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ENERGY DERIVATIVES-AN ANALYSIS OF THE TURKISH ELECTRICITY MARKET

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Abstract

With the new risk perception in financial markets, the use of derivative instruments has increased. In particular, energy derivatives, which are used to reduce the risks associated with energy price fluctuations, have been widely used worldwide and recently in Turkey. The objective of this paper is to contribute to the limited literature by analyzing the evolution of base load futures contracts traded in the Turkish electricity market. Based on a comprehensive literature review, a SWOT analysis is conducted to identify the strengths, weaknesses, opportunities and threats of these financial instruments. It is concluded that, especially after the radical restructuring of the electricity market, a transparent, reliable and competitive investment environment has been created and electricity futures contracts are now one of the most important contracts that help market participants to manage or hedge electricity price risks.

Keywords: Energy Derivatives, Electricity Futures, Base Load Futures Contracts
JEL Classification: Q40, P48, G13

ENERJİ TÜREV ÜRÜNLERİ-TÜRKİYE ELEKTRİK PİYASASI ANALİZİ

Öz

Finansal piyasalardaki yeni risk algısı ile beraber türev ürünlerin kullanımı artmıştır. Özellikle enerji fiyatlarındaki dalgalanmalardan kaynaklanan risklerin azaltılmasına hizmet eden enerji türevleri dünya çapında ve son zamanlarda da Türkiye'de yaygın olarak kullanılmaktadır. Bu çalışmanın amacı, Türkiye elektrik piyasasında işlem gören baz yüklü vadeli işlem sözleşmelerinin gelişimini analiz ederek sınırlı literatüre katkı sağlamaktır. Kapsamlı bir literatür taramasına dayalı olarak, bu finansal araçların güçlü ve zayıf yönleri, fırsatları ve tehditleri SWOT analizi ile belirlenmiştir. Özellikle elektrik piyasasının köklü bir şekilde yeniden yapılandırılmasının ardından şeffaf, güvenilir ve rekabetçi bir yatırım ortamının yaratıldığı ve günümüzde elektrik vadeli işlem sözleşmelerinin piyasa katılımcılarının fiyat risklerini yönetmelerine veya korumalarına yardımcı olan en önemli sözleşmelerden biri olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Enerji Türev Ürünleri, Elektrik Vadeli İşlem Sözleşmeleri, Baz Yük Elektrik Vadeli İşlem Sözleşmeleri
JEL Sınıflandırması: Q40, P48, G13

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1. Introduction

Energy derivatives are contracts about energy sources such as petroleum, coal, natural gas and electricity. They give an opportunity to the producers or users to manage risk associated with the volatility in energy prices. Volatility is used here to describe the risk of holding an asset. It measures the price fluctuation between two time periods. And also, a highly volatile asset is an asset that is often subject to large price fluctuations in the market (Edwards, 2010). The volatility of energy prices led to the emergence of energy derivatives which are instruments that include futures, forward, options, and swap. Energy producers and consumers use these derivatives to hedge their position against future uncertainty. The first energy futures contract, which was a heating oil contract, was developed by the New York Mercantile Exchange (NYMEX) in 1978. A few years later, in 1983, the light sweet crude oil futures contract was developed by West Texas Intermediate (WTI), and then energy derivatives began to be widely used for risk management (Simkins and Simkins, 2013). The leading markets for energy derivatives in the world are the New York Mercantile Exchange, Anglo- Dutch Energy Exchange, Chicago Board of Trade, Dubai Mercantile Exchange, Energy Exchange Austria, European Energy Exchange, Indian Commodity Exchange, Nadex Exchange and U.S. Future Exchanges.

Electricity, an important type of energy, as a commodity has different characteristics than other commodities due to its non-storage capacity, its inelasticity of demand and its seasonal patterns. It is mainly consumed for industrial and commercial activities and electricity prices show a daily, weekly, monthly and annual seasonal pattern. The necessity of a steady balance between supply and demand in the transmission mechanism causes supply and demand shocks to be reflected directly in electricity prices. Unique jumps, peaks and fluctuations in spot electricity prices resulting from shortages in electricity generation or peaks in electricity demand (Vehvilainen, 2002). In order to avoid these unexpected changes, the electricity spot markets are supplemented by electricity derivatives, which takes place both on the over the counter (OTC) market and futures market.

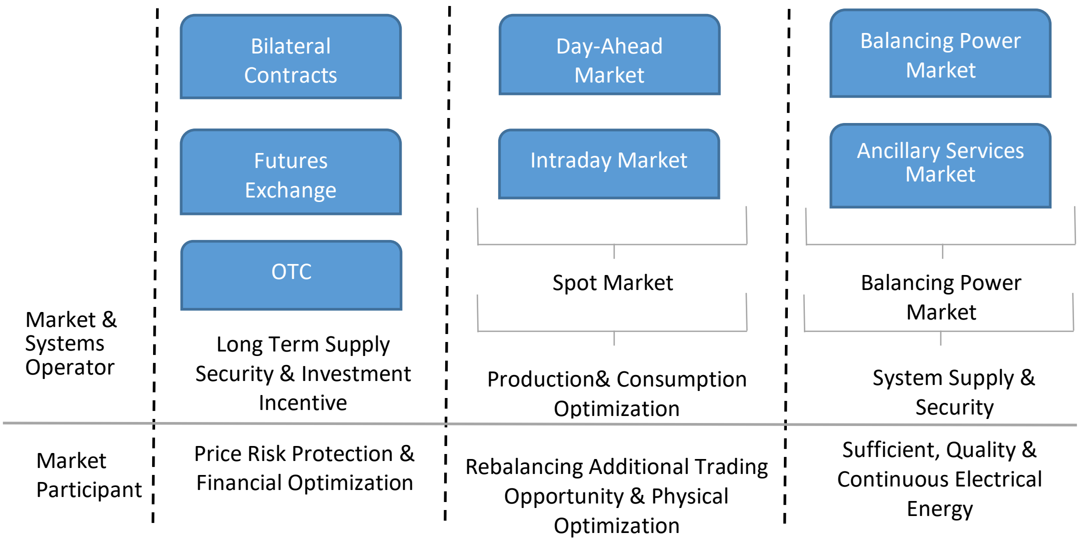
The futures market has been described as a market for continuous bidding to provide the latest information on supply and demand. The agents who participate in a futures market are usually categorized as hedgers, speculators, arbitrageurs and market makers. While hedgers use futures contracts to eliminate spot market risk, speculators take risks in anticipation of potential gains. On the other hand, arbitrageurs work simultaneously on the spot and futures markets to exploit price differences, and market makers on the futures markets buy and sell continuously during a trading session to exploit temporary imbalances in order flow (Silber, 1985). The purpose of hedging is to lock in a price and thus protect against price increases. However, speculators buy futures contracts to benefit from price increases. The idea behind selling futures contracts is that hedgers fix a price and thereby get protection against falling prices and speculators benefit from falling prices (National Futures Association, 1999). Power futures contracts were first traded on New York Mercantile Exchange (NYMEX) in March 1996. Although some futures contracts were not successful due to limited interest, interest in electricity futures seems to have been high (Stoft, Belden, Goldman and Pickle, 1998). Electricity futures, i.e. an agreement between buyer and seller to buy or sell a certain amount of electricity at an agreed date, price and location in the future, is one of the most widely used electricity derivatives. These financial instruments are traded on organized markets and standardized in terms of contractual details, trading venues, deal specifications, and settlement processes. They provide transparency of prices, ensure liquidity and reduce the costs of transactions and monitoring. If these financial products are used to hedge price fluctuations and the electricity price on the future date is higher than the price of the future contract, the buyer clearly benefits (Ghalayini, 2011). On the other hand, they entail some major risks associated with the rigid specifications and limited transaction sizes (Deng and Oren, 2006).

This study provides contributions to the existing literature in many respects. It analyses the electricity market and the key elements of electricity futures contracts. Another new aspect is the analysis of the strengths and weaknesses of base load futures contracts and the external factors they face, described by opportunities and threats, in order to reduce the degree of complexity of the main factors driving them. The SWOT analysis is used to assess the future potential of these derivative instruments. The paper is structured as follows. In the second part of the study the markets for electricity derivatives are presented. The difference between financial and electricity markets is analyzed and different market forms of electricity exchanges are explained. In the third part, the Turkish electricity market and the specifications of base load futures contracts are presented. Then a SWOT analysis is performed and finally a conclusion is given.

2. Electricity Derivative Markets

An electricity market is a marketplace where electricity suppliers and consumers interact to set the price and quantity of electrical energy. There are four types of participants in the electricity market, representing the four levels of generation, transmission, distribution and consumption. Electricity markets have different characteristics than financial markets. The financial market, a general term for markets on which financial instruments are traded, consists of three sub-markets, namely the money market, the capital market and the foreign exchange market. On the money market, the supply of money meets the demand for money. In contrast, financial instruments that are not traded on the money market are traded on the capital market. In addition, on the foreign exchange market, the currency of one country is converted into the currency of another country. The history of the financial markets goes back many years. Financial markets are very liquid, and in these markets both meteorological events and seasonal effects are not very effective. There are only some anomalies, especially in inefficient markets. On the other hand, the electricity markets are new markets and their liquidity is quite low. Apart from that, electricity markets allow storage and these markets are influenced by meteorological events and seasonal effects (Falbo, Felletti and Stefani, 2015).

Figure 1: **The Electricity Market Structure**



Source: Yazıtaş, 2018.

Electricity can be traded on power exchanges and on the OTC market. Trading on the exchanges enables companies to buy and sell standardized products on short-term spot markets and long-term futures markets. On the OTC markets, on the other hand, participants conclude individually negotiated bilateral contracts. In addition to these markets, the balancing markets, which are important for the storage of large quantities of electrical energy, are designed to balance production and consumption as closely as possible before the delivery of energy (Morales, Conejo, Madsen, Pinson and Zugno, 2014). Figure 1 shows the structure of the electricity markets.

The spot markets can be separated as day-ahead and intraday markets. Intraday electricity trading refers to the continuous buying and selling of electricity that takes place on the same day. This is known as the short-term wholesale electricity market, as opposed to long-term electricity trading, especially on the electricity futures market. The most important difference between the intra-day market and day-ahead trading is price determination. Although day-ahead transactions are linked to the principles of the market clearing price, where the last accepted offer determines the price for all transactions, prices in intraday trading are determined in a "pay as bid" process. This means that prices are determined for each transaction concluded in continuous trading. Consequently, there are no fixed prices for products on the intraday market. Much more often, different prices for the same product are common, depending on when the trade took place (European Parliament, 2016).

With the development of liberalised electricity markets, spot prices have begun to be determined by supply and demand. Under this market structure, long-term bilateral agreements between generators and wholesalers dominate the majority of electricity trading. However, when approximately four-fifths of trading is carried out according to the terms of these bilateral agreements, the remaining one-fifth takes place in spot markets. Here the spot electricity market is the trading place for electricity, which is a day-ahead market managed by the system operator. Market players send their remaining generation capacity not covered by bilateral agreements or their additional electricity requirements to the network operator in the form of prices and quantities for each accounting period of the following day. The system operator gathers these bids, ranks them in order of performance from cheapest to next cheapest and so on, and then creates the supply and demand functions (Talaşlı, 2012).

The futures or derivatives market, on the other hand, comprises the markets on which electricity buy/sell contracts for the delivery of electricity at a certain time in the future at a price agreed today are traded. A future is a standardized agreement in which all conditions related to the transaction are fixed in advance, so that the price is the only remaining point of negotiation (Stoft, Belden, Goldman and Pickle, 1998). According to Falbo, Felletti and Stefani (2014) uncertainty of spot prices and uncertainty of production costs are the two main risks faced by electricity suppliers, and financial derivatives, if well understood and properly used, can help to share and control these unwanted risks through properly structured hedging strategies. Derivative instruments are indispensable for hedging against volatility in the electricity markets. Electricity futures and forwards in particular can help generators, consumers and marketers to cope with volatility, but they also carry their own risks.

The balancing market refers to an organized market, regulated by the Transmission System Operator (TSO), on which players with available units can submit balancing offers. Participants in the balancing market use balancing offers to provide regulatory services, in other words, they offer to increase or decrease their electricity generation or consumption for a certain operating hour. The balancing market becomes open after the closure of the spot market. The submission of balancing offers starts the day before and can continue intraday, depending on the country (Kiener, 2006).

For market and system operators, futures markets offer long-term supply security and promote investment. Spot markets, on the other hand, are markets where production and consumption are optimized. Balancing markets offer system and supply security. If the markets are assessed in terms of their participants, market participants use the futures market to hedge price risks and optimize their financing. In addition, the spot market is used to balance additional trading opportunities and to optimize physical trading. The balancing market is also used for enough, qualified and continuous electrical energy.

3. Turkish Electricity Market

For many years around the world electricity trading was characterized by a monopolistic structure. Because of the absence of a retail competition model, first developed in Finland, Norway, Spain and Sweden which reduces the barriers to potentially competitive activities, there were not transparent electricity prices (OECD, 2001). The start of the liberalization of electricity markets occurred in the early 90s which is the beginning of a transformation process. The goal of this liberalization process was to create free markets and, with these liberal reforms, to transform cost-based pricing into market-oriented regulation. During this process, the production, transmission, distribution and marketing activities were separated and gradually subjected to competition. On the other hand, the move from cost-based rates to market-based prices leads to higher price volatility as the industry moves away from the regulatory determination (Stoft, Belden, Goldman and Pickle, 1998). This liberalisation process ends the monopoly control of electricity, increases competition and lowers prices (Pietz, 2009).

Turkey does not have many domestic energy resources and therefore does not produce large amounts of energy, but it is a country that consumes significant amounts of energy due to its growing economy and population. Turkey's geographical location is very important for the transfer of energy, e.g. with the Baku-Tbilisi-Ceyhan (BTC) pipeline, through which oil reaches the European markets, and it connects the East and West like an energy bridge with the transfer of energy. Turkey produces a small amount of oil and gas and produces poor quality coal. On the other hand, the country does not produce any nuclear energy. Therefore, it is a large importer of energy, which leads to an increase in the current account deficit (Yurdakul and Cevher, 2015).

Turkey has recently made radical changes in the energy sector, particularly in the electricity sector. It has introduced a new energy policy for consumers and producers. The Electricity Market Act adopted in 2001 aimed primarily at creating a competitive market in generation, transmission and distribution. In order to create a stable, transparent and competitive energy market, a self-regulatory organisation, the Energy Market Regulatory Authority, was established (Halicioglu, 2007). Turkey has embarked on a comprehensive programme of liberalisation and privatisation of the electricity market, with the distribution of electricity to 21 different distribution companies in 21 different regions that have been granted permission to distribute and sell electricity (Bahçe and Taymaz, 2008).

Until the 1990s, the Turkish Electricity Authority (TEK), a state-owned organization, controlled the Turkish electricity sector. Following market deregulation and privatization, the TEK was divided in 1993 into TEAS for the production, transfer and wholesaling of electricity and TEDAS for distribution. In 2001, TEAS was further divided into EUAS for generation, TETAS for wholesale and TEIAS for transmission, each of which were established as separate legal entities with the introduction of the Electricity Market Law. With the Electricity Market Act the liberalisation process has begun and has integrated itself into the electricity markets of other countries. To this end, many planned steps have been taken and significant progress has been made to make the electricity market stronger and more dynamic, in which market participants play an active role and market players are managed and monitored in the best possible way. The electricity market was transformed from a single buyer/seller model to a liberal and competitive model and the day-ahead planning system was introduced. The establishment of the day-ahead market in 2011 has brought a new dynamism and vision to the electricity market in Turkey and enabled the formation of a competitive, value-oriented market structure. On the other hand, intraday markets were established in 2015, which operate on a continuous trading basis (Electricity Market Development Report, 2018).

The electricity sector has grown rapidly due to the growth of GDP per capita, the rapid development of industry and services and urbanisation. Turkey's electricity production was approximately 25411,043 GWh in January 2020, increasing by 2.9% compared to 2019, during the same period of time the electricity consumption was 21940,142 GWh. While 9289,785 GWh of the total electricity production is generated from renewable energies, the amount of energy generated from non-renewable energies is 16121,258 GWh. Most of the electricity in Turkey is generated from coal and natural gas. Of the total production, 36.28% of electricity is generated from coal, 26.83% from natural gas and 26.83% from hydropower, which is a renewable source (Monthly Electricity Statistics, 2020).

Supply and demand volumes are announced together with the market clearing prices in accordance with the orders submitted by market participants on the day-ahead market, while on the intraday market there is consistency with the method of continuous trading (EPIAS, 2018). According to Electricity Market Development Report 2018, the hourly development of the weighted average market clearing price is generally between 150-350 TL / MWh. While the peak price reached 375,79 TL / MWh, the weighted average price for market clearing prices (MCPs) increased by 38.65% compared to 2017, reaching 233,101 TL / MWh. The monthly electricity consumption decreases in spring and autumn. In addition, the water capacity of hydroelectric power plants increases in spring, which is the period when the lowest prices of the year are usually recorded. On the other hand, average prices increase due to agricultural irrigation consumption in summer and the need for warming and education in winter, in parallel with the increase in electricity demand and consumption.

Table 1: **Contract Specifications of Electricity Futures on the Borsa Istanbul**

	Electricity Futures
Name	Base Load Electricity Futures
Size of contract	Number of hours in the contract month x 0.1 MWh
Minimum Price Tick	0.10 TRY pro MWh
Settlement Type	Cash Settlement
Trading Hours	from 09:30 to 18:15 (local time)
Base price	Base price is the previous day's settlement price
Last trading day	Third business day which is before the end of the last calendar day of the month prior to the maturity period
Times to maturity	The next 2 annual contracts (after the current year) can be traded simultaneously

Source: Borsa Istanbul, 2017.

On 26 September 2011, base load power futures contracts were introduced on the Turkish Futures Exchange. They are the first energy derivatives issued in Turkey and it is expected that this futures contract will expand investments in the electricity sector. In response to the needs of growing demand and the rapid development of the electricity market, the Turkish Futures Exchange has introduced a new product range and issued base load futures contracts for electricity to reduce the volatility of electricity prices affecting consumers, producers and investors.

This base load electricity futures is the arithmetic average of the Unconstrained Market Clearing Prices declared by the Turkish Electricity Transmission Company for each hour of the term (VIOP Derivatives Market, 2017). The contract size is calculated by multiplying the number of hours in the contract month by 0.1 megawatt hour (MWh). Due to the fact that electricity consumption varies according to the season, the size of the contract varies according to the number of days in the contract month and summer/winter time. The contract size changes depending on the number of days in the contract month and season. 1 MWh of electricity is expressed in Turkish lira to two decimal places and the minimum price tick is 0.10. Furthermore, the due months of the monthly base load electricity futures contracts are all months of the year. The contracts are traded for a total of 16 maturity months, including the current month and the following 15 months. In addition, settlement is in cash and the settlement period is calculated at time T+1, i.e. on the first day after the expiration date. However, losses are deducted from the accounts at the end of day T, profits are added to the accounts also on day T, and trading hours are between 09:30 and 18:15 local time (VIOP Derivatives Market, 2017). The details of the contract are summarised in Table 1.

4. SWOT Analysis of Electricity Futures

In this section, a SWOT analysis based on an extensive literature review is used as a methodological tool to assess the current state of the electricity market in Turkey. The aim of this SWOT analysis is to make a critical evaluation of the strengths of base load electricity futures and to identify the potential of these derivative instruments. Table 2 summarizes the main points discussed.

Table 2: **The Main Elements of the SWOT Analysis of Electricity Futures**

Strengths	**Weaknesses**
-Protection against unexpected changes in electricity prices -Higher returns through arbitrage or speculation -Better balanced portfolios -High efficiency -High liquidity -Highly leveraged investments -Low transaction and monitoring costs	-Scarcity of energy resources -Lack of an effective energy storage system -The unsustainability of electric energy due to the occupation with non-renewable sources -The volatility of futures prices -Less flexibility
Opportunities	**Threats**
-Increased electricity demand and further growth potential -Comprehensive restructuring of the electricity market -Different tax incentives -Opportunity to take positions with less initial investment -Fully integrated structure with the electricity markets of the European Union -Distributed generation nature of renewable sources	-Possibility of asset price reduction as the expiry date comes closer -Possible extremely large losses through speculation -Dependence on energy imports -The increased complexity in balancing supply and demand -The belief that the day-ahead market will weaken or lose its importance over time -Low financial literacy and low demand for energy derivatives -Lack of control over future occurrences -Instability of currency exchange

Source: Author.

4.1. Strengths

The first important strength of electricity futures is the protection against unexpected changes in electricity prices. The main reason why investors or companies use energy futures is to balance their risks and protect themselves against price fluctuations. These contracts generate price signals for energy investors and secure future revenue streams necessary to support investments (State of the Energy Market, 2009). Base load electricity futures contracts are ensuring the highest possible yield with the lowest risk. They offer a cost-efficient way to determine prices for large electricity consumers and therefore one of the most used energy derivatives for hedging purposes. Electricity futures promote competition in the whoesale and retail markets, which will further reduce the disruptive market power of the major generation companies and provide consumers with a further way of coping with their cost volatility (KPMG, 2014).

Financial futures contracts are an important element of the financial sector as they offer low-cost transaction services to different types of financial intermediaries. Depository institutions use financial futures contracts to balance the risk position of their asset-liability mix, while market-making securities traders balance the risk of their holdings with financial futures, and portfolio managers hedge their revenue-generating assets with financial futures (Silber, 1985). Additionally, there are examples of large arbitrage profit opportunities in the commodity markets (Protopapadakis and Stoll, 1983). According to Olsson (2017), investors use two strategies to profit from the relatively wrong pricing on the futures market. The first is to buy a spot of an asset while the asset is sold short in the futures market - this is often called " cash and carry" trading. And the second is to sell short spot of an asset while taking a long-term position in the futures market, usually known as reverse cash and carry trading. These strategies can provide arbitrage opportunities when assets in different markets do not have the same price.

It is also pointed out that electricity producers, final consumers and marketers could also speculate on futures contracts. These players could speculate in the market on purpose in order to make huge profits (Stoft, Belden, Goldman and Pickle, 1998). Additionally, the speculators increase market depth and liquidity by setting bid and ask prices, by taking trading positions and by taking market risks to ease transactions (State of the Energy Market, 2009). Changes in the price of futures trading are highly leveraged, to a greater extent than any other form of speculation or investment (National Futures Association, 1999). And this high leverage resembles a double-edged sword, which provides the opportunity to make large profits with little capital on the one hand, and on the other hand, under extremely difficult market conditions, a higher risk of loss can even be greater than the investment (Zhang, 2014).

These contracts enabled investors to create better balanced portfolios. Investors consider energy derivatives as alternative investments to benefit from portfolio diversification, as they have a low correlation with traditional instruments such as stocks and bonds. Energy resources such as oil, gas and coal are consumed by companies in each country, although they cannot control the risks of price fluctuations on their own. Therefore, there are high expectations for energy derivatives as most market participants seek to minimize the volatility of investment returns (Nakajima, 2019). On the other hand, this type of futures are highly liquid contracts arising from the increased involvement of hedgers and speculators in the market (Silber, 1985). In addition, an organized market and standardized contract conditions also ensure liquidity.

Another strength is the efficiency of electricity futures, which has been proven in many studies. In the literature, the relationship between electricity spot prices and futures prices is determined and a positive risk premium is calculated for short and medium-term futures contracts (Lucia and Torro, 2008; Handika and Trück, 2012). It has become clear that the spot market is generally much more volatile than the futures market (Shawky, Marathe and Barrett, 2003). Futures contracts also provide a reduction in transaction costs, while most electricity futures are settled through cash payments rather than physical delivery (Silber, 1985). In addition to this, these contracts also have lower monitoring costs and credit risks due to strict margin requirements (Deng and Oren, 2006).

4.2. Weaknesses

The scarcity of energy resources in Turkey, the lack of an effective energy storage system and the unsustainable production of electricity from non-renewable energy sources can be seen as weaknesses of electricity futures. On the other hand, price volatility is greater for short-term futures because longer-term futures have more time to mirror the supply adjustment of the underlying asset (Olsson, 2017). This can also be counted among the weaknesses of these base load electricity futures.

The non-existence of an effective energy storage mechanism is one of the biggest weaknesses for which a solution must be found. The European Commission considers that energy storage will be a major issue in the future and the choice to make investments in the development of storage and the development of suitable storage capacity will be determined by the development of the whole energy system. Energy storage is crucial to balance supply and demand. On the other hand, it can also help to enhance the management of transmission networks, lower expenses and increase energy efficiency (DG ENER Working Paper, 2017).

The production of electricity from non-renewable energy sources that is not sustainable can also be considered a weakness of the electricity future. Studies show that the cheapest way to generate electricity is to use wind energy (TSKB, 2019) and according to World Bank Report (2015), Turkey has significant wind energy capacity waiting to be exploited. Of course, this production also involves certain costs, but as soon as these costs are covered and a plant is built, the plant begins to pay for itself within a short time. The share of electricity generated from renewable energy sources has increased significantly since the early 2000s. While in 2001 the share of electricity generated from renewable energy sources was 20% of the total electricity production and this share came exclusively from hydropower plants, in 2018 the share was 32.3%, with a variation of resources. The share of electricity generated in geothermal, solar and wind power plants has increased from 0.1% to 11.4% over the last 20 years. Investments in wind power plants after 2011 and unlicensed solar power plants after 2013 have proven to be very effective in this context. Although electricity is being produced from renewable energy sources, this level is not sufficient if we compare this production with European countries. According to the Fraunhofer Institute for Solar Energy Systems (ISE) (2020), the share of renewable energies in Germany's annual net electricity generation rose from 40.6 percent in 2018 to 46 percent in 2019, thus exceeding the share of fossil fuels, which is 40 percent.

While it is assumed that non-renewable energy sources are not sustainable, it is also a fact that renewable energy installations such as solar and wind power plants operate at low capacity and produce little electricity in the absence of sun and wind. The volatile power generation from wind and sun makes the amount of electricity generated highly dependent on the weather. For thermal power plants, the capacity factor, i.e. the distribution of the energy actually produced to the maximum energy that can be produced at full capacity, is over 85% (Aslan, 1996), while for solar it is around 20% (Cengiz and Mamiş, 2016).

Another weak characteristic of futures contracts is the price volatility of futures. There are two types of theories that explain the volatility of futures prices: the time to maturity hypothesis and the state variable hypothesis. The maturity hypothesis, based on the fact that the futures price volatility rises as the expiration date nears. The second hypothesis, on the other hand, suggests that the variability of futures prices may change over the life of the contract depending on the distribution of the underlying state variables. Price fluctuations of futures contracts vary depending on the flow of information into the market and are more volatile during periods when a high degree of uncertainty is disclosed and more stable during periods when less information is available to the market (Kamara, 1982).

In general, future contracts are based on fixed standards for fixed amounts and conditions, which allow less flexibility for investments. Futures contracts are standardized contracts without paying attention to the specific needs of buyers and sellers. Therefore, the expiration date or contract size may not correspond to what the buyer or seller of the futures contract wants. Standardization makes it difficult for hedgers seeking to reduce or eliminate risk to accurately hedge a position (PwC Report, 2013). This situation can be seen as an other weakness for these financial instruments.

4.3. Opportunities

Electricity consumption in Turkey is estimated at around 385 TWh by 2023 (Sector Overview, 2019). This high demand for electricity and further growth potential as well as a comprehensive restructuring of the electricity market can be identified as opportunity for these futures contracts. The regulation of electricity markets and the privatisation of electricity distribution companies increased the reliability and transparency of the market. Turkey has ended the state monopoly in the electricity market and liberalised wholesale, distribution and retail channels through privatisation. In addition, organised markets were created where market participants can assess their trading potential on the free market and obtain a price reference for all players. Also, the country plans to expand and diversify its installed electricity portfolio by increasing capacity for new power plant investments (PwC Report, 2012). The necessary investments to meet this high demand have always kept the electricity markets alive. Especially electricity supplies from operational lignite-fired power plants and a secure highway for the entire electricity value chain can be shown among the important investments made.

Although there are some opinions that in energy markets with a high percentage of renewable energy, which is not a continuous or steady form of energy, hedging is not possible and future markets will collapse, there are also contrary opinions that say that interest in short-term markets such as intraday markets will increase (Haas, Auer, Resch and Lettner, 2013). Due to the distributed generation nature of renewable resources, plants for renewable energies such as solar and wind can be commissioned much faster than conventional power plants thanks to their separate generation capacities. As a result, they can be commissioned in situations with high and short-term rising electricity prices. From this it can be concluded that renewable resources can be used much more aggressively in the short-term market.

When assessing the other opportunities for these derivative products, global competitiveness, various tax incentives, a liquid and reliable investment environment can be highlighted. Investments in the electricity market can benefit from general tax incentives, which are VAT and duty exemptions (Deloitte, 2016). With these contracts it is also possible to take positions with lower initial investments. These contracts offer flexible investment strategies and allow investors to buy and sell from today at a future electricity price.

Increasing standardization and the fact that there is a fully integrated structure with the electricity markets of the European Union are key factors in attracting more investors. The Flagship Project is a project aiming at the full integration of the Turkish electricity market into the EU internal electricity market. Thanks to this project, positive progress has been made on the parallel test connection between the Turkish electricity grid and the ENTSO-E (European Network of Transmission System Operators for Electricity) synchronous zone in continental Europe. It will significantly reduce the need for grid interoperability and ensure the supply of electricity for the coming years. The Turkish electricity market has already become part of the EU internal electricity market.

4.4. Threats

The greatest threat to electricity contracts, meanwhile, is dependence on external energy sources. Another threat factor is that these electricity contracts involve both high profits and high losses, especially high losses from speculative transactions, and it is well known that it is difficult to establish simple rules that organise speculative activities (Stoft, Belden, Goldman and Pickle, 1998). With the increasing complexity of balancing supply and demand over time and the belief that the day-ahead market will become less important or weaken over time with the introduction of the intra-day market, may also be a threat. At the same time, low financial literacy leads to low interest in and demand for energy derivatives, and they are considered too risky for not being well understood. Since it is impossible to have control over tomorrow's events, a possible reduction in asset prices at the forthcoming maturity date is a threat to this type of financial contract. Futures contracts that have been used as hedging instruments may cause the potential benefits of favourable price movements to be lost in the future (Moreno Munera, 2016).

While speculative activity reduces market volatility and provides liquidity, there is some evidence in the literature that this type of activity triggers price volatility and contributes to market instability. Speculators can move prices away from their real values and create bubbles (Algieri and Leccadito, 2019). Another factor that threatens derivative products is exchange rates. The instability of the currency, i.e. the dramatic change in the exchange rate between the future and today, will reduce the attractiveness of the futures markets. This situation can also be seen as a threat to electricity derivatives, especially for countries that import energy with the currency of another country and are most affected by exchange rate fluctuations, such as Turkey and other developing countries.

5. Conclusion

The energy market is changing, mainly due to new framework conditions, trends and regulations. As mentioned above, Turkey has gradually built up a well-functioning electricity market over the last ten years. Although legislation and privatization have been implemented and a competitive framework has been established, further measures are needed to promote the development of the electricity market. One of these measures is to support the development of electricity exchanges. There are basically two types of electricity trading on the exchange: spot and futures. Spot trading refers to the short-term trading of electricity. This is where electricity deliveries for the following day are traded on the basis of current consumption forecasts and where spontaneously occurring, unexpected surpluses are sold or short-term shortages are compensated. Longer-term transactions, on the other hand, take place on the futures markets. This is where future electricity quotas for the coming years, quarters or months are traded at fixed prices. In Turkey, base load electricity futures contracts are the first energy derivative instruments. These power futures contracts offer investors interested in the Turkish power market a strong mechanism to manage their risks anonymously.

The above discussion provides a general overview of the development of the electricity market in Turkey and analyses the strengths and weaknesses as well as the existing opportunities and threats of electricity futures. This study suggests that protection against unexpected changes in electricity prices, achieving higher returns through arbitrage or speculation, ensuring more balanced portfolios and effectiveness are the strong characteristics of these financial products. At the same time, an organized futures market minimizes transaction and hedging costs, with an important liquidity gain for the traded securities. On the other hand, an increased demand for electricity and further growth potential, a comprehensive restructuring of the electricity market, various tax incentives, the possibility to take positions with less initial investment and a fully integrated structure with the electricity markets of the European Union are the potential opportunities for base load futures contracts. In conclusion, this study, in parallel to the existing literature, also points to an enormous potential for base load electricity futures.

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