The Impact of Electricity Market Reform on Consumers

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Abstract: We examine the effect of current electricity market reform on residential consumers, using a sequence of hypothetical scenarios which are likely to be prompted by reform. These include raising tariffs to cost-reflective *levels* and introducing a standing charge to recover 10% of the revenue to mirror cost-reflective *structures*. For Albania and Bulgaria, where household expenditure surveys and electricity tariffs are available, we analyse the effects of each scenario according to expenditure decile and region. We compare these results to findings from a previous study of Turkey. The impact of reforms varies considerably, depending on how far current tariffs reflect the long run marginal costs of supply, but likely reform scenarios will adversely affect low income households more than others.
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1. Background and Methodology

This paper focuses on the direct effect of energy reform on residential consumers in two South East European countries which might come about through changes in their tariffs. We do not consider costs or benefits which may accrue to households from the effects of energy reform elsewhere in the economy. The reason for and background to electricity reform are outlined in other papers in this volume and are not repeated here. In South East Europe many residential consumers pay much less than the minimum tariff required to sustain supply in the long run, and there is a high level of non-technical losses in parts of the region, so that large numbers of consumers, particularly those with low income, pay nothing for their supply. Reform which raises tariffs, changes their structure or increases collection rates will have substantial redistributive effects and may cause real hardship and political concern in a region where incomes are generally low on average and have a wide dispersion, and where social security arrangements are undeveloped or absent. At tariffs current at that time, the European Bank for Reconstruction and Development (EBRD, 2003) estimated that the median household in each country could 'afford' the cost of a subsistence electricity supply of 100kWh per month (i.e. would need to devote less than 10% of household income). However such consumption would require more than 10% of the household resources for the poorest decile (measured in consumption terms) in Bulgaria, and over 5% of resources for this decile in Albania and Romania, see the figure 1 below.

Figure 1: Percentage of household resources required to purchase 100kWh per month

Source: EBRD (2003)

Potential difficulties in adjusting to cost-reflective prices were acknowledged by the European Community in their June 2005 Options Paper, which set 2015 as the target by which countries in the region should remove all price distortions and open their electricity markets fully, though the process was to be started with

immediate effect. Many countries reflected a Council of European Regulators (2004) proposal for interim lifeline tariffs to ease the transition (lower charges for the first units consumed). A similar scheme is suggested for Macedonia by consultants it has employed (Ministry of Economy, 2006). Kennedy reported that by 2006 only Kosovo's overall tariffs did not cover the average costs of supply, and only Albania retained cross-subsidy between sectors in its tariffs. All countries had payment problems (with residential collections averaging around 85% of billings); and seven out of ten countries, including Albania and Bulgaria, had some social safety net in place. The Athens Forum emphasized the importance of these issues in 2006 when it announced an affordability study, funded by USAID, to be undertaken in the region and published in February 2007 (papers from the 9th Athens Forum). We have found two recent affordability studies in the area, one for Macedonia (Ministry of Economy 2006) and one for Montenegro (Silva et al., 2007).

We are able to estimate the effects of recent reforms and likely future tariff changes on households in two countries, Albania and Bulgaria, using the methodology outlined in Bagadadioglu et al (2007). Our basic scenarios examine the change in expenditure for a household as tariffs change, assuming no change in demand. This zero price elasticity measure is equivalent to a Laspeyre's measure of welfare change and provides a bound of the welfare change. The two countries which are the subject of the analysis provide an interesting contrast. Bulgaria has already raised its tariffs to cost-reflective levels, while Albania still charges households well below the cost of supplying them (Kennedy 2006 and own research).

In the next section we discuss the data which we have used and the tariffs we have considered in the analysis, and in section 3 present and discuss the results and compare them with those from a similar analysis for Turkey; section 4 considers some policy implications and concludes.

2.   Data and tariff scenarios

Information on current tariffs, and the likely level of tariffs to reflect long run marginal costs of supply in the residential sector, are mostly taken from the EBRD report "Can the Poor Pay for Power? The Affordability of Electricity in South East Europe" published in November 2003. This provides an overview of the impact of reform in the region. The analysis reported here supplements this overview with some household-level findings.

The EBRD report estimates that reform will raise the *level* of tariffs in all countries in the region, as shown in the following graph. The total length of the line represents the estimated long run marginal cost for supplying the residential sector. We take this level as our basic post-reform charge, assuming that a tariff to raise this level of average revenue would be required to supply this sector

without subsidies either from outside the industry or from other sectors within it (e.g. industrial consumers).

Figure 2: Breakdown of the average residential cost-reflective tariff

We see from Figure 2 that in some countries, for example Croatia, the tariffs were close to cost-reflective at the time of the EBRD report in 2003, but in several countries there was a large gap between the current tariffs and what would be required for sustainability in an unsubsidised private sector. The greatest gap, both proportionally and absolutely, was in Albania, and the implications of this are explored in more detail below.

The effect of changing tariffs on different income groups and regions depends on the pattern of consumption in each group. The EBRD reports consumption according to income or consumption deciles or appropriate proxies for several countries in the region. These are collated in table 1 below.

Table 1: Average monthly electricity consumption by income or consumption expenditure decile

Decile	Lowest	2	3	4	5	6	7	8	9	Highest
Albania (2002)										
Electricity Consumption (kWh)	198	236	265	293	299	308	317	349	360	441
Income (Leke)	2,388	5,986	9,444	12,554	15,797	19,552	24,111	30,369	40,039	84,412
FBiH (2001)										
Electricity Consumption (kWh)	159	221	252	259	275	321	328	377	402	497
Consumption Expenditure (KM)	333	497	613	710	807	922	1,061	1,242	1,490	2,098
RS (2001)										
Electricity Consumption (kWh)	149	196	220	259	257	298	319	338	375	435
Consumption Expenditure (KM)	287	448	564	672	781	900	1,045	1,198	1,409	1,905
Bulgaria (2001)										
Electricity Consumption (kWh)	109	189	221	272	274	355	384	442	530	738
Consumption Expenditure (Leva)	85	141	186	230	275	336	407	494	623	983
Croatia (2001)										
Electricity Consumption (kWh)	200	254	291	355	366	401	454	483	481	550
Consumption Expenditure (HRK)	1,722	2,260	2,827	3,685	4,204	5,127	6,395	6,985	7,765	10,662
Romania (2001)										
Electricity Consumption (kWh)	49	62	77	90	106	109	121	145	155	175
Consumption Expenditure ('000 Lei)	3,374	3,548	3,746	4,041	4,381	4,549	4,997	5,855	6,814	10,342
Serbia & Montenegro (2002)										
Electricity Consumption (kWh)	160	260	330	350	400	430	450	540	610	820
Consumption Expenditure (YUD)	8,844	12,928	15,172	17,499	20,231	23,568	25,850	30,227	36,271	54,660

Source: Various tables in EBRD (2003)

Although the data show monthly consumption (in kWh) and monthly income/consumption (in money terms) it is clear that a common pattern emerges, namely that electricity expenditure increases with income, but less than proportionally. We see this pattern repeated for the two countries where we have been able to obtain data for household expenditure data and tariffs. The surveys were conducted some years ago, in 2002 and 2001 respectively. We have used contemporary tariffs to calculate each household's consumption from the electricity expenditure reported in the survey. Total household expenditure rather than income has been used to define the relevant deciles in tables 2 and 3 below, since these are generally considered more reliable, particularly for the lowest deciles. These show very similar distributions to the corresponding figures in table 1, though the figures for Bulgaria show lower consumption except for the poorest deciles. A similar pattern is evident for Turkey in Bagdadioglu et al. (2007).

We see high proportions of total expenditure spent on electricity by the lowest income households, with the proportion declining as income increases. These proportions seem particularly high for low income groups in Bulgaria, despite the presence at that time of lifeline tariffs, which have a lower rate for small levels of consumption, in both countries. We also note that the average expenditure on energy for the poorest deciles is higher than that reported in figure 1, even though the average consumption level is lower. This is probably related to the high proportion (almost a third) of low income households who report no electricity consumption, another common feature in the region (e.g. see Bagdadioglu et al., 2007). Nevertheless we have confidence in the broad pattern of consumption and expenditure shown here. With such a pattern of expenditure we expect that an increase in the level of prices will result in higher absolute losses for high income groups, but higher losses *relative to income* for low income groups. And a change which increases the average price at low consumption levels, for example through a standing charge or through removing current lifeline rates, would have an adverse effect both in absolute and relative terms on low income groups. Conversely a lifeline tariff (or an enhanced lifeline tariff where one already exists) which charged a lower average price at low levels of consumption should benefit low income groups more than others.

Table 2: Average monthly household electricity consumption and total household expenditure (Albania, 2002)

Consumption deciles	Average electricity consumption (kWh)	Standard deviation	Electricity Expenditure as % of consumption	Number in sample	% households for whom electricity consumption data missing
Average/total	260	112	3.8	3,595	0.1
1st	168	104	5.5	360	-
2nd	210	108	4.8	358	0.6
3rd	225	103	4.3	359	0.3
4th	243	99	4.1	360	-
5th	253	91	3.8	359	0.3
6th	263	98	3.6	360	-
7th	281	89	3.4	360	-
8th	300	95	3.3	360	-
9th	298	97	2.7	360	-
10th	360	107	2.5	359	-

Table 3: Average monthly household electricity consumption and total household expenditure (Bulgaria, 2001)

Consumption deciles	Average electricity consumption (kWh)	Standard deviation	Electricity Expenditure as % of consumption	Number in sample	% households for whom consumption data missing
Average/total	303	301	17.4	2,374	9.7
1st	63	62	22.2	177	32.7
2nd	121	92	21.2	227	13.7
3rd	186	131	22.1	240	8.7
4th	218	159	19.7	239	9.1
5th	269	198	19.2	243	7.6
6th	314	218	17.7	246	6.5
7th	386	299	17.0	244	7.2
8th	382	248	13.3	245	6.8
9th	457	316	12.0	255	3.0
10th	637	502	9.8	258	1.9

Regional variations in income are likely to be reflected in differences in energy consumption, with low income provinces using less energy. This may raise politically sensitive issues if tariff reform affects households in some provinces more adversely than in others. There may also be variations in consumption

because of different needs for energy in different parts of the country, though this is likely to be relevant only where there is demand for air conditioning in the summer (which is likely to vary both with income and with climatic conditions) or where electricity is used for heating, and heating needs vary across regions. We show below the regional variations in demand in Albania and Bulgaria.

Table 4: Average monthly household electricity consumption by district, Albania

	District	Average electricity consumption (kWh)	Standard deviation	Average household expenditure (Leke)	Electricity Expenditure as % of total expenditure	No in sample	% households for whom elec. exp. data missing
	Average/total	260	112	40,358	3.8	3,595	0.1
1	Berat	282	102	35,422	5.2	117	2.5
2	Bulqize	174	112	19,317	4.5	128	-
3	Delvine	254	74	46,761	3.1	16	-
4	Devoll	129	73	43,116	1.6	16	-
5	Diber	253	95	39,674	3.5	232	-
6	Durresi	283	79	39,534	4.1	159	0.6
7	Elbasani	259	93	34,196	4.2	152	-
8	Fier	206	84	40,661	2.8	224	-
9	Gramsh	169	115	31,486	2.7	120	-
10	Gjrokaster	250	99	50,077	2.7	32	-
11	Has	301	34	56,996	2.9	48	-
12	Kavaje	281	79	43,188	3.8	88	-
13	Kolonje	195	70	25,822	3.6	8	-
14	Korce	205	119	32,406	3.3	136	-
15	Kruje	245	81	31,895	4.2	40	-
16	Kucove	277	69	32,102	4.7	32	-
17	Kukes	232	100	41,050	3.1	184	-
18	Kurbin	280	69	27,209	5.5	64	-
19	Lezhe	274	77	47,910	3.2	64	-
20	Librazhd	129	110	33,376	2.1	200	-
21	Lushnje	225	103	39,717	3.2	152	-
22	Malsi E Madhe	267	63	32,088	4.5	24	-
23	Mallakaster	263	94	47,720	3.6	32	-
24	Mat	209	88	43,872	2.7	32	-
25	Mirdite	320	40	30,441	6.1	16	-
26	Peqin	250	64	36,701	4.1	24	-
27	Permet	190	111	44,204	2.5	16	-
28	Pogradec	169	119	32,962	2.5	48	-
29	Puke	281	63	26,724	6.2	24	-
30	Sarande	250	87	44,779	2.9	48	-
31	Shkoder	322	48	39,739	4.7	143	-
32	Skrapar	283	44	24,176	6.5	16	-
33	Tepelene	296	81	31,218	5.9	32	-
34	Tirane	351	96	53,129	4.3	688	-
35	Tropoje	289	53	34,204	4.9	88	-
36	Vlore	280	77	47,906	3.5	152	-

Table 5: Average monthly household electricity consumption by region (Bulgaria, 2001)

	Region	Average electricity consumption (kWh)	Standard deviation	Average household expenditure (Leva)	Electricity Expenditure as % of total expenditure	Number in sample	Percentage of households for whom electricity expenditure data missing
	Average/total	303	301	177	17.4	2,374	9.7
1	Sofia City	267	234	232	12.2	372	7.5
2	Sofia Region	293	298	171	17.3	262	14.7
3	Plovdiv	342	328	191	18.2	332	10.5
4	Bourgass	339	430	184	18.3	238	10.9
5	Varna	322	293	173	18.1	260	11.9
6	Haskovo	295	247	147	20.7	246	4.3
7	Montana	267	275	138	17.7	187	10.1
8	Lovetch	314	280	163	18.1	283	7.5
9	Rousse	279	281	144	18.9	194	10.6

We note considerable variations in the proportions of expenditure devoted to electricity in different regions in each country. In Albania the average ranges from 2.1% to 5.9% (we omit consideration of regions with sample numbers less than 30 in the survey). For Bulgaria, the range is 12.2% to 20.7%.

We use this information from the household expenditure survey data to examine the effect on different households of different aspects of reform, according to household expenditure and region, using the methodology of Ugaz and Waddams Price, 2003. We consider scenarios in which either the tariff structures or levels, or both, are changed. In the first we explore the impact on consumers of past tariff changes, by examining the effect of tariff changes between the time of the survey and 2007. We abstract from changes in the general price levels by using as the basis of comparison the expenditure which households would have made with the consumption identified from the survey and with the tariffs current at the time of the survey but at 2007 price levels. For Albania this involves a change in structure as the lifeline tariff was removed. For Bulgaria, there has been no change in the structure of tariffs, but a substantial increase in their level. In the second scenario we identify the effect of raising price levels to long run marginal cost pricing, at 2007 price levels, compared with 2002/1 tariffs at 2007 general prices. Bulgarian prices already seem to be at or above long run marginal cost, so we omit this scenario for them. In the third scenario we examine the effect of introducing a fixed charge which recovers 10% of the total revenue, because this reflects more closely the pattern of supplier costs (see Bagdadioglu et al., 2007). While this is the converse of most lifeline tariffs

which generally incorporate a lower average price for low consumption consumers, it may be the result of introducing competition in the market, which will tend to drive tariff *structures* to cost-reflective patterns. In each of these scenarios we compare household expenditure with a base case of tariffs at the time of the survey, but uprated to 2007 prices, so that our comparisons use consistent price levels throughout and the effects of general inflation are excluded.

We summarise our scenarios as follows in tables 6 and 7.

Table 6: Scenario definitions and their effects on prices

Scenario	Effect on price
1. 2007 tariffs compared with tariffs current at time of survey, in 2007 prices	General increase, especially for low consumption households where lifeline tariffs have been abolished
2. Raise level of tariffs to long run marginal costs, current tariff structure	Increase across the board
3. 10% standing charge introduced with current revenue recovery	Revenue neutral compared with scenario 2; increase for low consumption, decrease for high consumption

Table 7: Old and new tariffs under each of the scenarios, including 20% VAT

Country	Old tariffs at current prices	Old tariffs at 2007 prices	New tariffs at 2007 prices Scenarios		
			2007 tariffs **1**	at LRMC **2**	10% standing charge **3**
Albania	4.8 Leke/kWh (< 300kWh) 9.6 Leke/kWh (>300kWh)	5.64Leke/kWh (< 300kWh) 11.29Leke/kWh (>300kWh)	8.4Leke/kWh	16.2Leke/kWh	421.1Leke/month 14.58Leke/kWh
Bulgaria	0.0804Leva/kWh	0.114Leva/kWh	0.157Leva/kWh	As scenario 1	4.76Leva/month 0.14Leva/kWh

The evolution of tariffs in the two countries has been very different. In Albania the main change has been the abolition of the lifeline tariff, under which all households had received their first three hundred kWh of electricity at half the price of later units. Although tariff levels have risen in real terms, the current tariffs are still only just over half the estimated long run marginal cost level. In contrast, Bulgaria has seen a 38% real increase in prices since 2001, with a flat charge per kWh in both 2001 and 2007. A lifeline tariff introduced in the interim has since been abolished. The increases since 2001 bring the tariffs above the level which the EBRD believed represented long run marginal costs, so scenario 2 is irrelevant for Bulgaria.

The effect of introducing a fixed consumer charge to recover 10% of revenue (but revenue neutral relative to the level tariffs charged in scenario 2 for Albania and scenario 1 for Bulgaria) is to lower the charge per unit of energy used, but impose a fixed levy on each household.

3.   Results

The effect of each of our scenarios in terms of expenditure deciles is shown in tables 8 and 8a, 9 and 9a below, in terms of absolute changes and as a proportion of household consumption.

3.1   Changes for different income groups

Table 8: Average monthly change in expenditure due to tariff changes in different total expenditure deciles, Albania (2002), (10,000Leke p.m.), 2007 prices

	Scenarios					
	1		2		3	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
All	580	219	2,608	1,013	2,608	836
Consumption deciles						
1st	437	259	1,735	1,071	1,887	901
2nd	528	247	2,165	1,076	2,246	902
3rd	561	229	2,315	1,014	2,372	849
4th	588	207	2,482	949	2,510	790
5th	617	189	2,589	854	2,600	709
6th	612	195	2,663	913	2,658	757
7th	640	172	2,833	806	2,799	664
8th	630	179	2,972	814	2,906	664
9th	628	186	2,952	835	2,890	682
10th	565	234	3,375	728	3,213	563

Table 8a: Average change in expenditure due to tariff changes: % of total household consumption, Albania (2002)

	Scenarios			Household Numbers
	1	**2**	**3**	
All	1.5	6.4	6.5	3,595
Consumption dec				
1st	2.5	9.9	10.9	360
2nd	2.0	8.4	8.7	358
3rd	1.8	7.4	7.6	359
4th	1.7	7.0	7.1	360
5th	1.5	6.5	6.5	359
6th	1.4	5.9	5.9	360
7th	1.3	5.6	5.6	360
8th	1.1	5.2	5.0	360
9th	0.9	4.2	4.2	360
10th	0.6	3.5	3.3	359

- *Base: Expenditure at 2002 tariffs, with 2007 price level (5.64Leke/kWh for <300kWh and 11.29Leke/kWh for >300kWh)*
- *Scenario 1: Expenditure at current tariffs (2007) (flat rate 8.4Leke/kWh)*
- *Scenario 2: At LRMC (flat rate 16.2Leke/kWh)*
- *Scenario 3: at LRMC revenue with 10% standing charge*

Table 9: Average monthly change in expenditure due to tariff changes in different total expenditure deciles, (Bulgaria, 2001), (100Leva p.m.), 2007 prices

	Scenarios			
	1		**3**	
	Mean	**SD**	**Mean**	**SD**
All	14	13	14	8
Consumption deciles				
1st	4	2	7	1
2nd	6	4	9	2
3rd	9	5	10	3
4th	10	6	11	4
5th	13	8	13	5
6th	14	9	14	6
7th	18	12	16	8
8th	18	10	16	6
9th	20	13	18	8
10th	28	21	22	14

Table 9a: Average change in expenditure due to tariff changes: % of total household consumption, (Bulgaria, 2001)

	Scenarios		Household Numbers
	1	**3**	
All	7.1	8.7	2,374
Consumption deciles			
1st	12.2	23.5	177
2nd	9.0	13.0	227
3rd	8.9	10.6	240
4th	8.0	8.8	239
5th	7.7	7.8	243
6th	7.0	6.7	246
7th	6.8	6.1	244
8th	5.3	4.8	245
9th	4.6	4.0	255
10th	3.7	3.0	258

- *Base: Expenditure at 2001 tariffs, with 2007 price level (0.114Leva/kWh)*
- *Scenario 1: Expenditure at current tariffs (2007) (flat rate 0.157Leva/kWh)*
- *Scenario 3: 10% standing charge*

The different results reflect the different paths which tariff reform has so far taken in each country. In Albania, the level has not risen greatly in real terms, and so the average effect is an increase of only 1.5% of income. The first scenario in each case shows how households have fared over the past five or six years, since the survey was undertaken in each country. The main effect of Scenario 1, compared with 2002 tariffs in 2007 prices, is from the removal of the lower initial lifeline rate. Since all consumers benefited from the lifeline rate, each decile is spending more on average after its removal. The only people who might not have done so are those with very large consumptions (over 600kWh per month), which we can see from table 2 is almost double the average consumption by the richest decile. This is reflected in the average absolute gains, which increase across higher deciles, with a slight fall for the very richest group. However table 8a shows that the removal of the lifeline tariff has a higher proportionate effect on the poorer groups, representing 2.5% of the income of lowest income groups, and only 0.6% of the income of the richest group, a ratio of 4:1.

In contrast the Bulgarian tariffs have increased substantially in level, but not changed in structure. Real increases in electricity tariffs between 2001 and 2007 account for 6.4% of the income of the average household. Again absolute increases increase with income, but the poor experience higher rises as a proportion of income. Because only level and not structure has changed, the ratio of the proportion is lower than for Albania, at 2.3:1 (8.2:3.6). But the proportions for all households are much higher because of the substantial rise in tariff levels.

These increases mean that Bulgaria's tariffs now need no further increases in level to reflect broadly the level of long run marginal costs. However Albania's

power tariffs are still well below this level, and would need to be almost doubled to reach it. This scenario is shown in scenario 2 of tables 8 and 8a, and would require an increase representing 6.4% of average total household consumption compared with real tariffs in 2002. As we have already seen for substantial increases in tariffs in Bulgaria, such a rise in the level of tariffs represents a higher absolute increase for high income households, but a higher increase as a proportion of overall expenditure for the poor. The ratio here combines the effect of changed structure and level and is around 2.8.

Since scenario 3 represents a change in tariff structure but to yield the same overall revenue as scenario 2 (1 for Bulgaria), we see from tables 8 and 9 that the average increase in expenditure is the same in absolute terms, but the standard deviation is less in scenario 3, i.e. the variation in the change is much lower. This arises from the fact that the increases in levels raise expenditure most for high income households who use more energy than for low income consumers; but in scenario 3 this effect is counteracted by the increases which low consumption (and low income) households face, relative to those using more energy, when some revenue is collected through a fixed charge. The differences are reversed when considered in terms of income groups. For the richest half of the population, restructuring tariffs in this way would reduce their real electricity bills below the value of long run marginal costs. The additional effect of the standing charge is to raise the energy bill as a proportion of income absorbed much more for low income than for high income groups. In Albania the increase represents over a tenth of the income of the poorest group, and only 3% of the increase of the richest. In Bulgaria the additional cost would absorb on average nearly a quarter of the income of low income groups, but only 3% of the income of the richest decile (compared with the base case of 2001 tariffs). Thus the differential between the impact on the low and high income groups for scenario 3, compared with the base case, is 3.3 for Albania and 7.8 for Bulgaria. These are large proportions, though in the case of Bulgaria we note that about half of the change for the poorest group is reflected in tariff increases which have already been imposed. Nevertheless the analysis shows that for Albania restructuring tariffs in this way would add a considerable burden to the effect of increases needed to raise tariffs to cost-reflective levels; and in Bulgaria it would impose a burden on this group similar to that they have already faced through the heavy increases in tariffs already imposed over the past six years.

3.2   Regional changes

The average effects of each scenario on households in each region are shown in tables 10, 10a, 11 and 11a below.

Table 10: Monthly change in expenditure by region, Albania, 10,000Leke, 2007 prices

		Scenarios					
		1		**2**		**3**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
	Average/total	580	219	2,608	1,013	2,608	836
1	Berat	587	202	2,732	978	2,708	803
2	Bulqize	446	265	1,807	1,130	1,945	949
5	Diber	603	191	2,576	864	2,587	714
6	Durresi	675	167	2,881	764	2,844	634
7	Elbasani	638	210	2,656	910	2,658	760
8	Fier	534	188	2,143	813	2,230	678
9	Gramsh	425	261	1,746	1,147	1,892	962
10	Gjrokaster	579	178	2,528	896	2,544	738
11	Has	768	73	3,116	309	3,050	256
12	Kavaje	676	167	2,867	760	2,833	632
14	Korce	483	244	2,080	1,074	2,170	885
15	Kruje	658	211	2,566	837	2,591	706
16	Kucove	708	160	2,869	656	2,841	547
17	Kukes	549	184	2,356	943	2,402	782
18	Kurbin	698	152	2,884	667	2,851	556
19	Lezhe	668	158	2,804	720	2,782	597
20	Librazhd	319	239	1,322	1,080	1,534	902
21	Lushnje	565	234	2,320	1,010	2,376	845
23	Mallakaster	661	225	2,710	940	2,706	788
24	Mat	498	114	2,126	797	2,209	655
28	Pogradec	409	247	1,729	1,146	1,876	955
30	Sarande	609	170	2,561	807	2,576	667
31	Shkoder	709	93	3,221	390	3,120	314
33	Tepelene	683	170	2,992	752	2,934	624
34	Tirane	588	196	3,324	678	3,177	530
35	Tropoje	716	99	2,968	479	2,922	395
36	Vlore	681	166	2,866	740	2,834	616

Table 10a: Monthly change in expenditure by region, Albania, % of household consumption

		Scenarios			Household Numbers
		1	**2**	**3**	**s**
	Average/total	1.5	6.4	6.5	3595
1	Berat	1.8	8.4	8.5	117
2	Bulqize	2.0	8.0	8.8	128
5	Diber	1.4	6.0	6.1	232
6	Durresi	1.8	7.5	7.4	159
7	Elbasani	1.8	7.3	7.3	152
8	Fier	1.3	5.1	5.4	224
9	Gramsh	1.2	4.8	5.5	120
10	Gjrokaster	1.1	4.6	4.7	32
11	Has	1.3	5.2	5.1	48
12	Kavaje	1.6	6.5	6.5	88
14	Korce	1.4	5.7	6.2	136
15	Kruje	2.0	7.8	7.9	40
16	Kucove	2.1	8.3	8.3	32
17	Kukes	1.2	5.2	5.4	184
18	Kurbin	2.4	9.7	9.6	64
19	Lezhe	1.4	5.6	5.6	64
20	Librazhd	0.9	3.7	4.5	200
21	Lushnje	1.4	5.7	6.0	152
23	Mallakaster	1.6	6.4	6.5	32
24	Mat	1.0	4.5	4.7	32
28	Pogradec	1.1	4.5	5.2	48
30	Sarande	1.2	5.1	5.2	48
31	Shkoder	1.7	7.6	7.4	143
33	Tepelene	2.3	9.9	9.8	32
34	Tirane	1.2	6.3	6.1	688
35	Tropoje	2.1	8.6	8.5	88
36	Vlore	1.4	6.0	5.9	152

Table 11: Average monthly change in expenditure due to tariff changes in different regions, (Bulgaria, 2001), (100Leva p.m.), 2007 prices

		Scenarios			
		1		3	
		Mean	SD	Mean	SD
	Average/total	14.5	12.8	14.5	8.1
1	Sofia City	12.4	9.9	13.2	6.3
2	Sofia Region	14.8	12.7	14.7	8.0
3	Plovdiv	16.4	13.9	15.7	8.8
4	Bourgass	16.4	18.8	15.7	12.0
5	Varna	15.7	12.3	15.2	7.8
6	Haskovo	13.3	10.5	13.7	6.7
7	Montana	12.8	11.8	13.4	7.4
8	Lovetch	14.6	11.8	14.6	7.5
9	Rousse	13.4	12.0	13.8	7.6

Table 11a: Average change in expenditure due to tariff changes: % of total household consumption, (Bulgaria, 2001)

		Scenarios		Household
		1	3	Numbers
	Average/total	7.1	8.7	2,374
1	Sofia City	4.8	5.6	372
2	Sofia Region	7.5	9.6	262
3	Plovdiv	7.5	9.0	332
4	Bourgass	7.6	9.5	238
5	Varna	7.6	8.9	260
6	Haskovo	8.0	9.7	246
7	Montana	7.3	9.3	187
8	Lovetch	7.2	9.0	283
9	Rousse	7.8	9.7	194

In tables 10 and 10a the regions for which there is information on fewer than 30 households are not reported (although they are included in the aggregate figures). Amongst the other Albanian regions we see considerable variations in the average changes for households in real tariffs up to 2007 (scenario 1), from 318Leke per month in Librazhd to more than double this figure, 716Leke per month, in Tropoje. Increases to bring the tariffs up to long run marginal costs have similar proportionate effects (but much larger effects in absolute terms). As a proportion of income the ratios are very similar. However when combined with the introduction of a standing charge, the differences between provinces (which depend on the average consumption in each province) are slightly less pronounced, both in absolute terms and as a proportion of income.

The regional differences in the effects of introducing reforms in Bulgaria are much smaller, with a ratio of only 1.3 between the greatest and smallest

average absolute changes in bills from the recent increases in tariffs, reflecting the much more geographically uniform levels of consumption in Bulgaria. (Since there are fewer regions than are reported for Albania, this also reflects greater aggregation across adjoining areas.)   However as a proportion of income, the changes are much higher outside Sofia than inside the city, reflecting the higher incomes and slightly lower consumption levels in Sofia, probably reflecting the greater availability of district heating there.

3.3   Comparison with Turkey

Bagdadioglu et al. (2007) conducted a similar analysis for another country in South East Europe, namely Turkey. The results of similar scenarios are shown in table 12 below. Scenario 2 reflects the increase in tariffs needed for the ratio of residential and business tariffs to reflect the OECD average; and scenario 3 compares the introduction of a fixed charge to recover 10% of revenue. Both scenarios are compared with the tariffs which were in force in 2003.

Table 12: Average change in expenditure due to tariff changes in different income deciles (1,000,000TL p.a.): Turkey (2003)

Turkey (2003)	Scenarios					
	2			3		
	Mean (TL)	SD	% of household disposable income	Mean (TL)	SD	% of household disposable income
All	+57.98		+1.39	0		0
Income deciles						
Poorest	+41.21	1.44	+5.49	+15.57	1.34	+2.08
2nd	+44.83	1.24	+3.53	+11.40	1.08	+0.90
3rd	+48.02	1.02	+2.89	+7.79	0.80	+0.47
4th	+50.79	0.74	+2.48	+5.71	0.59	+0.28
5th	+52.53	0.56	+2.13	+3.80	0.39	+0.15
6th	+54.91	0.33	+1.88	+2.31	0.25	+0.08
7th	+57.13	0.10	+1.64	+0.54	0.06	+0.02
8th	+60.99	0.33	+1.41	-2.75	0.31	-0.06
9th	+66.88	1.01	+1.17	-7.96	0.90	-0.14
Richest	+84.62	3.11	+0.65	-19.91	2.32	-0.15

Source: adapted from Bagdadioglu et al. (2007)

The patterns in Albania and Bulgaria are very similar to the pattern shown here, both in terms of absolute and average changes. There are also considerable variations in demand in different Turkish provinces, which generate very different gains and losses from the various reform scenarios. This is particularly so for scenario 3, which disadvantages low income consumers, which are concentrated in low income provinces, mostly in the south and east of Turkey. In Turkey, as in many other countries, regional issues are politically sensitive, so there are formidable barriers to introducing changes which have a particularly adverse effect on such regions.

3.4   Comment on analysis

Before drawing general conclusions, we return to two particular features of our analysis, the assumption of zero price elasticity and the high proportion of households who have reported no electricity expenditure. First we discuss own price elasticity. Short run demand elasticities for residential electricity are low, and the assumption of zero elasticity provides an upper bound to the change in expenditure, and a lower bound for welfare change, since the consumption level which forms the basis of our analysis is that in force before any price change. Thus the measure we have calculated is equivalent to a Laspeyre's measure of welfare change.

The 2003 EBRD study uses price elasticities of 0.25 throughout its study of South East Europe. The effect of using such an elasticity would have been to decrease the changes in expenditure by 25% throughout, with little effect on the relativities between the impact of the changes on different consumer groups and so would not affect our general conclusions. In practice, low income groups are likely to have higher elasticities than high income groups, simply because the changes represent a much higher proportion of their income (Baker et al., 1989). In particular low income households are likely to reduce electricity consumption when faced with increases of 12% of their household budget, as they have already done, or the additional 11% which introducing a standing charge would apply. The savings in expenditure would be at the expense of lower electricity consumption, which may itself not be desirable in an area where low income levels and poor safety nets are likely to mean that demand for electricity may already be below the level to ensure good health and adequate participation in society.

A second feature of both the Bulgarian and Turkish household surveys is the high proportion of respondents who reported no electricity consumption. In Turkey such non- reporting was checked against the ownership of electricity appliances, which suggested that the government's claim of virtually universal connection to the network is correct, despite the fact that over a quarter of all households, and half the poorest households, declared no electricity consumption. In Bulgaria the figures are lower – 10% overall, but nearly a third of the poorest decile. These omissions complicate the interpretation of the analysis of increased expenditure under the various scenarios. If the households for whom data are missing do not pay for electricity, and continue not to do so (whether or not they actually receive a supply), then the changes calculated from the analysis here *overstate* the 'average' difficulties for the poorest groups as a whole, since it omits this substantial proportion of low income deciles where reforms will have no effect. However if, as seems more likely, many of these households are receiving electricity, and reform will mean that they will have to pay for it, the analysis which omits these households *understates* the effect of reforms, since a substantial proportion of low income households (in the Turkish case, a half) will be paying a great deal more for their electricity than their current zero expenditure. The exact effect would depend on whether or not, when faced with a positive price for their consumption, their consumption patterns are similar to those who were previously paying for their energy.

A third issue, related to the two above, is whether higher prices might drive households to use fuelwood or other sources instead of electricity. Silva et al (2007) consider this a real danger in Montenegro, and this may also be a problem in Albania and Bulgaria. Such changes might have detrimental environmental consequences.

4.   Policy Implications and Conclusions

The effects of tariff changes in Albania and Bulgaria, and in Turkey, and confirmed by recent studies of Macedonia (Ministry of Economy, 2006) and Montenegro (Silva et al., 2007), reflect the patterns of electricity consumption by income decile and by region in several countries in the South East Europe Regional Electricity Market region. Such a pattern is likely to be repeated elsewhere in the region, for countries where such comprehensive information on household expenditure and tariffs was not available to the authors. These examples therefore provide useful guidance on the likely effect on households of reforms throughout the region. The comparison between the effects of the different aspects of reforms in Albania and Bulgaria is instructive. In the former country these have consisted mainly of removing the lifeline tariffs, which has raised the expenditure of all households, but particularly the rich in absolute terms, and the poor proportionally to income. In Bulgaria the changes were to raise the level of the tariffs to long run marginal costs (lifeline tariffs were introduced and abolished between 2001 and 2007, so do not feature in our analysis) and have had a much greater effect proportional to income, both on average and for the poorest households. A similarly sized effect would result from Albania raising its price to a long run marginal cost level, and we conclude that there are likely to be major income and distributional effects from such changes, which form a central part of the reforms proposed for the region.

If tariffs are to reflect the structure of costs in the form of a consumer charge which is unrelated to consumption, the effects are also substantial, particularly for the lowest income groups. To prevent real hardship, and to achieve political acceptability, any such changes would need to be carefully analysed and the interim temporary support might need to be adjusted to support households unable to cope with changes which represent so great a proportion of their income. If reforms also entail collecting revenue from a large proportion of low income households who have not hitherto paid for electricity, there is likely to be additional hardship, again concentrated in the lower income groups, in those countries where a substantial number of consumers have not been paying for their energy.

Further analysis to identify the likely effect of non-zero elasticities, and particularly the application of higher elasticities to lower income groups, would provide a clearer idea of potential difficulties to the authorities concerned. So, too, would more analysis of those households who currently report no electricity expenditure. We see this paper as a preliminary tool to identify the effects of reform which could be used to alert authorities to types of households which are likely to be adversely affected by energy reform to

enable them both to alleviate hardship and to increase the political acceptability of the programme.

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