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SUPPLEMENTARY INFORMATION

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Large inequality in international and intranational energy footprints between income groups and across consumption categories

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Large inequality in international and intranational energy footprints between income groups and across consumption categories

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Supplementary Note 1

Supplementary Table 1: Data applied

Real world system	Data representation	Spatial scope	Temporal scope	Income granularity	Sectoral granularity
Household Expenditure South/Developing/Emerging	The Global Consumption Database (GCD) by the World Bank	92 countries	2010	4 income groups	87 Consumption Categories
Household Expenditure North/Developed	The Eurostat data tables on household expenditure patterns	30 countries	2010	Quintiles	41 Consumption Categories
Supply Chains	The Global Trade Analysis Project – GTAP	140 regions	2011	/	57 industries
Energy System	IEA Energy Balances from the UK data service (UK Data Service, 2018)	142 countries	2011	/	26 industries
Overall		**86 countries**	**2011**	**mixed**	**reduced**

Supplementary Table 2: Country coverage and sample description

Name data	Sample size	Income resolution	Temporal scope	% of Global GDP 2011 in GTAP	% of Global Population 2010	Countries covered
Global Consumption database (GCD)	N = 56	4 income segments	2010	~ 30%	~ 70%	Albania, Armenia, Azerbaijan, Bangladesh, Belarus, Benin, Bolivia, Brazil, Burkina Faso ,Cambodia, Cameroon, China, Colombia, Cote d'Ivoire, Egypt, El Salvador, Ethiopia, Ghana, Guatemala, Guinea, Honduras, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lao PDR, Madagascar, Malawi, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Nigeria, Pakistan, Paraguay, Peru, Philippines, Russia, Rwanda, Senegal, South Africa, Sri Lanka, Tanzania, Thailand, Togo, Uganda, Ukraine, Vietnam, Zambia
Eurostat Household budget surveys	N = 30	Quintiles	2010	~26%	~ 8.4%	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Germany, Denmark, Estonia, Spain ,Finland, France, Greece, Croatia, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, Turkey, United Kingdom
Added together	N = 86	/	2011, since the GTAP is 2011	~56%	~ 78.4%	Union of above

Supplementary Note 2

Scaling up expenditure volumes: Initially both databases come in the form of “micro-level” surveys which is a sample of households from each country stating their yearly expenditures. They do not initially display the national expenditure volume per income class per product in each country. They display expenditure per household in the case of Eurostat and per capita in the case of the Global Consumption database. This is why these surveys have to be scaled up to national volume.

In terms of the Eurostat two preparatory steps are necessary. The expenditure data in the Eurostat database comes for 30 countries in a unit called “parts per mille” that is the same as percentage wise proportions of expenditure per COICOP category. Another data table called “Mean household expenditure across income quintile and COICOP category” delivers the actual spend volume of an average household. The mean expenditure comes in the unit “Purchasing Power Standard (PPS) per household” which is an international exchange rate with respect to the Euro. This average total expenditure volume then had to be distributed via the proportions. In order to scale up the expenditure volumes to national level the number of households per country is needed. In Eurostat this number is given via the data-table called “Conventional dwellings by occupancy status, type of building and NUTS 3 region (cens_11dwob_r3)”.

Scaling up the Eurostat survey results to national level happens via the following simple calculation:

$$E_{i,j,k} = S_{i,j,k} \times M_{i,j,k} \times \ HH_{j,k}$$

where E is the total expenditure volume per country, S is the spend proportion given per product, M the mean total expenditure volume per household and HH the number of households in each country. The indices stand for:

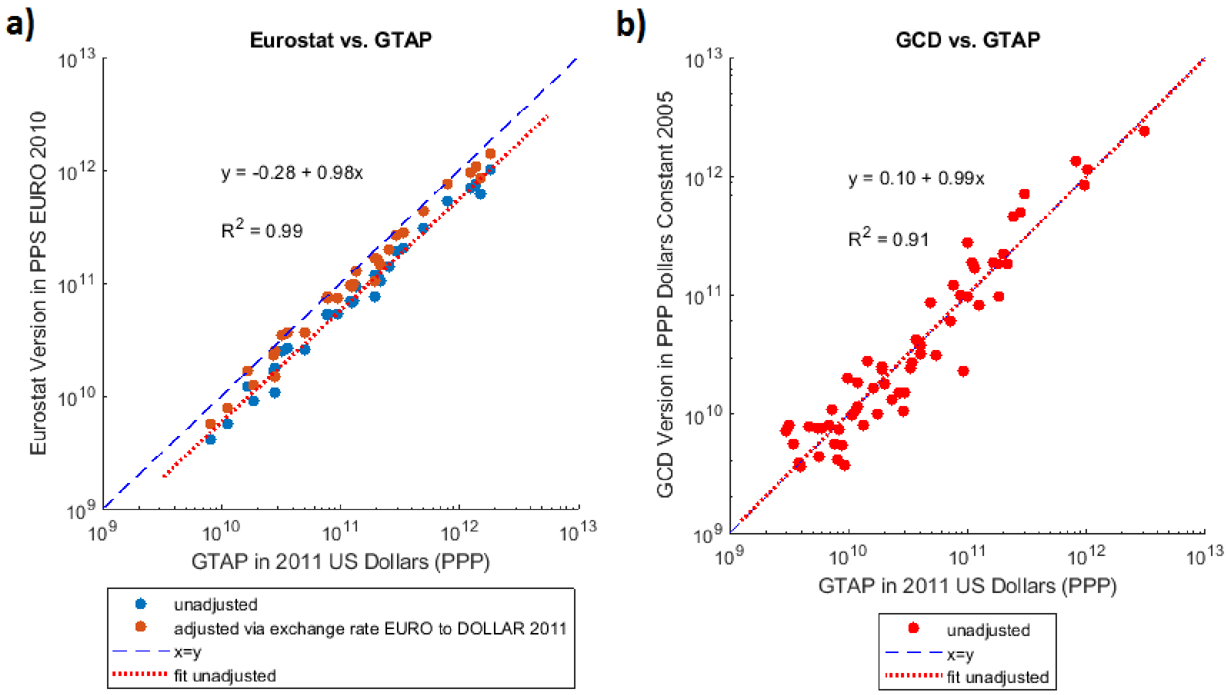
i = Product

j = Income Quintile

k = country.

The GCD comes in a different initial format. There is expenditure data per capita available. This per capita value can then be multiplied (scaled up) via the population in each country in order to arrive at national volumes.

Important is that the resulting volumes make sense. Since we do not have final household consumption per income group in the GTAP, we must compare the national expenditure volume from Eurostat and GCD to GTAP. Figure 6 demonstrates the results. It is clearly visible that despite smaller deviations the volumes coming from the GTAP (x axes) are consistently similar to the calculated volumes coming from Eurostat and GCD (y axes).



Supplementary Figure 1: Comparing final household expenditure in GTAP, Eurostat and GCD

The Eurostat volumes are systematically somewhat smaller very similar. The comparison of the respective results with the GTAP is not as accurate and systematic as the one with Eurostat. Yet, the results fall into a reasonable range with none leaving the corresponding order of magnitude they should be in according to the GTAP model. This is what figure 1 (b) shows.

There are, moreover, five countries available that occur in both expenditure databases, Eurostat and GCD. These are:

1) Latvia

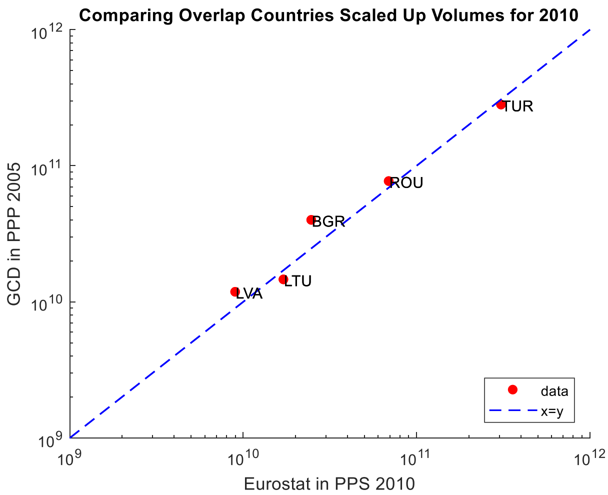
2) Lithuania

3) Bulgaria

4) Romania

5) Turkey

Conveniently, we can also compare both methods to scale up the surveys on the basis of these five countries. The results here are very similar which is a strong indication for the underlying empirical quality of the surveys and supports both methods to scale up to national level. Note however that two different currency units are at work here. Once USD PPP at constant prices with reference to 2005 and once Euro PPS version with 2010 as reference. However since both units are meant to capture physical trade volumes for the same year, 2010, the comparison is appropriate.



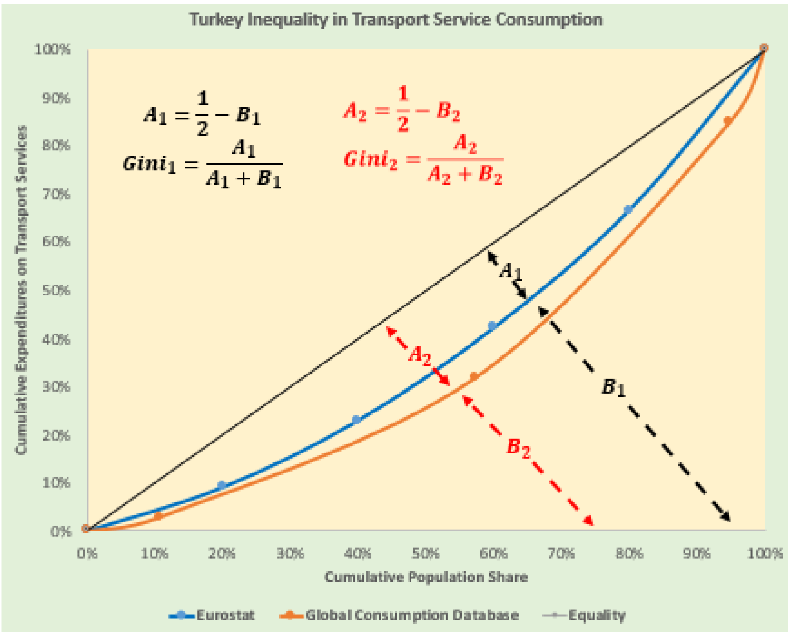
Supplementary Figure 2: Expenditure volume comparison for the Eurostat and GCD overlap. In general, we can note that the data relates well to each other.

Supplementary Note 3

Comparing inequality systematics in Global consumption database vs. Eurostat: The World Bank data is segmented into four invariable income groups across all countries:

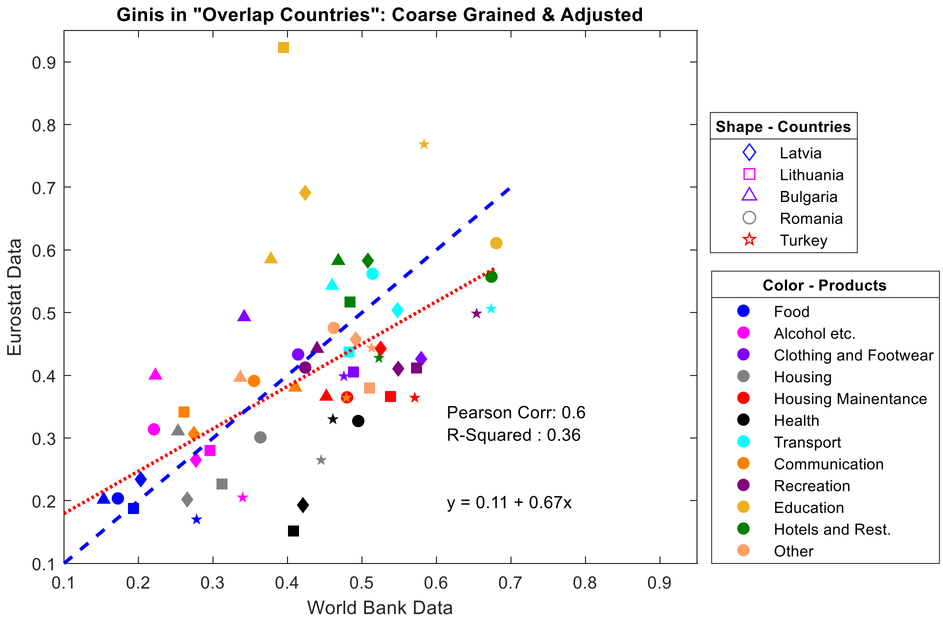
- Lowest—below \$2.97 per capita a day
- Low—between \$2.97 and \$8.44 per capita a day
- Middle—between \$8.44 and \$23.03 per capita a day
- Higher—above \$23.03 per capita a day.

The Eurostat data on the other hand comes divided into quintiles for each country, thus the thresholds for the five cut-off points vary with each country. The Eurostat version is usually the one better to investigate inequality and distributional issues because it preserves the necessary properties for computing inequality metrics, such as scale independence, population independence etc[2]. The World Bank systematic violates these principles but since a significant amount of our data is based on it, we investigated to what extent it does so. We compared the Lorenz Curves and corresponding Gini coefficients for the "overlap countries" that is the five countries that occur in both data bases: Turkey, Latvia, Lithuania, Bulgaria and Romania. Supplementary Figure 3 displays how a direct comparison between the two databases for a specific product group can look like. It displays the Lorenz Curve for expenditures in the COICOP category Transport Services based on the Eurostat data (blue) vs. based on the GCD data (orange). Both curves are very similar with the inequality in the second Lorenz Curve a bit more pronounced. Supplementary Figure 4 on the other hand illustrates the results for all five overlap countries and 12 aggregated COICOP product groups. One sees that the results are systematic for all groups except education. We see product groups pretty much gathering around the x=y line that is Food, Alcohol etc., Clothing, Transport, Hotels and Restaurants. Some fall systematically below that line which means they tend to exhibit higher inequality in the World Bank data e.g. Housing and Housing Maintenance as well as Health.



Supplementary Figure 3: Comparing Lorenz Curves of Gini Coefficients.

Why is education in **Supplementary Figure 4** diverging so far from the x = y line as well as from the model fit? The definition of what has been measured in the GCD surveys is stated as "*Education this group covers educational services only. It does not include expenditures on educational materials, such as books and stationery, or education support services, such as healthcare services, transport services, catering services and accommodation services. It includes education by radio or television broadcasting.*" The definition is similar for the Eurostat data. Thus, we have to assume that most likely it is due to differences in the applied surveys. We apply the Gini small sample correction by Deltas 2003.



Supplementary Figure 4: Comparing Gini Coefficients World Bank Systematics vs. Eurostat Systematics

Supplementary Note 4

Supplementary Table 3: Mapping COICOP to GTAP: Correspondence to the International Standard Industrial Classification of Economic Activities Revision 3.1 (ISIC Rev. 3.1) is used to map the COICOP to GTAP. For a full list of the GTAP sectors please consult https://www.gtap.agecon.purdue.edu/databases/contribute/detailedsector.asp.

COICOP ID 1999	Category	GTAP sectors associated
1.1	Food	1,2,3,4,5,6,8,9,10,11,14,19,20,21,22,23,24,25,26
1.2	Non-alcoholic beverages	8,25,26
2.1	Alcoholic beverages	26
2.2	Tobacco	26
2.3	Narcotics	8,25
3.1	Clothing	7,12,27,28,31,33,37,42,47,54,55
3.2	Footwear	27,29,47,54,55
4.1, 4.2	Actual rentals for housing, Imputed rentals for housing	47,54,57
4.3	Maintenance and repair of the dwelling	30,31,33,34,37,42,46,54,56
4.4	Water supply and miscellaneous services relating to the dwelling	41,45,54,56
4.5	Electricity, gas and other fuels	13,15,16,17,32,33,37,43,44
5.1	Furniture and furnishings, carpets and other floor coverings	13,27,28,29,30,31,33,36,37,41,42,46,47
5.2	Household textiles	27,30,33,42,47
5.3	Household appliances	13,27,37,41,46,47,54
5.4	Glassware, tableware and household utensils	13,29,30,33,34,37,41,42,47
5.5	Tools and equipment for house and garden	13,30,33,37,39,41,47,54
5.6	Goods and services for routine household maintenance	13,27,29,30,31,32,33,36,37,41,42,54,55
6.1	Medical products, appliances and equipment	33,39,41
6.2	Outpatient services	54,55,56
6.3	Hospital services	56
7.1	Purchase of vehicles	35,36,38,39
7.2	Operation of personal transport equipment	32,33,34,37,38,39,40,41,47,48,49,54,56
7.3	Transport services	35,48,49,50
8.1	Postal services	51
8.2	Telephone and telefax equipment	40
8.3	Telephone and telefax services	51,54
9.1	Audio-visual, photographic and information processing equipment	31,33,40,41,46,47,54
9.2	Other major durables for recreation and culture	27,29,30,37,38,39,41,42,47,48,56
9.3	Other recreational items and equipment, gardens and pets	13,18,27,29,30,31,33,34,37,41,42,47,54,55,56
9.4	Recreational and cultural services	48,51,54,55,56
9.5	Newspapers, books and stationery	31,33,37,40,41,42
9.6	Package holidays	48,50
10.1,10.2,10.3,10.4,10.5	Education	56
11.1	Catering services	47
11.2	Accommodation services	47

12.1	Personal care	27,28,31,33,37,41,42,47,55
12.3	Personal effects n.e.c.	29,30,33,34,37,41,42,47
12.4	Social protection	56
12.5	Insurance	53
12.6	Financial services n.e.c.	52,54
12.7	Other services n.e.c.	47,52,54,56

Supplementary Note 5

Supplementary Table 4: IEA to GTAP mapping: Correspondence to the International Standard Industrial Classification of Economic Activities Revision 3.1 (ISIC Rev. 3.1) is used to map the IEA to GTAP as well.

IEA Sectors	GTAP Sectors associated (Names or IDs)
Iron and steel	Ferrous metals
Chemical and petrochemical	Petroleum, coal products Chemical, rubber, plastic products Ferrous metals
Non-ferrous metals	Petroleum, coal products Metals nec
Non-metallic minerals	Mineral products nec
Transport equipment	Motor vehicles and parts Transport equipment nec Machinery and equipment nec Manufactures nec
Machinery	Chemical, rubber, plastic products Metal products Motor vehicles and parts Transport equipment nec Electronic equipment Machinery and equipment nec Manufactures nec
Mining and quarrying	Coal Oil Gas Minerals nec Construction
Food and tobacco	1, 4, 8, 10, 12, 19-26, 33
Paper, pulp and printing	Textiles, Paper products, publishing Metal products Manufactures nec
Wood and wood products	Wood products Leather products Manufactures nec
Construction	Construction
Textile and leather	Textiles Wearing apparel Leather products Mineral products nec Motor vehicles and parts Manufactures nec
Non-specified (industry)	27-31, 33,34,37,39,41,42
Domestic aviation	Air transport
Road	Trade (direct/fuel and indirect way)
Rail	Transport nec
Pipeline transport	Transport nec Electricity Gas distribution
Domestic navigation	Water transport
Non-specified (transport)	Transport nec Recreational and other services
Residential	Gas manufacture and distribution (direct way/heating)
Commercial and public services	14,18,27,30-34,37-42, 51-56
Agriculture/forestry	1-13

Fishing	Fishing
Non-specified (other)	Public Administration, Defense, Education, Health
Zero energy dummy	Dwellings (because no energy associated with dwelling rents)

Supplementary Note 6

Aggregation of COICOP consumption categories: We have aggregated the COICOP consumption categories to a resolution of 14 categories for the main results. Supplementary Table 5 depicts precisely which COICOP categories we aggregated to the ones displayed in the main results.

We selected the aggregation based on what is the smallest common denominator between databases with the additional consideration of what yields the most useful insight: Where can we make useful distinctions between products and their energy intensity as well as their income elasticity of demand? Therefore, for example, wheat and rice might not be very different in terms of these properties. This is why we kept Food a general category. However, Package Holiday is fundamentally different to food commodities with respect to both aspects. Often these criteria coincide with a product being a significantly large share of energy footprints, for example in terms of Food, Vehicle Fuel or Heating and Electricity. Sometimes, however, as in the case of Package Holiday the overall contribution to the total energy footprint is not that large but our data allowed us to attain granularity and yield a useful distinction between low-income consumer and high-income consumers.

Supplementary Table 5: Aggregation mapping of consumption categories

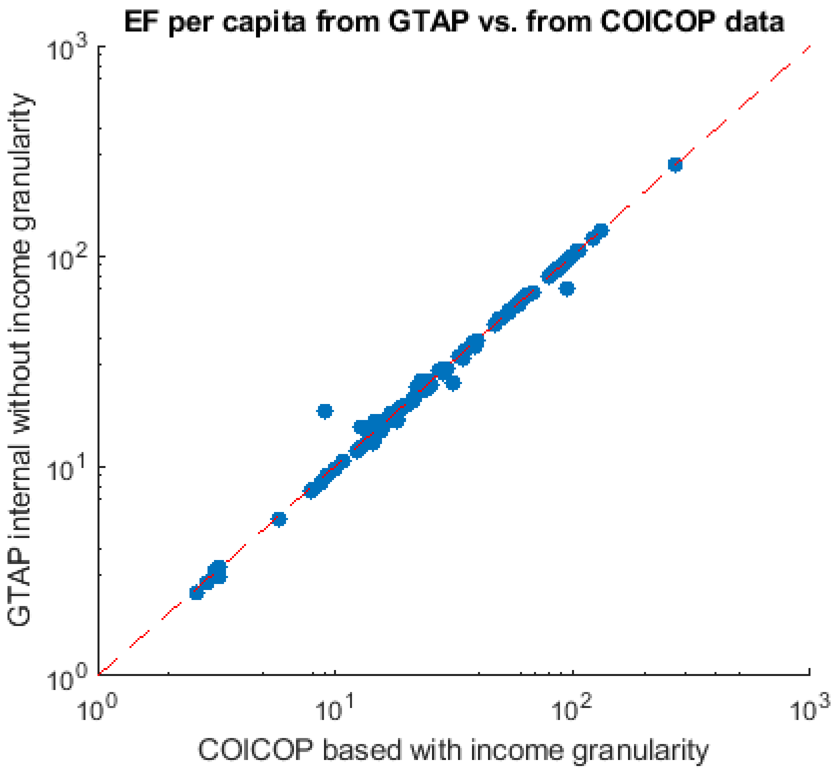
Consumption categories aimed at in our analysis	**COICOP Version 1999 IDs associated**
Food	01.1.2,01.1.3,01.1.4,01.1.5 01.1.6, 01.1.7, 01.1.8,01.1.9,01.2.1,01.2.2
Alcohol and Tobacco	02
Wearables	03
Other housing	04.1, 04.2, 04.3, 04.4
Heating & Electricity	04.5
Household Appliances and Services	05
Health	06
Vehicle Purchase	07.1
Fuel for own vehicles	07.2
Other transport (Land transport, Airtransport, Watertransport, Other transport modes)	07.3.1, 07.3.2, 07.3.3,07.3.4,07.3.5,07.3.6
Communication Tech. and Equip.	08, 09.1, 09.5
Recreational items	09.2, 09.3, 09.4
Package Holiday	09.6
Education & Finance & Other Luxury	10, 11, 12.1, 12.2, 12.3.1, 12.3.2, 12.4, 12.5, 12.6, 12.7

Supplementary Note 7

Computing energy-intensities and energy footprints: The national energy footprints are computed as detailed in the main method section "Input Output Modelling of Energy footprints". Potentially, there are three ways to compute energy intensities and derive the granular energy footprints per income group and COICOP category. All three possibilities are related to the fact that we use RAS balancing in order to translate between the COICOP expenditures and the ones in the GTAP.

1) One might divide the computed energy footprints per country and per COICOP category by the balanced expenditures, that is the column sum of C_i, in equation (7). This gives a set of energy intensities that if applied to the national level GTAP expenditures exactly reproduces the national energy footprints. The GTAP expenditures however are missing income granularity. This is why they have to be applied to the original expenditure coming from the databases in Eurostat and GCD. However, in this case the national energy footprints do not exactly match the ones produced by the GTAP.
2) Take the energy footprints and divide them by the balanced spends to attain energy intensities. This time also split up the balanced spends according to income group proportions in the original COICOP data. Then multiply with the energy intensities. This would work if the spends were 100% complete in the original COICOP data. However since there are some gaps, interpolations to distinguish income groups are necessary.
3) Take the energy footprints and divide them by the original COICOP expenditure to attain energy intensities and afterwards use these energy intensities to multiply them with the original and granular COICOP expenditure per income group and consumption category. This produces up to 99% the correct national footprints but also renders income granularity as found in the original household budget surveys. It only misses some minor portion of the entire energy footprints for a few countries because there are some gaps in the original expenditure data.

We applied option three because it almost perfectly captures national footprint volumes and on top of that, it preserves the original income granularity. Option one implies large trade-offs in terms of national footprints and option two does not capture the original expenditure distribution based on household budget surveys. **Supplementary Figure 5** illustrates how well the actual average national footprint per capita (y-axis) is reproduced by the approach No.3 (x-axis).



Supplementary Figure 5: National average energy footprints per capita. The figure depicts energy footprints computed according to approach No. 3) above (x-axis) vs. the national volumes computed via the GTAP (y-axis).

Only for four countries there are significant differences (here >|+/-10%|) in the energy footprints per capita. This is mostly because of missing expenditure data. These countries are listed in Supplementary Table 6.

Supplementary Table 6: Countries with significant differences in energy footprints due to different RAS balancing approaches. Based on granular approach vs. non-granular approach.

Name	GTAP ID	Average Energy footprint per capita (COICOP with granularity and gaps)	Average Energy footprint per capita (GTAP without granularity and gaps)	% difference
Honduras	44	9.02 GJ/yr	18.3 GJ/yr	-50.67%
Cyprus	56	93.85 GJ/yr	70.12 GJ/yr	+33.84%
Jordan	100	31.28 GJ/yr	25.06 GJ/yr	+24.81%
Benin	112	12.93 GJ/yr	15.34 GJ/yr	-15.70%

Supplementary Note 8

Elasticity to logistic regression to power-Law: We assume that energy footprints are a function of consumption and that consumption is a function of income. The latter is captured by the elasticity of demand which is defined as the percentage change of demanding a good, given a one percentage change in income[3,4] or formally

$$\epsilon = \frac{\frac{dQ}{Q}}{\frac{dI}{I}}. \qquad \text{Elasticity of Income}$$

These elasticities can be interpreted as the exponent of a power law. The crucial insight is that the derivative of the natural logarithm is equal to 1/x

$$\frac{d}{dx}\ln(x) = \frac{1}{x}$$

$$\mathrm{d}\ln(x) = \frac{dx}{x}.$$

Now the expression dx/x is similar to our percentage ratios in the definition of elasticity. Therefore it follows

$$\epsilon * \frac{dI}{I} = \frac{dQ}{Q}$$

$$\mathrm{d}\ln(Q) = \epsilon * \mathrm{d}\ln(I)$$

$$\ln(Q) + k = \epsilon * \ln(I) + c \qquad \text{Logistic Regression}$$

$$Q * e^k = I^\epsilon * e^c$$

$$Q = I^\epsilon * e^{c-k} \qquad \text{Power Law}$$

Set $e^{c-k} = a$, *Q = y, I = x, ϵ = b* and one arrives at

$$y = a * x^b$$

These power law relationships allow us to model the consumption of goods not only as function of income but determine either proportional, escalating, decaying or saturating behaviour. The "intermediate version" of a logistic regression model connects these concepts directly to the empirical data.

An interesting view on the connection between log-log regressions and their interpretations as elasticity comes also from "reasoning the other way around". Assume the general case of "logged" variables Y and X.

$$\log(Y) = a + \mathrm{b}\log(X)$$

$$\frac{d}{dX}\log(Y) = \frac{d}{dX}(a + \mathrm{b}\log(X))$$

$$\frac{dY}{dX}\frac{d}{dY}\log(Y) = \frac{d}{dX}(a + \mathrm{b}\log(X))$$

$$\frac{dY}{dX}\frac{1}{Y} = b * \frac{1}{X}$$

$$\frac{dY}{Y} = b * \frac{dX}{X}$$

$$b = \frac{\frac{dY}{Y}}{\frac{dX}{X}} \coloneqq \epsilon$$

This proves that the coefficient b in a general log-log regression is directly interpretable as an elasticity.

Supplementary Note 9

National income inequality compared to energy inequality: Energy inequality exhibits a wider spread and faster growth than income inequality, no matter whether the small-sample bias correction is applied to the measured Energy footprint Gini coefficient as in the main text or not.

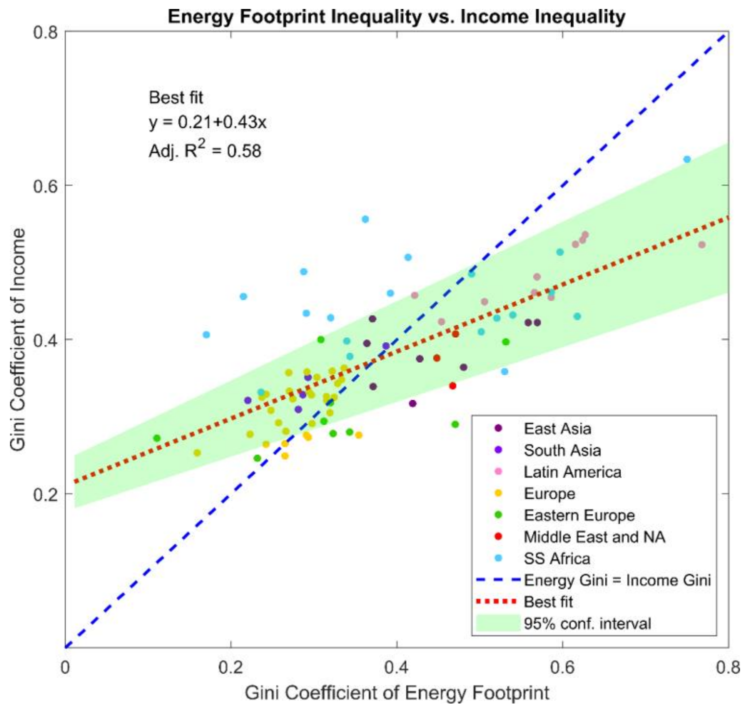
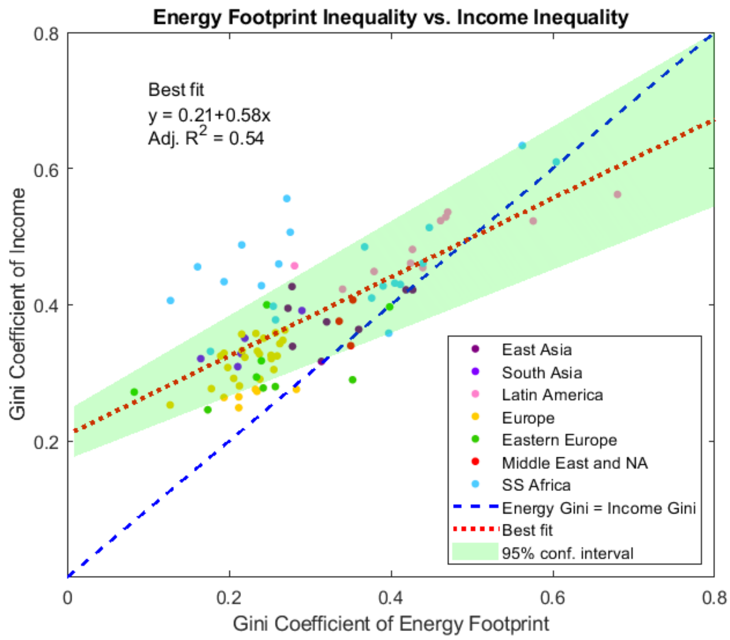


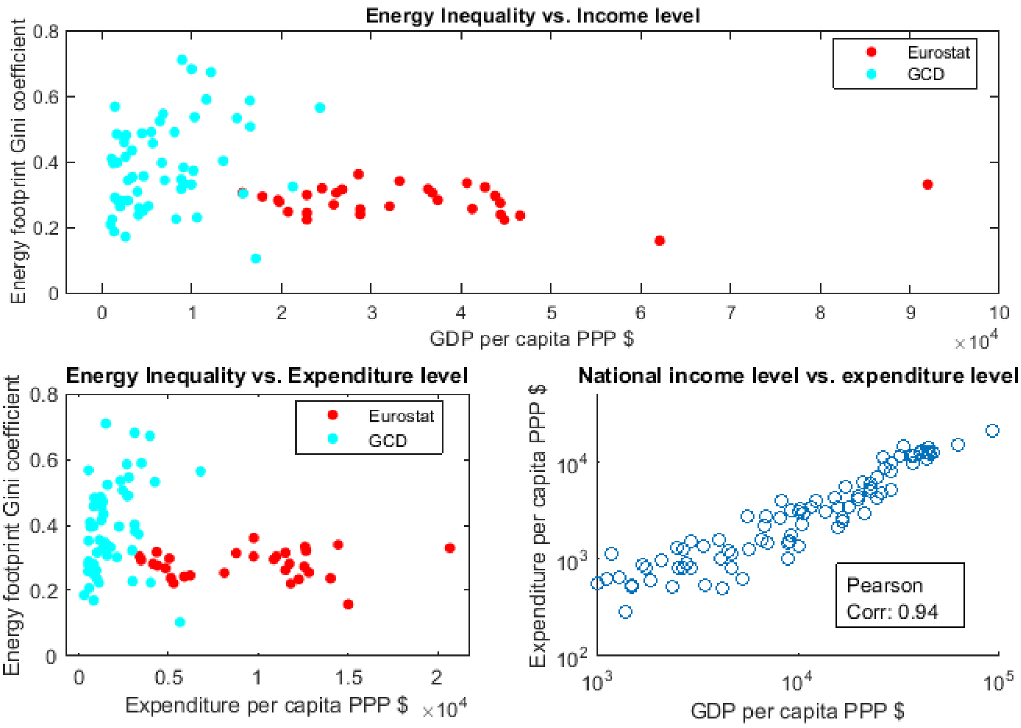
Figure 6: Energy footprint inequality vs. income inequality (corrected for small sample bias).



Supplementary Figure 7: Energy footprint inequality vs. income inequality (not corrected for small sample bias).

Supplementary Note 10

Energy inequality and income level: There is no systematic relationship between income level per capita and energy inequality of a country. The same goes for expenditure level per capita, which is also uncorrelated with energy inequality. This makes sense, since it highly correlates with income.



Supplementary Figure 8: Energy inequality and income level

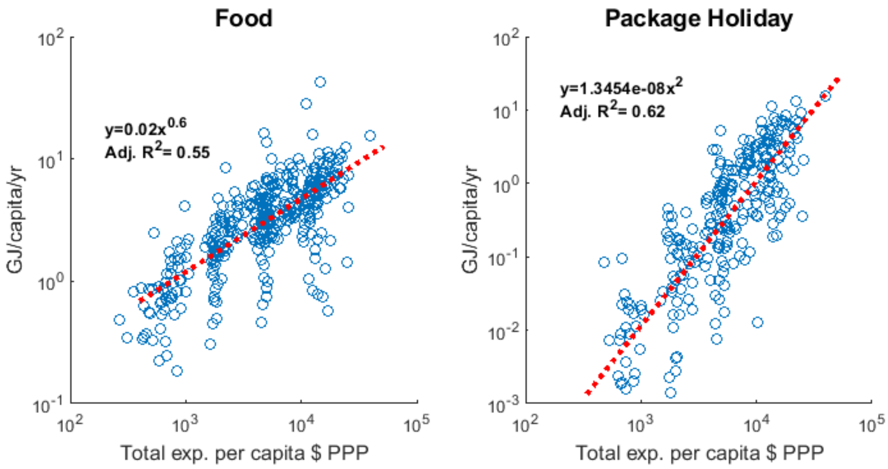
Supplementary Note 11

Supplementary Table 7: Regional energy inequality

Gini coefficient	East Asia and Pacific	South Asia	Latin America and Caribbean	Europe	Eastern Europe and Central Asia	Middle East and North Africa	Sub-Saharan Africa
total	0.42	0.26	0.49	0.27	0.39	0.38	0.48
Food	0.33	0.18	0.33	0.20	0.26	0.21	0.47
Alcohol and Tobacco	0.37	0.11	0.57	0.28	0.28	0.27	0.72
Wearables	0.47	0.26	0.44	0.36	0.46	0.35	0.51
Other housing	0.48	0.61	0.54	0.26	0.40	0.36	0.66
Heating and Electricity	0.39	0.20	0.31	0.20	0.37	0.22	0.47
Household Appliances and Services	0.50	0.38	0.61	0.40	0.49	0.42	0.62
Health	0.50	0.30	0.57	0.36	0.50	0.41	0.65
Vehicle Purchase	0.56	0.48	0.80	0.57	0.66	0.88	0.81
Vehicle Fuel and Maintenance	0.53	0.56	0.64	0.34	0.54	0.71	0.81
Other transport	0.56	0.32	0.38	0.39	0.47	0.33	0.63
Communication	0.57	0.47	0.55	0.32	0.47	0.50	0.74
Recreational items	0.57	0.42	0.63	0.38	0.68	0.54	0.87
Package Holiday	0.60	0.74	0.85	0.54	0.52	0.78	0.87
Education & Finance & Other Luxury	0.44	0.38	0.61	0.39	0.50	0.42	0.70

Supplementary Note 12

International energy footprint elasticity of consumption categories: We show that energy footprints decomposed by consumption category do not always decouple from increasing total expenditure, i.e. our proxy to income. Here for example we depict the consumption categories Food and Package Holiday. Food does get less energy intense at higher expenditures but Package Holiday does not. This is visible by the steep slope of the best-fit line. Package Holiday exhibits internationally an energy footprint elasticity of 2 while Food does exhibit one of 0.6. These two graphs stand in direct relationship and contrast to Figure 1 in the main text. There we show the scaling of energy footprints with overall expenditure but here we differentiate between consumption categories.



Supplementary Figure 9: Scaling of energy footprints with total expenditure by consumption category

Supplementary Note 13

Multivariate regression explaining energy inequality: We conducted a multivariate regression in order to explain the observed levels of energy inequality. The variables chosen were Fossil fuel share (to represent energy mix), Degree of urbanization, and Manufacturing value added to GDP as well as Agriculture value added to GDP for representing industrial production structures. None of the tested variables proves significant.

Supplementary Table 8: Multivariate regression results

Regression Statistics	
R Square	0.03
Adjusted R Square	-0.02
Standard Error	0.35
Observations	78

	Coefficients	*SE*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.80	0.28	-2.85	0.01	-1.36	-0.24
Fossil fuel % of total energy consumption by	0.13	0.19	0.71	0.48	-0.24	0.51
Urban population % of total	0.24	0.36	0.65	0.52	-0.49	0.96
Manufacturing value added % of total GDP	-0.01	0.22	-0.06	0.96	-0.45	0.43
Agriculture,forestry, fishing value added % of total GDP	0.19	0.12	1.53	0.13	-0.06	0.44

The data for independent variables in this section is all based on the open source World Bank repository[5].

Supplementary Note 14

Supplementary Table 9: Business as usual future energy inequality across all consumption categories

		2011	2030	2050
Gini coefficient	Total	0.52	0.48	0.50
1	Food	0.45	0.41	0.43
2	Alcohol and Tobacco	0.60	0.62	0.66
3	Wearables	0.54	0.50	0.52
4	Other Housing	0.70	0.61	0.61
5	Heating and Electricity	0.45	0.41	0.41
6	Household Appliances and Services	0.66	0.60	0.60
7	Health	0.56	0.54	0.56
8	Vehicle Purchase	0.79	0.74	0.76
9	Vehicle Fuel and Maintenance	0.70	0.64	0.63
10	Other Transport	0.60	0.57	0.63
11	Communication	0.73	0.71	0.71
12	Recreational Items	0.77	0.73	0.74
13	Package Holiday	0.82	0.80	0.82
14	Education & Finance & Other Luxury	0.66	0.62	0.64

Supplementary Note 15

Further statistics applied: The probability density functions of Figure 3 in the main text have been computed via a Kernel density estimator with Matlab. Code and formula can be found here: https://uk.mathworks.com/help/stats/ksdensity.html.

The rank correlations measured with respect to Figure 4 in the main text are according to "Spearman's rho" which is a Pearson correlation coefficient computed from the ranks of the data. These too have been computed with Matlab where code and formulas can be found here: https://uk.mathworks.com/help/stats/corr.html.

Supplementary References

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