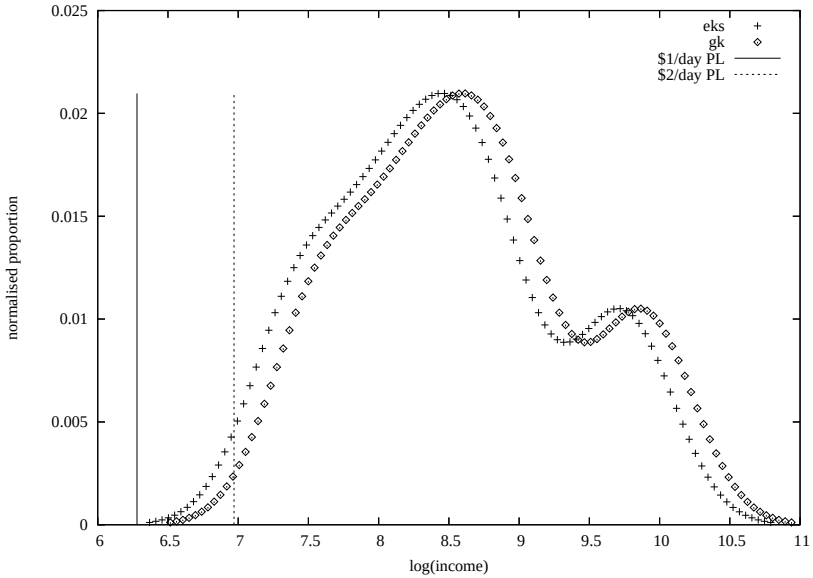

Figure A.6: Estimated income density function, Russia

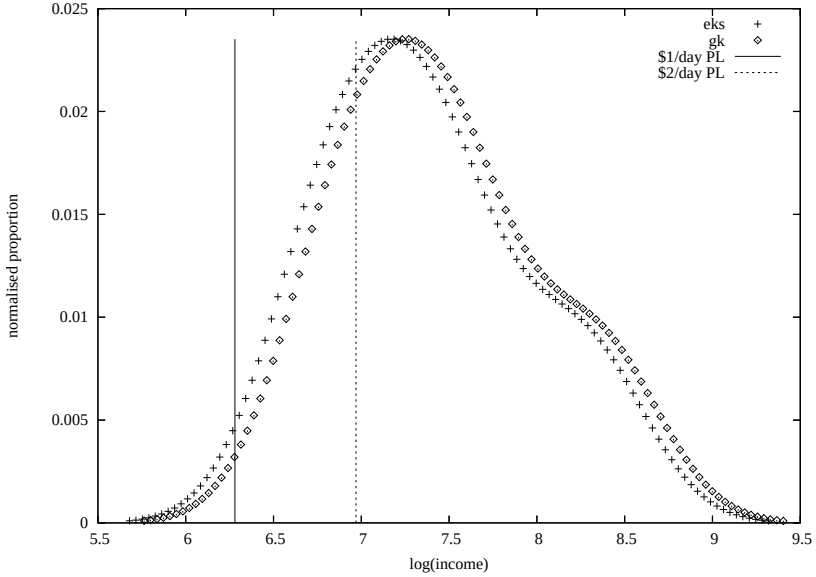

Figure A.7: Estimated income density function, Pakistan

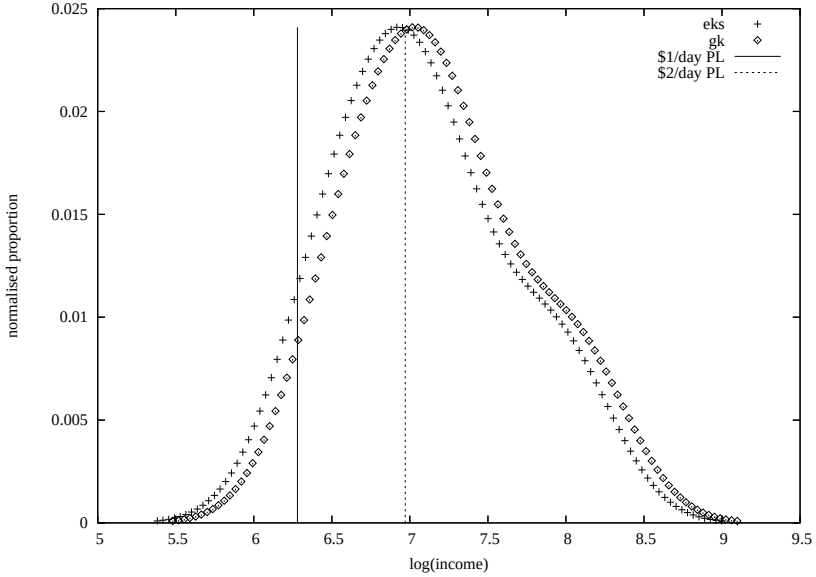

Figure A.8: Estimated income density function, Bangladesh

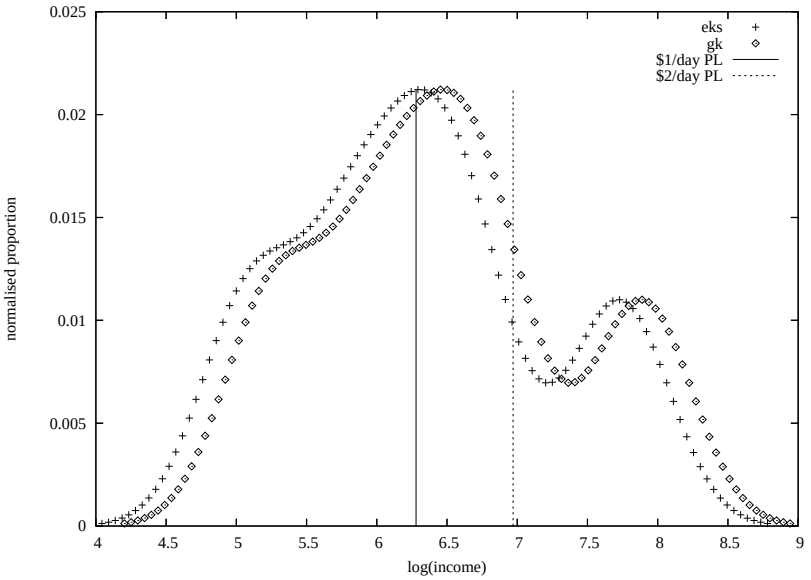

Figure A.9: Estimated income density function, Nigeria

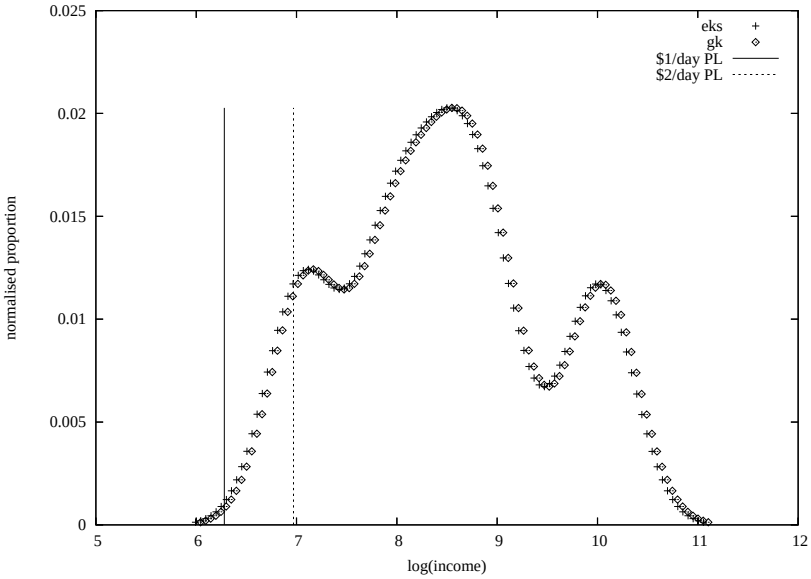

Figure A.10: Estimated income density function, Mexico