

Engineering, Economics & Regulation of the Electric Power Sector

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Session 18

Module G

Electricity retail

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Study material

- Florence School of Regulation (FSR), “Electricity retail markets” <Tutorial text>
- C. Battle, P. Rodilla, “Electricity demand response tools: Current status and outstanding issues”, European Review of Energy Markets, Sept. 2009 <This reading is also applicable to the topic of tariff design>
- S. Tierney, T. Schatzki, “Competitive procurement of retail electricity supply: Recent trends in State policies and utility practices”, The Electricity Journal, Jan/Feb 2009 <A good review of US experiences in this specific topic>

Readings (1 of 2)

- It is interesting to read the sharp arguments pro & con electricity retailing by two well-known regulation experts
 - P. Joskow, “Why do we need electricity retailers?”, CEEPR working paper, February 2000
 - S. Littlechild, “Why we need electricity retailers”, August 2000
- and the opinions of the course instructor & colleagues
- C. Vázquez, C. Batlle, S. Lumbreras, I.J. Pérez-Arriaga, “Electricity retail regulation in a vertically integration context: The debate on regulated tariffs”, IIT Working paper IIT-06-028A, December 2006

Readings (2 of 2)

- National Action Plan for Energy Efficiency (2007). *Aligning Utility Incentives with Investment in Energy Efficiency*. Prepared by Val R. Jensen, ICF International. www.epa.gov/eeactionplan
- J. Vasconcelos, “Survey of regulatory and technological developments concerning smart metering in the EU electricity market”, RSCAS Policy Paper 2008/01, Florence School of Regulation,

Outline

(retail = supply = commercialization)

- Electricity retail market: the basics
 - Open issues in electricity retail
 - Electricity pricing & electricity tariffs
 - Independent versus vertically integrated retailers
 - Is competitive retail justified for small consumers?
 - Hurdles to retail competition
 - Unbundling distribution & retail
 - Demand response & advanced metering
 - The role of retailers & energy service companies in energy efficiency & conservation programs
 - Other open issues
 - Regulatory support to retail competition
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Electricity retail market: The basics

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Supply (retail): The basics

- Supply: Buy wholesale & sale electricity to end consumers
 - Generators could sell energy directly → suppliers are intermediaries
 - Narrow profit margins (*typically*) but large volumes
 - Various formats of supply
 - Competitive, Regulated, Default tariffs
 - & different kinds of intermediation: retailers, traders, brokers
 - Also: just electricity vs. multi-utilities
 - In most markets the supply activity has been gradually liberalized (*progressive eligibility of consumers*)
 - The convenience of extending eligibility to all consumers has been frequently questioned

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Supply: The technical processes (1)

- Some are common to regulated & competitive supply (*e.g. metering*), others are required to change supplier
- **Customer database**
 - Consumer data are typically collected & controlled by the incumbent distributor
 - This provides a commercial advantage to the retailer that is associated to that distributor, although in most jurisdictions the information has to be shared with any competing retailer
 - An option that has been adopted in some systems (*e.g. UK, Spain*) is an independent agency that centralized all the information & controls/performs the switching process

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Supply: The technical processes (2)

- **Metering equipment & load profiles**

- The “obvious” solution: Hourly meters
 - Are they economically justified for small consumers?
- The crude but pragmatic solution: Load profiles (*representing the “normal” consumption pattern of a class of consumers*)
 - Result in cross-subsidies among consumers
 - Suppliers may take advantage (*cherry picking, if better metering is then used*)
 - Loss of efficient economic signals
 - Static (*not updated*) versus dynamic profiles (*adjusted using real time data*)
 - Need for reconciliation of total load with standard profiles & actual aggregated demand → delays in definitive billing

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Supply: The technical processes (3)

- **Billing & collection**

- Billing: compute charges & issue the bill
- Diversity of markets and market prices plus existence of hourly meters → large volume of information to handle
- Actual processes of billing & collection are equivalent to the traditional approach

- **Other services**

- Energy-related advice or support
- Multi-utility offerings
- Improvement of metering or control equipment

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Supply: Energy purchases & sales (1)

The analysis to be performed by the supplier:

- Customer analysis: Obtain load to be supplied
 - It may be given by the sales contract itself
 - Alternatively, demand estimates may be needed (*based on historical data or on in-depth customer's activity analysis*)
 - Energy cost analysis
 - Once demand to be supplied is forecast → estimate the market price (*in general a basket of prices*) & the corresponding purchase costs
- Risks & risk hedging for suppliers

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Supply: Energy purchases & sales (2)

- Risks & risk hedging for suppliers
 - Price risk (*difference between estimated price & actual price*): Hedge by contracting with generators (*or own generators*) → reflect the incurred risk in sale price
 - Quantity risk (*difference between estimated demand & actual demand, in volume or profile*): This risk is typically passed to large consumers, but it is not currently possible for small ones
 - Collection risk (*the buyer may not pay*): Ask for some type of guarantee
 - Regulatory risk (*arbitrariness of regulator*): Send regulator to a good training course

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Open issues in electricity retail

Electricity pricing & electricity tariffs

For an excellent discussion on electricity prices see “Dynamic pricing, advanced metering & demand response in electricity markets”, S. Borenstein et al, CSEM WP 105, October 2002

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The regulated tariffs

The default tariff (1 of 5)

- How is procured the electricity that is sold by the retailers to the consumers at a regulated tariff? This is typically specified by the regulator
 - Option 1: From the spot market (*typically hourly prices of day-ahead market, as initially in California or Spain*)
 - Option 2: From competitive procurement in different processes, typically public auctions
 - e.g., more than 40% of US states require competitive procurement to ensure that utilities provide cost-effective retail services (*see “Competitive procurement of retail electricity supply: Recent trends in state policies & utility practices”, Analysis Group, July 2008; see next slide*)

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Frameworks for Procurement of Electricity Supply for Retail customers

Electric Industry Structure	Divestiture of Power Plants	Procurement Framework/Product Solicited	Supply Portfolio Management	State Examples
Traditional	None	Incremental supply- typically for resources from a specific power plant obtained through requests for proposals (RFPs)	Utility	CO, GA, LA, OK
Restructured, no retail choice	None or partial	Incremental supply (via RFP)	Utility	CA, MT
		Full requirements service (FRS) (via auctions or RFP to provide retail supply for basic service customers)	Market	MA, MD, ME, NJ
Restructured, with retail choice	Full (or near full)	Hybrid FRS frameworks : <ul style="list-style-type: none"> ▶ Long-term contracts (with FRS procurement) ▶ Utility ownership of generation, with some degree of portfolio management by the utility ▶ Public power authority ▶ Specialized procurements (e.g., renewable power supply or renewable energy credits) 	Variouly assigned to market and to utility	CT, DE, IL, OH, PA

Image by MIT OpenCourseWare.

The regulated tariffs

The default tariff (2 of 5)

(cont.)

- Option 3: Any prescribed mix of 1 & 2
- Option 4: The regulated retailer may have degrees of freedom in the procurement
 - In order to incentivise an efficient procurement, the regulator may acknowledge as regulated cost x% of the actual purchase costs of the retailer & 100-x% of the average purchase cost of all retailers (as in *The Netherlands*)

The regulated tariffs

The default tariff (3 of 5)

- Retail competition & the **potential interference from default tariffs**
 - Default integral tariffs are at least needed when there are not enough bidders to supply some consumer groups (*perhaps only in certain areas*)
 - Default tariffs protect consumers who have high transaction costs to change supplier
 - Unless there is a complete pass-through of the energy market price (*or an equivalent risk hedge*) the default tariffs may unfairly compete with retailers

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The regulated tariffs

The default tariff (4 of 5)

- **To avoid interferences of any default tariff** on retail competition → the basic rule is the **pass-through of the energy market price** to the default tariff
 - **How to define the price of energy** in the default tariff?
 - From any prescribed combination of purchases with transparent transactions in the long-term &/or short-term
 - Any incentives to purchase wholesale energy efficiently?
 - **Is an extra charge justified** in the default tariff to promote the change of supplier?
 - If a **transition period** between old & new default tariffs is needed → manage to maintain a level playing field between default tariff & market prices during the entire transition

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The regulated tariffs

The default tariff (5 of 5)

- **Do consumers need extra protection?** Is it reasonable that the regulator establishes conditions that limit the clauses that are freely agreed in a private contract?
 - Maximum duration (e.g. one year)?
 - Freedom to cancel a contract (*such as the 28-day rule in the UK allowing consumers to cancel any contract with 28 days notice*) without any charges?
 - May these “protection measures” backfire?

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The regulated tariffs

The last resort tariff (1 of 2)

- The need to define a “last resort tariff” as different from the “default tariff”
 - The “default tariff” is an option that the regulator decides to keep available for those consumers who do not want to bother to search for a retailer, or as a protection against insufficient competition from the supply side, or to protect any energy-poor consumers
 - It may exist or not
 - The “last resort tariff” is the regulated tariff that is assigned to the consumers whose retailer disappears (typically because of bankruptcy) and they have to be transferred to or find another retailer
 - It has to exist anyway

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The regulated tariffs

The last resort tariff (2 of 2)

- The existence of the last resort tariff should be mandatory, at least for small & medium consumers
- Meaningful approaches
 - Since the new retailer acquires an unexpected obligation & it will have to purchase additional energy on short notice → this tariff will typically be higher than the default tariff and it will be typically computed when needed, not in advance
 - The procedure has to be completely specified a priori
 - Whether the consumers may choose supplier by themselves individually & when, if this is the case (*note that a larger portfolio of consumers can normally be allocated to other retailer at a better price*)
 - The last resort tariff may last for a limited period of time, after which the individual consumers may wish to stay (at the default tariff) or to leave for another supplier
 - An *ex ante* auction may decide which retailer will be the last resort retailer in any given zone in case it is needed

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Competitive retailing

Electricity prices (1 of 4)

Static prices (*prices change infrequently*):

- **Flat rate** (*prescribed uniform price per kWh*)
 - The supplier absorbs the full risk of market price uncertainty (*assuming purchase price is not hedged*)
 - Frequently used with small consumers
 - It may include a capacity (\$/kW) component, applied to the amount of contracted capacity (*this concept does not even exist in many countries*)
- **Time-of-Use (ToU) prices** (*a long time in advance prices are pre-set for predetermined time periods*)
 - Same as above; the economic signals to consumers are better, although they may deviate significantly from reality

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Competitive retailing

Electricity prices (2 of 4)

Dynamic pricing (prices can change on short notice):

- **Critical peak pricing (CPP)** (the retailer can occasionally declare an unusually high retail price for a limited number of hours)
 - CPP is able to send economic signals that correspond to actual instances of scarcity of production in the power system
- **Real-time pricing (RTP)** (charge the actual price of each hour to the actual consumption in that hour)
- ToU, CPP & RTP require increasingly more sophisticated electricity meters

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Competitive retailing

Electricity prices (3 of 4)

Pricing schemes with discounts to provide reliability services:

- **Interruptible rates** (the utility may interrupt the service to consumers with these tariffs within a short notice and up to a maximum number of times per year)
- **Real-time Demand-reduction** programs (the utility may contact the consumer to offer a payment in return for the consumer reducing consumption below a prescribed baseline)
- Participation of demand in **forward capacity markets**
 - The case of ISO New England
- Note that this is different from “demand side bidding”, which is a typical feature of wholesale markets

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Competitive retailing

Electricity prices (4 of 4)

RTP pricing schemes with hedging mechanisms:

- **Two-part RTP** programs with a **customer baseline load (CBL)**
 - There is a Contract for Differences (CfD) for a baseline consumption (*agreed with the regulator*) at a regulated price (*some ToU price, for instance*)
 - In parallel the consumer is fully exposed to RTP for the entire demand
- **Two-part RTP** with **build-your-own (BYO) baseline load**
 - Same as above, but the consumer fully decides how much demand he wants to hedge

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Open issues in electricity retail
Independent *versus* **vertically**
integrated retailers

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Open issues

Retailers with or w/o own generation

- The **difficult life of the independent** (*i.e. without own generation*) **retailer**
 - Provider of some useful services: liquidity, arbitrage, risk hedging instruments, tailor-made tariffs (*instead of all-purpose default tariffs*) or contracts, additional services (*efficiency audits & advice, sales of appliances, etc.*)
 - Extra difficulties in risk hedging & often discriminatory treatment in market rules (*e.g. operating reserves, balancing*)
 - Questionable survival (*why not the generator?*)

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Open issues in electricity retail
Is competitive retail justified
for small consumers?

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Is retail justified for small consumers?

- Retail competition for **small** consumers: **is it worth it?**
 - Retail competition *versus* well designed (even including some *risk hedging*) default retail tariffs
 - While default tariffs must adopt a given general structure, retailers may offer ad hoc risk hedging structures that are best suited to each end consumer and also additional services
 - Small potential savings
 - Smaller consumers are less price responsive
 - Metering & billing costs are not negligible compared to savings & they become a complex task
 - Without hourly meters (& *the use of profiles*) gross errors will happen in settlement for individual consumers
 - The threat of arbitrage stimulates retail competition

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Is retail justified for small consumers?

- Pros & cons of extending retail competition also to small consumers (including domestic consumers) are well presented in the papers by Stephen Littlechild & Paul Joskow in the reading material (Stellar site).
 - A simplified version of the debate, as well as a proposal, can be found in the paper by C. Vázquez et al., also in Stellar

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Open issues in electricity retail

Hurdles to retail competition

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Hurdles to retail competition (1)

- **Interference of default retail tariffs**
 - Tariffs below (*also above, to promote that consumers may go to the market*) market prices
 - For large industrial consumers
 - For other consumers
 - Unfair ex post adjustments to tariffs (*as in the allocation of the "tariff deficit" in Spain: flat allocation to all consumers*)
- **Lack of adequate procedures to switch supplier**
 - Insufficient development of procedures to exchange information between distributor & retailers
 - Lack of precision in the specification of deadlines in the required tasks in the switching process
 - Abusive commercial practices by retailers when trying to get new customers

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Hurdles to retail competition (2)

- **Irregular practices** that are possible by an **insufficient unbundling** of distribution & retailing
 - Asymmetry in the access to commercial information of consumers by all retailers
 - Publicity or commercial offers that make use of services by other companies within the same holding
 - The use of quality of service of distribution as a commercial advantage
 - Sometimes just a threat, but also actual ex post discriminatory practices
- **Abusive practices** in the procedure to sign the **contract** for access to the distribution grid
 - New requirements regarding the contracted capacity or others
 - Request of financial guarantees

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Hurdles to retail competition (3)

- **Discriminatory practices** in relation with renting, installation & maintenance of **metering equipment**
 - New requirements because of the change of supplier
 - Impediments to the customer to access the information in its own meter
 - Excessive charges for the metering service
- Anomalies in the process of **invoicing**
- **Discriminatory charges** (*for instance: reactive power*)

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Hurdles to retail competition (4)

- **Inertia** of the consumers (*fidelity to traditional brands or previous supplier* → not a “regulatory” issue)
- **Common ownership of gas & electricity** distribution networks (*to be developed next*)
- **Demand-side management (DSM)** could be a component of retail competition (*which would then encompass a wider range of activities*), however
 - lack of incentives to promote an active demand participation
 - & inadequate regulation & metering to promote DSM activities

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(firmer conclusions would require further examination of case studies)

Issues in joint retailing of gas & electricity

- When choosing supplier, electricity consumers seem to have a **preference for their electricity distribution company** &, in 2nd place, for their gas distribution company. Same with **gas** retailing
- **Most competition** happens between the **distributors of gas & electricity**
- When **ownership of gas & electricity** distribution networks **overlaps**, **retail competition weakens**
- The prestige of the **brand** is a strong factor in retail competition

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Open issues in electricity retail

Unbundling distribution & retail

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Unbundling distribution & retail (1 of 3)

- Many problems with retail competition would disappear with the **ownership unbundling** of distribution + DSO & retail (*in general not an easy measure to apply*)
- **Assuming that only legal unbundling exists**, the following regulatory measures should **at least** be adopted
 - **Legal unbundling** of the normal retailer from the distributor (*& any retailer-for-tariff-customers that may exist*)
 - **Minimum quality standards** in attention to customers by the distribution companies (*on top of the usual minimum standards of quality of service*)
 - Clear definition of the **responsibility of** the activity of **metering** the demand of end consumers (*e.g. frequently assigned to the distribution company*)

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Unbundling distribution & retail (2 of 3)

(continuation)

- Clear procedures of **access to commercial information** about consumers by all existing retailers
 - At least: **decentralized** scheme whereby all retailers have equal access to the same basic information
 - Otherwise: **centralized** switching agency (*disadvantage: new institution & extra costs*)
- Clear procedures to switch supplier with **specified deadlines**
 - If it does not work in a decentralized format → centralized switching agency
 - Use ad hoc rules to **prevent gaming** by consumers with opportunistic switching (*taking advantage of different prices at different times of the year & imperfect contracts or default tariffs*)

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Unbundling distribution & retail (3 of 3)

(continuation)

- **Strict supervision** by regulatory agency
 - Irregular practices by retailers & distributors should be banned & prosecuted
- **More drastic measures** have been proposed &/or tried in some systems
 - Consumers cannot choose the supplier that belongs to the same holding as the corresponding distribution company
 - Retailing-to-tariff-consumers could be auctioned to retailers other than the one associated to the corresponding distribution company
 - And, finally, ownership unbundling of distribution & retailing

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The ownership of customer information

- Who owns / controls / has access to the **consumer database**?
 - Design options: Centralized, with an independent administrator, *versus* administered by the incumbent distributor or another local entity
 - Key issue 1: whether data have to be transferred between databases or stay where they are & just change the supplier's name
 - Key issue 2: prevent supplier malpractices (*enlist consumers or keeping them without their explicit consent*)
 - Key issue 3: whether meter reading is required when supplier changes (*to prevent gaming by consumers*)

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The EU approach Unbundling requirements in the EU Directive

- Directives 2003/54/EC (electricity) & 2003/55/EC (gas) require the distribution system operator (DSO) to be independent (*at least legally, in the organization & decision-making*) of any other activity in the respective sector
- The solution commonly adopted has been to legally unbundle any kind of retailing from distribution, which retains the DSO function
- *Does **legal separation** provide the adequate level of independence of the supply activity, therefore guaranteeing against the risk of discrimination of competing suppliers?*

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Open issues in electricity retail

Demand response and advanced metering

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Towards an active demand participation

- Regulation should
 - Promote the **active participation of demand** in energy markets
 - with adequate pricing schemes
 - and other direct procedures
 - **encourage retailers** to engage into demand-side management (DSM) activities
- Most of these activities require **advanced metering**
 - Careful specification, planning & standardization are needed, before massive deployment
 - Look for flexibility in the adaptation to any future requests & technological progress (*e.g. making use of Internet*) rather than deploying very smart but inflexible meters

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Open issues in electricity retail

The role of retailers in **energy efficiency** programs

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Role of retailers in efficiency programs (1 of 2)

- Although, in principle, it should be enough if all consumers could experiment **energy market prices** in real time (*either directly, via contracts or under default tariffs*)
- However, there are several **shortcomings**
 - Market prices do not reflect the true cost of electricity & gas (*most externalities are ignored: diverse environmental impacts, long-term scarcity of resources, inequalities in energy access*)
 - Poor design of access tariffs & default integral tariffs
 - Lack of advanced metering systems
 - Short-term energy prices are not experienced by most consumers

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Role of retailers in efficiency programs (2 of 2)

(cont.)

→ **Additional measures** are necessary

- Promote existence of **energy service companies**, whose business is energy efficiency, without conflicts of interest
- Direct demand-side measures (*standards, command & control, publicity of efficient appliances, direct control of appliances by utility, interruptibility contracts, etc.*)
 - With the support of **advanced metering & tariffication** schemes
- Interesting experiences using market-based mechanisms
 - White certificates (e.g. Italy, France)
 - Energy efficiency resource standards (EERS) in the US

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Open issues in electricity retail
Other open issues

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Other open issues

- How to protect the “**fuel poor**”? The difficult design of social tariffs
- Are there any significant **synergies** in combining distribution & retailing of **gas & electricity**?
- Is **switching** a good measure of success in retail competition?
 - Perhaps more effective as a threat than as a fact

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Regulatory support to retail competition

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Regulatory support to retail competition

- **Main factors for the success** of retail competition
 - Functioning & reliable wholesale market
 - Easy access by consumers to information about the available choices, their pros & cons, & the procedures to switch supplier
 - True competition among suppliers without significant barriers or discrimination
 - Absence of default tariffs or other regulated options that compete with advantage with retailers
 - Adequate metering equipment & data processing to support market transactions
 - Working institutions to protect consumer rights & to curb irregular commercial practices
 - Complete, correct & stable set of rules

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END OF PRESENTATION

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