

THE BUDAPEST EXCHANGE MUSEUM PROJECT¹

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ABSTRACT

The *Budapest Exchange Museum* portal – presenting the results of a research project launched eight years ago – went officially live as part of a half-day conference on 18 January 2024, the 160th anniversary of the foundation of the former Budapest Commodities and Stock Exchange. The portal was created to promote further high-quality research into financial and economic history as well as to pay tribute to this emblematic institute of Hungarian economic history that has overcome numerous ordeals during its 160 years of operation.

The original objective of the project was to quantify the long-term returns of financial investments, an interesting topic from both a theoretical and a practical point of view. In the first phase, we collected and digitalised the data required for these calculations. The second phase continued with the development of the portal, the compilation of a database from the available data and starting the research on returns. While studying the data, we realized how many companies and persons who had played a major role in the past have faded into oblivion. This inspired us to extend our research project by the current third phase which centres around the history of the 100 most prominent companies and the personalities associated with them.

This paper summarises the background and current results of the project as well as future plans.

JEL codes: G11, G15, N20, N80

Keywords: return, risk premium, financial markets history, company history

¹ Section 7 is authored by *Márton Pelles*, while the rest of the paper is primarily the work of *Márton Radnai*.

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1 PROJECT BACKGROUND AND OBJECTIVES

The project was originally launched with the objective to calculate the average long-term return of financial instruments (stocks, bonds, currencies, gold) listed on the Hungarian stock exchange between 1864 and 1948. The study of long-term returns has a theoretical as well as a practical importance. In terms of theory, they can be used for the investigation of the ‘risk premium puzzle’, i.e. the question of why equities seem to provide disproportionately higher returns than bonds. From a practical point of view, they are indispensable for retirement planning and asset allocation decisions.

Similar research has started in the US from the 1930s, when the Cowles Commission was established, but it gained real impetus from the foundation of the CRSP (Center of Research of Security Prices) in 1960, which by 1963 created a database of the monthly quotes, dividends and corporate actions of all stocks listed on the New York Stock Exchange between 1926 and 1960 (Fisher-Lorie 1964). The database has been continuously extended to include data on government securities since 1980, NASDAQ since 1984, investment funds since 1996 and daily data from 1925 to 1962 since 2006. In the 1960s and ‘70s, several results and studies in financial economics underlying later Nobel Prizes were based on that database.

The problem with US data is that they are less relevant for Hungarian investors since there was no armed conflict on the territory of the US in the 20th century, unlike Hungary that was involved in two. Studying data from Hungary may therefore produce interesting and valuable contributions.

In the Hungarian literature, Kőrösy (1901) was the first to calculate long-term returns on domestic stocks and government bonds from the period between 1874 and 1898. However, he has made a few methodological mistakes in the case of stocks. Among others, he recognised only dividends and not exchange gain in the results, and therefore underestimated actual returns. The analysis of Mérő (1988) covered the years from 1864 to 1944, almost our entire reference period, but not the entire market, only 94 stocks, and she did not calculate total average return either.

In the course of processing the data, we realized that the story of many of the formerly prestigious entities and their founders and most important leaders had been forgotten. The reason is not simply the forgetfulness of posterity. The Holocaust in 1944 and the rise to power of the Communist party after 1945 put a tragic end to the life of stock market companies and their leaders. It is a period which people were previously not allowed to remember and now they do not like to remember. We felt that this was not right and that we are obliged to these fellow Hungarians who had done so much for the Hungarian economy at their times to ‘excavate’ their stories and share them with the current and later generations.

Consequently, the project scope was extended by research on the history of the 100 most prominent stock market companies and their representative figures.

2 PROJECT PHASES AND PARTICIPANTS

The project was launched in 2016 with professional and financial support by Ramasoft Adatszolgáltató és Informatikai Zrt. The initiator and sponsor of the project is Ramasoft owner and CEO Márton Radnai.

The first phase of the project (2016–2018) was dedicated to researching data and compiling a database of stock market companies, their stock prices, trading volumes and dividends. Data extraction was performed remotely by a team of more than 40 people, headed by Alexandra Szatmári. The software used for the pre- and post-processing of stock market quotations was developed by Ramasoft. Sándor Biszak and Tibor Sándor participated as consultants in the digitalisation process.

In the second phase of the project (2019–2020), the *Budapest Exchange Museum* portal was created also through Ramasoft (primarily by Gábor Nagy, Dorottya Pelles and Tibor Szűcs), the database compiled from the processed data was uploaded to the portal and financial research on the long-term returns of stocks was started by Márton Radnai and Alexandra Szatmári.

In the third phase (2021–2024), the project continues with the publication of results and research on the history of the 100 most important stock market companies and the autobiographies of their founders and prominent leaders. Research is led by Márton Pelles, with contributions to date from Katalin Mérő, Róbert Szabó and Gábor Tamás.

2.1 Data sources and processing methods

In the period between 1864 and 1948, the primary publication outlet for daily stock quotes at the Budapest Commodities and Stock Exchange was its official *Quotation Journal* (Árjegyzőlap, hereinafter ‘QJ’). In addition, quotes were also published between 1864 and 1914 in the *Budapest Gazette* (*Budapesti Közlöny*), the official journal of Hungary, and in the German-language daily newspaper *Pester Lloyd*.

The oldest surviving copies of the QJ date back to 1873. As the printing technique of the time (manual typesetting) prevented cost-effective computer-assisted processing of stock quotes, data from the 1864–1894 period were processed manually on the basis of the newspaper *The Pest Daily* (*Pesti Napló*) for 1864 and 1865, and the *Budapest Gazette* from 1866 on.

Widening of the scope of data published in the *QJ* and transition to more advanced printing technology (automated typesetting) enabled the digital processing of data from 1894. Data from *QJ* copies from these years were extracted primarily by optical character recognition (OCR), followed by manual editing and correction.

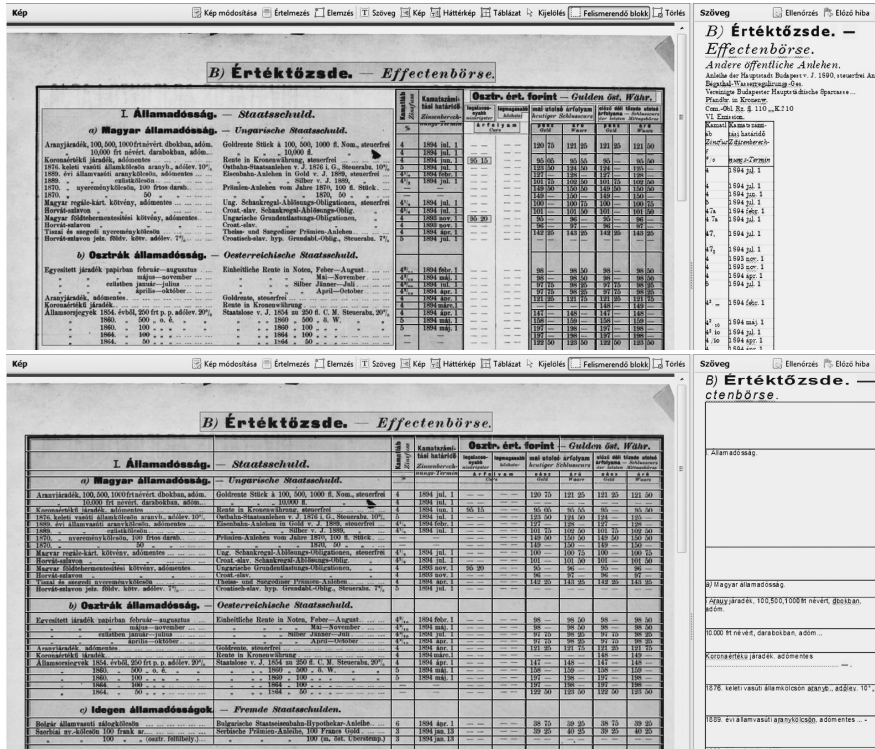
As dividends and number of outstanding shares of companies were available also in the *QJ* from 1894 on, it was our source for digitalising the relevant data for the 1894-1914 period manually. For the 1864-1874 period, data on dividends were recovered from the *Pester Lloyd*, while our data sources for dividends and traded volumes in the 1875-1894 period were the Hungarian and Austrian *Compass* year-books of finance, commerce and industry as well as the *Hungarian Railway Annals* (Magyar Vasúti Évkönyv). Data on number of outstanding shares between 1864 and 1875 are currently unavailable.

2.2 The digitisation of the *QJ*

QJ volumes from the 1894-1913 period were made available by the Budapest Collection of Metropolitan Ervin Szabó Library (Fővárosi Szabó Ervin Könyvtár) and scanned by Arcanum Adatbázis Kft. We used the ABBYY Finereader software for optical character recognition. Text and numbers were digitised in very good quality with the software. As the first output of the project, the digitised copies of the *QJ* were published in 2018 on the publicly accessible Hungaricana cultural heritage portal (*Official Quotation Journal of the Budapest Commodities and Stock Exchange* [1894–1913]).

Data analysis began afterwards. The first tests revealed that the software was less efficient in recognising data published in tabular format in the *QJ* for two main reasons. First, owing to the printing technology of the time, tables had a trapezoid rather than a rectangular shape (probably due to deformation of the extensively used printing plate), resulting in not perfectly parallel rows and columns. In addition, as it was not customary to mark rows in tables by a dividing line, the software usually merged rows.

Figure 1 Automated OCR of the original and the adjusted image



To fix these problems, we have developed a proprietary software for the pre-processing of QJ images. The software automatically adjusted the trapezoid shape after recognising the corners of the table. It also added the missing dividing lines after identifying distinct rows. After pre-processing, the OCR software recognised old tables with high accuracy (Figure 1).

After the OCR process, data were exported to an Excel spreadsheet where they were cleaned of insufficiently recognised characters, converted to the correct data type (prices were converted from text to numbers) and assigned to the database of uniform master data by an Excel macro developed for this purpose. The last step was more problematic because of the frequent occurrence of Hungarian quotation marks in the name of securities, which made it ambiguous and impeded recognition (Table 1).

The Excel files with the converted and matched data were re-exported into another file in which data were structured in bi-annual packages for manual correction. Finally, a common SQL database was created from the corrected files.

Table 1
Raw and edited data in Excel

Allamadósság. — Staatschuld.		eg. kJ z a 5	Kamatzzam- tási határidő Zinsenberech- nungs-Termin	Oszir. ert. forint — Gulden ost. Währ.					
				legalac- o- nyabb	legmag- sabb hochstet- er	mai utolsó beutiger s	arfolyan ch/uzzen rs	előző utolsó Schlusscours der Alltagsbörse	előző arfolyam utolsó letzter
aj Magyar államadósság. — Ungarische Staatschuld.		%		Arfo	lyam	Co	rs		
Aranyjárdék, 100,500,1000frtnévért dbokban, adóm.	Goldrente Stack á 100, 500, 1000 fl. Nom. steuerfrei	4	1894 júl. 1	—	—	120.75	121.25	121.50	
„ 10,000 frtnévért. darabokban, adóm.--	„ „ 10,000 fl. „ W	4	1894 júl. 1	—	—	—	—	—	
Koronaértékű járadék. adómentes	Rente in Kronenwahrung, steuerfrei	4	1894 jún. 1	95.15	—	95.05	95.55	95 — 95.50	
1876. keleti vasúti államkölcsön aranyb., adólev. 10%	Östbahn-Staatsanlehen v. J. 1876 i. G. Steuerabz. 10%	5	1894 júl. 1	—	—	123.50	124.50	124 — 125 —	
1889. évi államvasúti aranykölcsön, adómentes	Eisenbahn-Anlehen in Gold v. J. 1889, steuerfrei	4 1/2	1894 febr. 1	—	—	127 —	128 —	127 — 128 —	
1889. évi ezüstkölcsön.	„ „ Silber v. J. 1889, „	—	1894 júl. 1	—	—	101.75	102.50	101.75 102.50	
1870. évi nyereménykölcsön, 100 frtos darab.	Prämien-Anlehen vom Jahre 1870, 100 fl. Stück. „	—	—	—	—	149.50	150.50	149.50 150.50	
1870. évi nyereménykölcsön, 50 frtos darab.	„ „ „ 1870, 50 „	—	—	—	—	149 —	150 —	149 — 150 —	
Magyar regále-kárt. kötvény, adómentes	Ung. Schanzregal-Ablooms-Obligationen, steuerfrei	—	1894 júl. 1	—	—	100 —	100.75	100 — 100.75	
Horvát-szlavon „ „ „ „ „	Croat.-slav. Schanzregal-Ablooms-Obliq.	4 1/2	1894 júl. 1	—	—	101 —	101.50	101 — 101.50	
Magyar földtehermentesítési kötvény, adómentes	Ungarische Grundentlastungs-Obligationen, „	4	1893 nov. 1	95.20	—	95 —	96 —	95 — 96 —	
Horvát-szlavon „ „ „ „ „	Croat.-slav. „	4	1893 nov. 1	—	—	96 —	97 —	96 — 97 —	
Tiszai és szegedi nyereménykölcsön	Theiss- und Szegediner Prämien-Anlehen	4	1894 apr. 1	—	—	142.25	143.25	142.25 143.25	
Horvát-szlavon jelz. földv. kötv. adólev. 7 1/2%	Croatisch-slav. hyp. Grundabl.-Obliq. Steuerabz. 7%	5	1894 júl. 1	—	—	—	—	— — —	

Nap	1		86	101	1894.07.02		
Értékpapír	Határidő	Minimum	Maxim	Vételi	Eladási	Előző vételi	Előző eladási
Aranyjárdék, 100,500, 1000 frtnévért. dbokban, adóm.				120.75	121.25	121.25	121.5
Aranyjárdék, 10,000 frtnévért. darabokban, adóm.							
Koronaértékű járadék. adómentes		95.15		95.05	95.55	95	95.5
1876. keleti vasúti államkölcsön aranyb., adólev. 10%				123.5	124.5	124	125
1889. évi államvasúti aranykölcsön, adómentes				127	128	127	128
1889. évi államvasúti ezüstkölcsön				101.75	102.5	101.75	102.5
1870. évi nyereménykölcsön, 100 frtos darab				149.5	150.5	149.5	150.5
1870. évi nyereménykölcsön, 50 frtos darab				149	150	149	150
Magyar regále-kárt. kötvény, adómentes				100	100.75	100	100.75
Horvát-szlavon regále-kárt. kötvény, adómentes				101	101.5	101	101.5
Magyar földtehermentesítési kötvény, adómentes		95.2		95	96	95	96
Horvát-szlavon földtehermentesítési kötvény, adómentes				96	97	96	97
Tiszai és szegedi nyereménykölcsön				142.25	143.25	142.25	143.25

For details on the difficulties encountered in this project phase see Radnai (2019).

3 THE BUDAPEST EXCHANGE MUSEUM PORTAL

In the next step, the ‘*Budapest Exchange Museum*’ portal (<https://tozsdemuzeum.hu/en/>) was finished as a result of the work of colleagues from Ramasoft Adatszolgáltató és Informatikai Zrt. In addition to the processed data on stock quotes, dividends and number of outstanding shares, the history of the issuing companies and the prominent personalities associated with them is also accessible to scholars and to the general public on the portal. We have also involved professional and amateur economic historians in historical research, which is expected to continue for years (there are more than 500 issuing companies). To date, more than 70 companies and 40 biographies have been covered.

Figure 2
The Budapest Exchange Museum portal

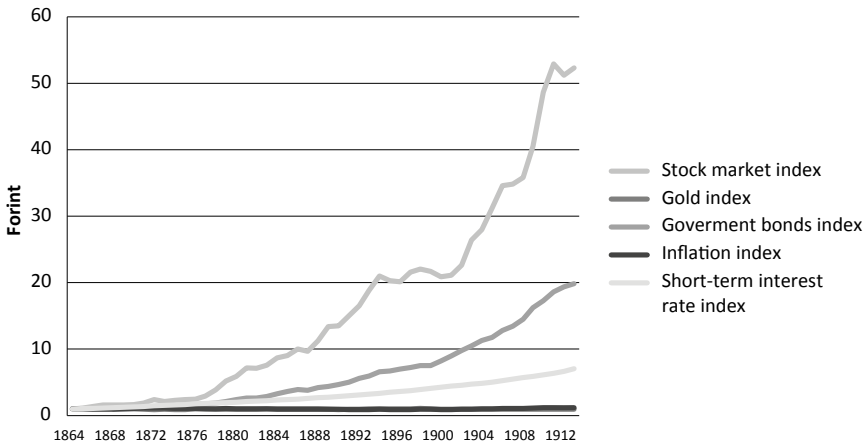


The portal was launched officially at a press conference held on 18 January 2024, the 160th anniversary of the foundation of the historical stock exchange. Figure 2 shows the start page of the portal.

4 LONG-TERM RETURNS

The calculation of long-term returns from the project input took place after the portal was launched.

According to the results, the average annual return on Hungarian stocks was 8.41% in the period between 1864 and 1913. Investors could reap a return of 6.87% on government bonds, 4.07% on bank deposits, but those investing in gold realised a loss of 0.03% per annum. Overall annual inflation in the period was 0.33%. *Figure 3* illustrates how the value of 1 contemporary forint (Austro-Hungarian gulden and later krone) invested in various financial instruments developed between 1864 and 1913.

Figure 3**The value of 1 contemporary forint invested in various financial instruments**

As the figure shows, all financial investments generated a substantial return well above the rate of inflation in the reference period, with stocks offering the highest rates. However, contrary to popular belief, investments in gold could not even retain the real value of the money invested.

In the same period, annual average returns at the New York and London Stock Exchange stood at 6.03% and 7.01% respectively, i.e. of the three markets, Hungary offered the highest rate of return.

The publication of detailed results is in progress (*Radnai-Szatmári 2024*).

5 SPECIAL SECURITIES

Below, we present a few unusual securities traded at the Hungarian stock market of the time.

5.1 Vineyard tithe redemption bonds

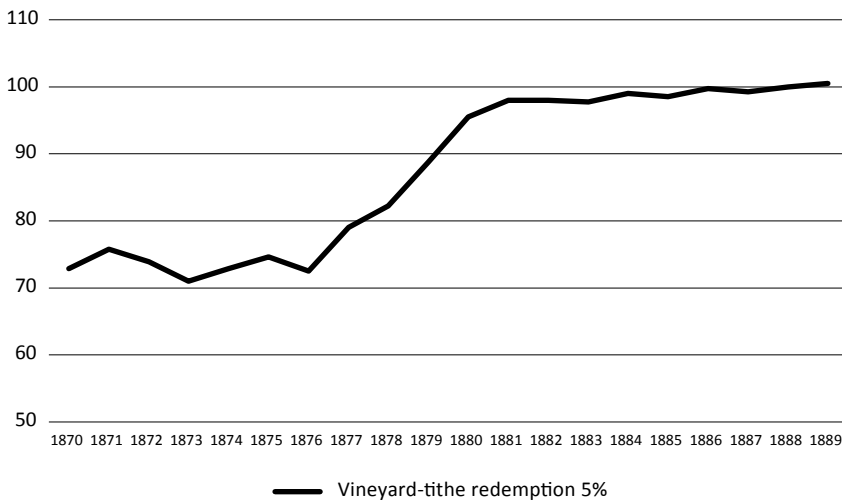
Vineyard tithe redemption is linked chronologically to the end of feudalism and the rise of the new civil social order. The Vineyard tithe or the 'ninth' was one of the servile dues payable in kind by serfs to their landlords. When the obligation to pay the ninth was abolished in 1868 by Act XXIX of 1868, the new proprietors of the land were subject to mandatory redemption by paying compensation to

their former landlords. The compensation payable was equal to 20 times the average duty paid annually in the 10 previous years. As landowners generally did not dispose of such a large sum, the state stepped in as creditor by issuing bonds in the value of the obligation less administrative fees to landlords, so that landowners paid the former annual duty for another 20 years to the state instead of their landlords. Interestingly, landowners repaid annually 8% of the face value, made up of 5% interest, 2.5% repayment fee and 0.5% administrative fee. Accordingly, new title holders only had to pay 50% of the principal in 20 years, while the state funded the remaining 50% from other sources.

The bonds issued under these terms were listed at the stock market and attracted buoyant demand in the secondary market. The Vineyard title redemption bond was the second government bond (after the so called 'Hungarian Railway Bond') issued by the Hungarian state emerging after the Austro-Hungarian Compromise.

The *Figure 4* below shows bond quotes over the term to maturity.

Figure 4
Quotes of the vineyard title redemption bond between 1870 and 1899



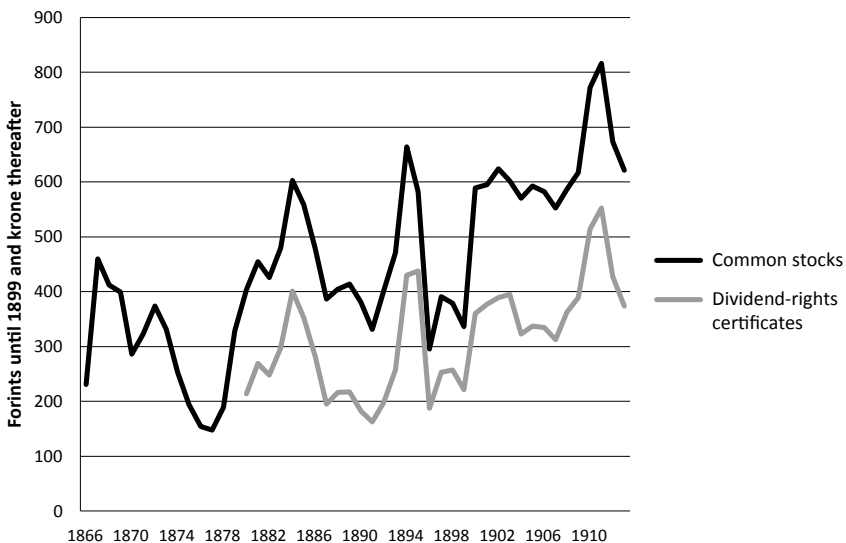
As *Figure 4* illustrates, the bonds of a 5% annual coupon rate were traded at around 75% of their face value in the beginning as the then applicable interest rate was higher than 5%. They reached face value by 1880 as interest rates decreased. This also means that landlords financed 25% of the missing 50%.

5.2 Dividend-rights certificates

Unlike today, shares issued in the 19th century had a maturity. In most cases, the shares were exchanged at maturity for new shares issued by the company, but some companies chose to pay off their share capital on a continuous basis by drawing lots among a percentage of their shareholders (e.g. 2% of holders of shares with 50 years' maturity) and repaying the face value to the winners. In some of the cases, these shares no longer paid dividends, but in other cases, they were exchanged for so called 'dividend-rights certificates' that entitled owners to dividends decreased by the rate of interest paid on the face value (e.g. at 200 forints face value and 5% interest, they pocketed 10 forints less than common stock owners). The two most renowned issuers of such securities were the Budapest Tram Railway Company and the Budapest Tram Urban Railway Ltd.

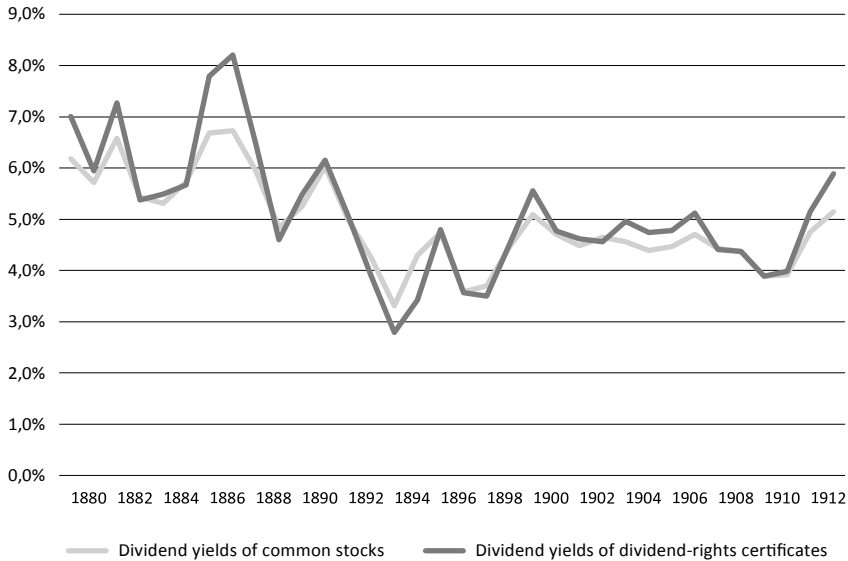
Figure 5 traces the quotes of the common stocks and dividend-rights certificates of the former company in the 1866-1913 period.

Figure 5
Quotes of the common stocks and dividend-rights certificates of the Budapest Tram Railway Company, 1866-1913



The dividend yields of the two securities are plotted on *Figure 6* below.

Figure 6
Dividend yields of the common stocks and dividend-rights certificates of Budapest Tram Railway Company, 1879-1913



It can be observed that return on dividend-rights certificates was generally slightly higher than on common stocks, which is just logical considering that common stock holders had priority over dividend-rights certificate holders when it came to dividend payments. The difference increased when business dwindled and so the market price of its securities fell (in 1886-1887). 1892-1895 was a period for arbitrage as the return on common stocks exceeded that on dividend-rights certificates.

These and other interesting findings are presented in Radnai (2022).

6 THE LEGACY OF FORMER STOCK MARKET COMPANIES IN TODAY'S ECONOMY

It may be surprising, but several of the former stock market companies have persisted in some form or another until today.

Budapest Tunnel Society and Budapest Chain Bridge were both present on the stock exchange, the former between 1864 and 1896, the latter between 1864 and 1869. Back then, the bridges could be used for a fee.

József Bárdi Automobile Ltd was also listed on the stock exchange between 1911 and 1927. Today's Bárdi Automobile Plc is run and owned by founder József Bárdi's successors.

From 1895 to 1947 the stocks of Royal Grand Hotel Ltd were also traded at the stock exchange. The hotel still operates in Teréz körút, now known as Corinthia Grand Hotel Royal.

The Kühne agricultural machine factory was another listed company in the period between 1922 and 1935. Kühne Agricultural Machine Factory Ltd., its successor company is still active. The Arms and Machinery Factory Ltd, commonly known as 'FÉG', which was listed on the stock exchange between 1899 and 1944 operates up until today. However, they are now manufacturing boilers instead of weapons. The stocks of Ganz & Comp. Danubius Machine, Railway, Carriage-Manufacturing & Ship-Building Co. Ltd., now Ganz Machine Manufacturing Holding Ltd., were publicly traded from 1872 to 1948.

First Hungarian Share Brewery was among the first companies which went public after the foundation of the stock exchange, listed from 1869 until 1948. After a merger in 1935, the business continued as Dreher-Haggenmacher First Hungarian Share Brewery Ltd. Beer is still brewed at the Kőbánya plant by the successor Dreher Breweries Ltd. (part of Asahi Group).

This year (2024) is the 100th anniversary of the 1924 foundation of the National Bank of Hungary, also publicly traded at the stock exchange between 1925 and 1946.

While the majority of the companies no longer exist, their former premises remain distinctive landmarks of Budapest. Among them, Adria Palace, the former headquarters of Adria Royal Hungarian Sea Navigation Company Ltd still stands tall among the prominent buildings of Szabadság tér. The former headquarters of Hungarian General Creditbank Ltd currently accommodates the Ministry of Finance, while the buildings of Hungarian Commercial Bank of Pest Ltd host the Gerbaud confectionery and the Ministry of Interior today. The prominent companies of the period not only left their mark on the city landscape, their legacy is clearly perceptible in the present-day economic environment of Hungary.

7 THE MOST PROMINENT COMPANIES AND PERSONALITIES ASSOCIATED WITH THEM

As described above, the primary objective of the *Budapest Exchange Museum* project was the historical analysis and publication of long time series data of the Budapest Commodities and Stock Exchange. As a corollary, we realised that the history of many of the companies listed on the Hungarian stock market at the time have not received any scholarly attention. We know little even of corporations that contributed significantly to the development not only of Hungary, but the entire region. Similarly, the biographies of their founders and the professionals leading these companies over their decades-long history are mostly unaccounted for. Therefore, as an additional objective, we collected and published the history of a hundred companies that were deemed the most important based on their stock market figures. For each company, we also highlighted a leader or founder whose life and work was decisive for the company.

In theory, writing company histories should not be problematic as economic history has a tried and tested methodology for pinpointing the most important elements in corporate histories. Similarly, collecting documentary sources – such as the study of archives or the literature, statistical data collection and analysis – is a time-consuming but routine task. Moreover, in the case of a few companies, there is previous or even ongoing research by contemporary economic historians who can also be involved in accomplishing the task.

The final list of the most prominent companies is presented in *Table 2* below.

Table 2
List of the most prominent stock market companies

Issuer	Industry
'Hermes' General Hungarian Exchange Office Company Limited	
Anglo-Austrian Bank	
Austrian Creditbank	
Austro-Hungarian Bank	
Budapest Banking Association Ltd	
Central Mortgage Bank of Hungarian Savings Banks	Banks
Croatian-Slavon National Mortgage Bank	
First Hungarian Industrial Bank	
Fiume Credit Bank	
Hungarian Commercial Bank of Pest	
Hungarian Discount and Exchange Bank	

Issuer	Industry
Hungarian General Creditbank Hungarian Mortgage Bank National Bank of Hungary	Banks
'Athenaeum' Literary and Printing Ltd 'Pallas' Literary and Printing Ltd Franklin Society Révai Brothers Literary Institute Ltd	Book publishers
First Hungarian Share Brewery Gschwindt Distillery for Spirits, Yeast, Liqueurs and Rum Ltd	Breweries and distilleries
'Chinoim' Medicine and Chemical Products Factory Ltd 'Hungária' Chemical and Metallurgical Plants Ltd 'Szikra' Hungarian Gypsum Factories Ltd Diana Industrial and Commercial Ltd First Pest Spodium and Hay Factory Ltd	Chemical companies
Fiume First Hungarian Rice Mill and Rice Starch Manufacturing Company Limited	Food companies
United Incandescent and Electric Ltd	Gas and electricity companies
'Foncière' General Insurance Institute First Hungarian General Assurance Company Hungarian Ice and Reinsurance Ltd Pannónia Reinsurance Institute Vienna Insurance Company Vienna Life and Annuity Insurance Institute	Insurance companies
Arms and Machinery Factory Ltd Ganz & Comp. Danubius Machine, Railway, Carriage-Manufacturing & Ship-Building Co. Ltd. Hungarian Metal and Lamp Manufacturer Ltd Láng L. Machine Factory Ltd Rimamurány-Salgótarján Ironworks Ltd Schlick-Nicholson Machine, Wagon and Shipyard Ltd Teudloff and Dittrich Bp. Armature, Derivative and Mechanical Engineering Ltd Weitzer J. Machine, Wagon and Iron Foundry Ltd	Ironworks and machine factories
'István' Brickworks Ltd Bauxit Trust A.-G., Zurich	Mines and brickworks

Issuer	Industry
Beocsin Cement Factory Union Ltd	
Borsod Coal Mines Ltd	
Budapest-Szentlőrinc Brick Factory	
Coal Mine and Brickworks Company in Pest	
Hungarian Asphalt Company Limited	
Hungarian Ceramic Factory Ltd	
Hungarian General Coal Mine Ltd	Mines and brickworks
Kőbánya Steam Brickworks Company	
North Hungarian United Coal Mining and Industrial Company	
Northern Hungarian Mining and Metallurgical Ltd	
Salgótarján Coal Mine Ltd	
Újlaki Brick and Lime Burning Ltd	
United Brick and Cement Factory Ltd	
Brassó Cellulose Factory Ltd	
Budapest General Electricity Ltd	
First Hungarian Paper Industry Ltd	
First Hungarian Pig Fattening Ltd	
General Wagon Hire Association	
Hungarian Electricity Ltd	Miscellaneous companies
Hungarian Railway Traffic Ltd	
Hungarian Rubber Goods Factory Limited	
International Wagon Hire Ltd	
Kőbánya Civilian Brewing Ltd	
Telephone Factory Ltd	
Turkish Imperial Tobacco Ltd	
Hungarian General Savings Bank	
Pest's First Domestic Savings Bank Association	Savings banks
United Savings Bank of Budapest	
Concordia Steam Mill Ltd	
Erzsébet Steam Mill Society	
First Budapest Steam Mill Ltd	
Hungária United Steam Mills Ltd	
Lujza Steam Mill Ltd	Steam mills
Pannónia Mill	
Pest Millers and Bakers Steam Mill Ltd	
Pest Roller Mill Ltd	
Pest Viktória Steam Mill	

Issuer	Industry
Agricultural Industry Ltd Hungarian Sugar Industry Ltd Sugar Factory Ltd Veliki-Beckerek	Sugar factories
First Hungarian Wool Laundry and Fine Textile Mill Ltd Győr Textile Works Ltd Hungarian Cotton Industry Ltd Nasic United Factories and Forestry Operations	Textile companies
Adria Royal Hungarian Sea Navigation Company Limited Austro-Hungarian State Railways Barcs-Pakrac Railway Budapest Tram Railway Company Budapest Tram Urban Railway Ltd Budapest Tunnel Society Budapest-Újpest-Rákospalota Tram Road Railway Ltd First Imp. and Royal Free Danube Steamship Co. Hungarian Levant Sea Navigation Company Hungarian Western Railway Hungarian-Czech Railways Kassa-Oderberg Railway Kassa-Torna Local Area Railway Ltd Limited Company for Electricity and Transportation Companies Máramaros Salt Railway North-Eastern Railway Plain-Rhineland Railway Southern Railway	Transport companies

As opposed to company histories, identifying the professionals who played an important or even decisive role in the history of the respective companies was a real challenge. To have a better overview, we should look to the characteristics of the Hungarian economy in the 19th and 20th century. Single-person companies or great founders no longer had a central role in this period. Instead, the major players were businesses incorporated as joint-stock companies that could mobilise bank capital. As a result, it is very difficult to single out the most important professionals of these companies that in some cases had grown into multinational

groups in the present-day sense of the word. For example, in the case of Ganz & Ship Building, Railway, Carriage-Manufacturing & Ship-Building Company, it would be unjustified to feature the biography of the founder Ábrahám Ganz, who had little to do with the company's activities in the late 19th let alone in the 20th century. We might as well state that since the object of our study are the prominent figures of listed companies, i.e. specifically joint stock companies, founders by default may not be important. And yet there are cases where it is indeed the founder who emerges as the most representative professional in the company's history. A good example is Mihály Gschwindt, the owner of a Budapest distillery, achieving enormous success with his business which was later reorganised into a family-owned joint-stock company run for generations by his successors. At the same time, there were founders who eventually drove their business into bankruptcy, but continued in its leadership – as experts of the industry – after the company was acquired by a bank (e.g. Károly Teudloff of the company Teudloff & Dittrich). There is also a third option when the company was established by a group of investors wishing to enter a new sector (e.g. the Oil Refinery Works Ltd in Rijeka). In these cases, finding an answer to the question 'who is the professional who had a foundational role in the life of this company?' is especially difficult.

Along these considerations, we concluded that we should probably search in the management board of the companies – if a company's success can be linked to the work of a single professional at all. We discovered two things while searching: First, we quickly spotted frequent repetitions across the management of prominent companies. Second, we noticed that many of them have been awarded a title of nobility while in office. These observations led to two research questions:

- 1) Who had been granted a title of nobility for or in connection with their management work?
- 2) Who were the most influential business managers in Hungary in the period investigated?

The two questions are partly interrelated and also point to a third question. We started our research on the assumption that we are going to present the 'professionals' associated with the 100 selected companies, but the high number of inter-personal links made us realise that we are actually looking for the central figures of the network of Hungarian corporations. Some of them were even granted a title of nobility by the state in recognition of their work. Others, by contrast, can only be identified relying on methods of network theory.

We needed a database also for finding these figures. In the database, we recorded the noble rank and title, the academic title, the name and the posts held within the company of all board members of all the selected companies between 1875

and 1945³. After cleaning the data (e.g. handling name variations such as Hermann/Ármin, Rezső/Rudolf, Félix/Bódog, etc.), the final database consisted of 3 768 persons. As we looked for the most successful among them, it seemed logical to first identify those who had been appointed to the Hungarian nobility or to a higher rank of nobility in connection with their business activity in the first half of the reference period, i.e. the Dualist Era, since a title of nobility – granted by the monarch or purchased – was a telltale sign of success. There were 220 persons in our database with a title of nobility, including 2 princes, 11 counts, 74 barons and 133 common nobles. Of them, we compiled a shortlist of 109 persons with a directly granted title of nobility (1 prince, 2 counts, 34 barons and 72 common nobles).⁴ There were still a few persons among them who held a post only in a single company, while we wanted to map the centre of the Hungarian corporate network as well.

Therefore, we analysed the number of posts held by the same person in the full database. Based on the analysis, 293 persons held a post in at least 3 entities (of the 100 companies studied) and 53 held posts in at least 6. The list of persons with the most corporate affiliations is itself informative.

- 13 posts:
 - Fülöp Weisz
- 12 posts:
 - Baron Adolf Ullmann de Baranyavár
 - Leo Lánczy
- 11 posts:
 - Dr. Tibor Scitovszky de Nagyker
 - József Lukács de Szeged
- 10 posts:
 - Baron Dr. Albert Radvánszky de Radvány et Sajókaza
 - Baron Zsigmond Kornfeld
 - Dr. Lajos Mándy de Mánd
 - Dr. Gyula Pósch
 - Dr. Lajos Walko

3 Management boards were studied within a shortened period, from 1875 to 1945, as comparable data were available only after the reforms in Hungarian national administration, statistics and archives as a result of the 1868 Compromise, but before nationalisation began in 1945 and dedicated records on joint-stock companies were not kept any longer.

4 The rest of the persons eliminated from the shortlist were mostly second-generation grantees, such as a 20th descendant being active between the two World Wars of a 19th century grantee.

We proceeded with a detailed analysis of the 293 persons filling a post in at least 3 companies. We plotted a network of connections between them. To assign weights, we defined a symmetrical array in which no person had a connection to himself (i.e. the value of the main diagonal was 0), while if a person and another person were both members of the board of a given company, they mutually acquired a weight of 1 in relation to each other. Consequently, professionals sitting together on the board of more than one companies were overweighted. At the same time, weights were acquired also by persons who have never met each other, as one of them sat on the management board in 1875, while the other was a member of the board of the same company in 1940. However, the total mutual weights of these cases were so low that we excluded them later from the analysis.

The result was a network of 15 384 connections between 286 persons (some of the initial 293 persons were cast to the periphery already at this step). We found that the resulting network was scale-free, i.e. we have managed to delimit a quite stable class of society which, due to its scale-free nature, was highly resilient to shocks. It should be noted at this point that it was not pure coincidence that the lives of many company leaders ended in the 1940s and 1950s. It was the takeover by the Nazi and then the Communist regime that finally broke this distinct business manager group of society delineated in our investigated network.

A deeper analysis revealed smaller (3-5 persons) and bigger (30-40 persons) central sets of nodes, representing the interest groups occupying the highest corporate positions. In depth analysis of the network also reflected chronological changes as the business elites of the Dualist and the Horthy Era formed distinct clusters. We also prepared a summary of persons with the highest number of ties to other persons in the database. While for network analysis we identified persons with the highest weights, now we examined nodes with lower weights to see who had the highest number of connections to other persons, i.e. the highest number of weak ties within the network. Finally, we compared the three datasets (nobility title, centrality, extensive weak ties).

Table 3 shows persons who have taken a prominent place in all three analyses.

Table 3
Prominent stock market company leaders with a title of nobility at the centre

Name	Number of connections	Number of posts	Merit for the title of nobility and most important posts
Baron Adolf Ullmann de Baranyavár	191	12	Vice Chairman and Chief Executive Officer of Hungarian General Creditbank
Baron Zsigmond Kornfeld	172	10	Chairman of the Budapest Commodities and Stock Exchange and Chairman of Hungarian General Creditbank
József Lukács de Szeged	152	11	Member of the Board of Anglo-Austrian Bank
Bun József de Hidegvölgy	138	7	Chief Executive Officer of the United Savings Bank of Budapest
Baron Dr. Albert Radvánszky de Radvány et Sajókaza	129	10	With brother Antal Vice Chairman of the Upper House
Baron Károly Hatvany-Deutsch de Hatvan	119	7	Merits in economics and social welfare Chairman of the Concordia Steam Mill company
Baron Dr. Adolf Kohner de Szászberek	111	6	Wholesaler Chairman of the First Hungarian Wool Laundry and Fine Textile Mill company
Miksa Fehér de Nagyabony	109	6	Managing Director of Hungarian Commercial Bank of Pest
Baron Sándor Hatvany-Deutsch de Hatvan	95	6	Merits in economics and social welfare Member of the Board of Pest's First Domestic Savings Bank Association
Dr. Imre Pekár de Rozsnyó	94	7	Chief Executive Officer of Hungarian Discount and Exchange Bank
Baron Vilmos Kohner de Szászberek	90	8	Wholesaler Vice Chairman of the First Hungarian Wool Laundry and Fine Textile Mill company
Baron Dr. Géza Pap	77	6	Merits in public life and economics Member of the Parliament of Hungary

The 12 names in *Table 3* above were the most influential figures in economic life in Hungary, held posts in the most prominent companies, were connected with managers at many other companies and were appointed to the Hungarian nobility or to a higher rank of nobility in recognition of their work.

In addition to these central figures, our analysis identified the 15 persons in *Table 4* below who also held a title of nobility but were located farther away from the network centre.

Table 4
Other important stock market company leaders with a title of nobility

Name	Number of connections	Number of posts	Merit for the title of nobility and most important posts
Baron József Hatvany-Deutsch de Hatvan	108	4	Large landowner, regulation of the bed of River Zagyva Member of the Board of First Budapest Steam Mill Ltd
Baron Géza Radvánszky de Radvány et Sajókaza	102	3	As son of Albert, but jointly with his father Chairman of the Liberal Party
Baron Béla Hatvany-Deutsch de Hatvan	91	5	Merits in economics and social welfare Member of the Board of Pest's First Domestic Savings Bank Association
Dr. Konrád Burchard-Bélaváry de Bélavár	87	5	Member of the Board of the Pest Roller Mill Ltd
Béni Enyed de Nagyenyed	85	5	Technical Counsellor of the Hungarian Agricultural and Annuities Bank
Jakab Simon de Boglár	82	5	Vice Chairman of the Budapest Commodities and Stock Exchange
Sándor Strasser de Kisbab	81	4	Landowner Member of the Board of Pannónia Mill
Hugó Kilényi de Kilény	81	5	Merits in the railway industry and commerce Minister's Counsellor
Baron Lipót Jenő Haupt-Stummer de Tavarnok	80	3	Merits in humanity, public education and economics Vice Chairman of Agricultural Industry Ltd

Knicht Miksa Brüll de Domony	76	5	Business and bank manager Member of the Board of Pest's First Domestic Savings Bank Association
Baron Zsigmond Schossberger de Tornya	76	3	Large landowner, wholesaler Member of the Board of First Hungarian General Assurance Company
Henrik Jellinek de Haraszt	76	4	Member of the Board of Budapest Tram Railway Company
Baron Henrik Lévy de Kistelek	73	5	Member of the Board of First Hungarian General Assurance Company
Baron Manfréd Weisz de Csepel	72	5	Factory owner Member of the Board of Manfréd Weiss Steel and Ironworks, Vice Chairman of Arms and Machinery Factory Ltd
Baron Dr. Henrik Ohrenstein de Beocsin	70	4	Chairman of the Beocsin Cement Factory Union Ltd

Last but not least, the 26 persons in table 5 below emerged as additional key figures in the network, also having several weak ties:

Table 5
Other important stock market company leaders

Name	Number of connections	Number of posts	Highest post filled
Dr. Tibor Scitovszky de Nagykér	204	11	Minister of Foreign Affairs, Chief Executive Officer of Hungarian General Creditbank
Fülöp Weisz	203	13	Chief Executive Officer of Hungarian Commercial Bank of Pest
Leo Lánczy	188	12	Chief Executive Officer of Hungarian Commercial Bank of Pest
Dr. Gyula Pósch	109	6	Managing Director of Pest's First Domestic Savings Bank Association
Baron János Harkányi de Taktaharkány	200	8	Minister of Trade, Chairman of Hungarian General Creditbank

Name	Number of connections	Number of posts	Highest post filled
Dr. Lajos Walko	172	10	Minister of Trade, Minister of Foreign Affairs, Chairman of Hungarian Commercial Bank of Pest
Baron György Ullmann de Baranyavár	173	7	Vice Chairman of Hungarian General Creditbank
József Tivadar Salamon	166	9	Member of the Board of «Hermes» General Hungarian Exchange Office Company Limited
Baron Dr. Marcell Madarassy-Beck de Madaras	168	9	Chairman of Hungarian Discount and Exchange Bank
Pál Szécsi	127	9	Chairman of Nasic United Factories and Forestry Operations
Dr. Tihamér Fabinyi	149	7	Minister of Trade and Finance, Vice Chairman of Hungarian General Creditbank
Dr. Lajos Mándy de Mánd	147	10	Managing Director of Hungarian General Creditbank
Pál Engel	135	8	Vice Managing Director of Anglo-Austrian Bank
Rudolf Kállay	147	8	Managing Director of Hungarian General Creditbank
Henrik Fellner	122	8	Vice Chairman of Hungarian Commercial Bank of Pest
Dr. Ferenc Chorin Jr	145	8	Chief Executive Officer of Salgótarján Coal Mine Ltd
Géza Kovács	127	8	Chairman of «Hermes» General Hungarian Exchange Office Company Limited
Kálmán Jálics	140	7	Member of the Board of Hungarian Commercial Bank of Pest
Dr. Aurél Dobay	95	8	Deputy Chief Executive Officer of the Anglo-Hungarian Bank
Knight Dr. Mór Domonyi de Domony	134	6	Chairman of the Brassó Cellulose Factory
Dr. Gusztáv Gratz	104	8	Minister of Finance, Minister of Foreign Affairs

Name	Number of connections	Number of posts	Highest post filled
Károly Barzca	133	7	Managing Director of Hungarian General Creditbank
Dr. Sándor Matlekovits	91	8	Member of the Diet of Hungary, Member of the Hungarian Academy of Sciences
Dr. Sándor Popovics	130	6	Governor of the National Bank of Hungary Vice Chairman and Chief Executive Officer of
Sándor Fleissig	75	7	the Anglo-Hungarian Bank Chairman of the Budapest Commodities and Stock Exchange
Baron Pál Kornfeld	120	6	Member of the Board of Hungarian General Creditbank

Overall, the persons listed in tables 3-5 above can be considered the most prominent business figures of their time. Obviously, many of them were executives at a bank and were appointed to the management on account of their banking background (especially between the two World Wars, when companies were drawn under banks' control due to the inflation of the Hungarian korona and the impact of the Great Depression). It was common for banks holding a stake in a business to import their own executive officers into the management board of the company. Whenever we identify other professionals who had a conspicuously important role in the life of a company, their biographies will also be researched and published.

8 FUTURE PLANS

The two main project tasks remaining are the completion of the research on long-term returns (extension to the 1914-1948 period) and the rest of the company histories and biographies.

The English version of the portal is currently under preparation to make the information available to the international public as well.

We also have a longer-term plan to work in cooperation with other institutions (archives, museums, collectors) to make objects, photos and documents relating to the former stock exchange available on (and also outside) the portal to scholars and to anyone interested.

9 SUMMARY

We outlined in this paper the most important highlights and achievements of the *Budapest Exchange Museum* project launched in 2016.

In the first phase of the project, stock market quotes, dividends and corporate actions were recorded and processed using OCR technology. As a result of the project, almost 20 volumes of the *Quotations Journal*, the publication outlet of quotations on the former stock exchange, are now searchable online.

The second phase included the development of the *Budapest Exchange Museum* portal presenting project outputs and the structuring of the data into a database. Research on long-term returns also began in this phase. Based on our findings, the average return on stocks at the former Hungarian exchange was 8.41% in the period between 1864 and 1913, exceeding average returns at the London and New York Stock Exchange in the same period.

In addition to returns, we explored some intriguing securities such as the Vineyard tithe redemption bond, issued to discharge the tenth formerly payable in kind after wine products, or dividend-rights certificates granted instead of shares to shareholders whom the capital had already been repaid.

We also observed that even though most of the former stock market companies discontinued operation in parallel with the 1948 shutdown of the stock exchange, former company premises, trademarks or other company property are still in use and preserve a link between former and present-day companies.

The currently ongoing third project phase covers research on the history of the 100 most prominent stock market companies of the time and the personalities associated with them. As part of the research, we mapped connections between company leaders, and identified a robust network formed by the contemporary business elite that could only be destroyed by the Holocaust and takeover by the Communist Party – tragically, together with many of the people involved in it. We are positive that by reviving the stories and biographies of former stock market companies and leaders, we can save their memories for future generations.

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