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A Source Collection on Urban Annuities, 14th–18th Centuries

An Introduction to the Data

ABSTRACT: Annuities were an important credit instrument throughout much of Europe during the pre-modern period. Here we present the interest rates on annuities sold by urban authorities across the Holy Roman Empire and Italy from the 14th to 18th centuries. Following an introduction to the sources for urban annuities, the data is organized into three sets: 1. Annual means by market; 2. Raw data by market; 3. City links expressed in currency, silver weights and commodity baskets. This is the largest data set of its kind, representing over 35,000 observations from 103 markets. The data offers exceptional insight into the development of capital markets, networks and urban finance, among other topics, over this period. It is hoped its publication will open new avenues for future research.

Keywords: annuity markets, dataset, public debt

JEL-Codes: N23, O16, Y1

1. Introduction

The data published here comprises interest rates computed from annuities sold by urban authorities across the Holy Roman Empire and Italy. It was compiled for the project 'Integration and Growth: Capital and Grain Markets in Central Europe, 14th to 18th centuries', which sought to compare capital market integration in the Empire with that of Italy.¹

Annuities were the most important credit instrument north of the Alps. They were sold privately, between individuals or groups of people, or publicly, by urban authorities. Sales of public annuities could in some years amount to a quarter or more of towns' revenues and expenses – leading to high indebtedness and potential social unrest. Sometimes cities sold annuities to cover extraordinary expenses, such as those arising from wars and conflict or large building projects. More typically, however, German cities sold annuities continuously, not only in response to specific or unusual financial needs. Be-

1 The first analysis of this data is presented in Chilosì et al. (2018). Researchers intending to use the material provided here are advised to consult this article for further information data. This project was funded by the Leverhulme Trust (RPG-133) and directed by Max Schulze and Oliver Volckart.

cause of their role in public finance, previous research has focused primarily on local case studies and individual urban markets, particularly amongst scholars of northern Germany.² More recently, sources on urban annuity sales have been employed in studies on the cost of borrowing, state formation and market integration.³ In Italy credit took a different form, largely based on forced loans from the 12th to 15th centuries and voluntary annuities thereafter. The result, however, remained increasing indebtedness as cities failed to increase revenues to fund their expanding expenditures.⁴

In addition to a distinction between public and private annuities sales, there were also two broad categories of annuity: those which were heritable and redeemable (such as perpetuities in their various forms), and those which were sold for the term of the life or lives of the purchaser or the person for whom the annuity was purchased.⁵ Although data on life annuities supplements the main data set, priority here has been given to non-life annuities.⁶ Heritable annuities increased in importance over life annuities during the period surveyed.⁷ They also provide more easily comparable data, since contracts for life annuities were often complex, sometimes including varying rates for multiple beneficiaries. At times, life annuities were even redeemable, as for example in Hanover. With very few exceptions, however, there is no evidence that life expectancy / age had any impact on the interest rate for life annuities.⁸

The dataset presented here is unique. Drawn almost entirely from unpublished archival sources, it offers the largest set of historical interest rates based on annuities yet produced. The dataset also covers the widest selection of markets and the longest chronological spread of any such dataset. As such, the data makes a large quantity of evidence accessible for the first time, and it is hoped will allow for future research on a wide range of topics.

In the following, we will first discuss the provenance of the data, particularly the types of sources used. This section also offers insight into further information given by

- 2 An overview is given in Isenmann (2014), pp. 953 f., pp. 549 f. For case studies see for example: Eberhardt (1996); Albers (1993); Baum (1985); Beyer (1901); Bohmbach (1969); Cremer (1936); Fuhrmann (2003); idem (2016); Gätjen (1928); Gilomen (1982); idem (2003); Kirchgässner (1986); Knipping (1894); Lorenzen-Schmidt (1979–1980). See more broadly on the topic of urban public debt and annuities also the volumes of von Seggern et al. (2008); Lau et al. (2018); Zijderdijjn et al. (2015).
- 3 For example, Epstein (2000); Stasavage (2011); Chilosì et al. (2018); Zijderdijjn (2009).
- 4 Chilosì et al. (2018), p. 640; Chilosì (2014).
- 5 Terms regarding heritable annuities include *erflik/erfrenten*, and *reemptions, redditus, losrenten / rente ten lossen, widdereufluch rente or wedderschatte*, all meaning that they were redeemable. In some places term ‘perpetuity’ remained in use (*ewiggelt, ewiger czins, ewigrenten, rentes perpetuelles, luoghi non vacabili*), however, with the context demonstrating that they were indeed redeemable. In later centuries, *obligation* is also a common term.
- 6 Furthermore, for reasons of comparability, availability, and geographic spread, short-term loans have been largely excluded. The exceptions are a few term annuities from Italian cities, such as Venice.
- 7 Compare Eberhardt (1996) pp. 52 f.; Albers (1939), pp. 27 f.; Knipping (1894), p. 346; Beyer (1901), pp. 87 f., 90–93, 97; Fuhrmann (2008), pp. 2–14.
- 8 In most cases, there is no information on the age of the buyers. In Brunswick and Munich, information on age is occasionally stated in the sources. The ledgers for Leiden and Amsterdam do note age, pointing towards a different practice in selling life annuities in the Low Countries. However, there are only isolated examples when the pay-out was explicitly linked to the age of the purchaser, such as Venice in 1625, when three age bands were specified. Such instances have been excluded from the computations of yearly means.

the records which may be of interest for those wishing to use the data, but which is not included in the data sets. We continue with an overview of the general characteristics of the dataset, particularly the geographic and chronological distribution of the observations. In the final part, we explain the tables: how they were built, how the data sets were constructed and biases/restrictions of the data.

2. Types of Sources

In the data collection, we focused on the types of sources in which annuities were regularly and systematically recorded, namely:

- 1) The annuity letters themselves and copies of the letters in city book series specifically created for that purpose
- 2) Ledgers for administrative purposes, e. g. managing payouts
- 3) Urban accounts, listing sold annuities as extraordinary revenues
- 4) Edicts

Table 1 gives a summary of the main types of sources from which the dataset has been derived.

Table 1: Observations by source type and annuity type

Annuity type	Heritable annuities	Life annuities	Total
Source type			
Letters	9,153	4,131	13,284
Ledgers	7,048	730	7,778
Urban accounts	6,053	6,114	12,167
Edicts	489	92	581
Secondary sources	3,612	395	4,007
Total	26,355	11,462	37,817

Source: *Datasets*.

Letters, the most common source for the Empire, provide the most detailed information about the contract. Ledgers and other urban accounts offer rather more uneven detail. Some record all of the annuities sold and the conditions of the contract and its transfer or redemption, while others list only the amount of the loan and subsequent payout. Additionally, some ledgers and accounts record only later interest rates rather than the rate at which the annuity was originally purchased and these cannot be used with certainty for calculating the rate at the date of purchase unless used with other corroborating sources. On the other hand, edicts were official proclamations of the interest rate and conditions on which annuities were purchased – and subsequent examination of annuities in areas for which edicts were found, primarily Italy and the Low Countries,

show that the official rates set by edict prevailed. For non-German markets in the Empire – for example Dutch or Flemish – the dataset includes rates determined by law and published in edicts. In Lille and Amsterdam, where it is possible to compare such rates with those paid on the primary market, both match.⁹

Below is an example from the annuity books of Brunswick, one of the markets with the most extensive data:¹⁰

Figure 1: Annuity letter for Jeronimus Grimme

Source: Stadtarchiv Braunschweig, B I 12 Weddeschatbücher, vol. 5, fol. 168v. © Stadtarchiv Braunschweig.

9 Similar conclusions have been found for Zeeland: Feenstra (2014), pp. 15 f. Paper presented at the Leiden International conference in Political History.

10 Stadtarchiv Braunschweig, B I 12 Weddeschatbücher, vol. 5, fol. 168v.

Table 2: Annuity letter for Jeronimus Grimme, 1509

Original text in Low German	English translation
Seller	
<i>Wy de Gemeine Rad der Stad to Brunswigk in allen vijf wibelden Bekennen openbar in dussem breve vor uns unse Nakoemen Gemeynen Borgere und alsweme dat wy eindrechtliken myt witscop und fulborden alle der jennen de dat myt uns fulborden scholden hebben vorkoft van unser Stad wegen unde vorkoepen jegenwordigen in craft dusses sulven breves ...</i>	We, the common council of all five towns of Brunswick avow openly in this letter before ourselves, our successors, the common citizens and whoever else that we consentaneously, with knowledge and approval of all those who should give their approval together with us, have with this letter sold for our town's ends ...
Capital, annuity	
<i>... vor vijfhundert gude rinsche gulden, de uns alle betalet in unser Stad nuth und fromen witlicken gekort syn [...] Twintich gude fulwichtige rinsche gulden an golve ofte goides gewert jarliker renten ...</i>	... for 500 good Rhinegulden that have all been paid to us and delivered to our town's end [...] 20 good Rhinegulden annual payment of full weight in gold or the value of the gold ...
Buyer, beneficiaries	
<i>... dem vorsichtigen Jeronimo Grymmen Borger to Gosler ofte hebbet dusses breves, myt synen guden willen ...</i>	... the respectable Jeronimus Grimme, citizen of Goslar, or the holder of this letter with his will ...
Security, dates of pay-outs	
<i>... [jarliker renten] de wy und unse Nakoemen one jarlikes van unser Stad Schote unser Stad redesten guden und upkoemen to Sunte Martens dage schullen und willen unvortochlick gutliken entrichten und geven ...</i>	... [the annuity] that we and our successors will pay him annually from our town's taxes and rightful goods and revenues on St Martin's day without delay and amicably ...
Conditions of redemption	
<i>Jedoch hebben wy uns in dussem kope den willen und de macht beholden, dat wy ofte unse Nakoemen dusse twintich gude fulwichtige rinsche gulden tynses van dem gedachten Jeronimo Grymmen ofte synen medebenomen alle jare wan id uns belevet vor vijfhundert gude rinsche gulden moigen wedderkoepen. Wan wy des geneiget syn so schullen wy und willen one dat eyndel jares tovoorn vorkundigen. Na ummekomyng des ferndel jares schullen wij und willen one dat vorkundigede golt nomlick vijfhundert gude Rinsche gulden sampt den bedageden tynsen gutlick vornoigen unde overtellen.</i>	However, we have with this sale reserved for us the right and power that we or our successors can redeem these 20 good Rhinegulden of full weight interest from the said Jeronimus Grimme or whoever is named with him in each year whenever we like, for 500 good Rhinegulden. If we want to redeem, we must announce it to him a quarter of the year before and after the quarter, we must amicably pay [the buyer] the announced gold, namely 500 good Rhinegulden and the accumulated interest.
Eschatol, date	
<i>Dat sodan is alle wu boven berort van uns und unsen Nakoemen stede vast aene jenigerleye list ofte hulperede schal geholden werden hebben wy to forderer orkunde und merer bestendicheyt unser Stad ingesegel nedden an dussen breff witlicken don hangen dat soan is alle wu boven berort van uns und unsen nakoemen stede vast ... nach Cristi unses heren gebort vefteinhundert unde negen jare am avende Sancti Martini Episcopi.</i>	For further authentication and permanence, to confirm that all that is stated above will be observed by us and our successors without any deceit and excuses, we have attached our town's seal below this letter, affirming that all is as stated above, confirmed by us and our successors, after the Navity in the year 1509 on the eve of St. Martin's Day.

Original text in Low German	English translation
Marginal notes:	
<i>Is affgeloset anno lix.</i>	Is redeemed anno 1559.
<i>Nota dat gold dar von dusse breff vormeldet is itzund in dussem jare [1524] by den rad nicht gekomen sundern to vorn so de gifte des breves uthwiset is wandelinge van den umme up de veer gulden rente und was togescreven Ludeken van dem Hagen Borger to Hildensem.</i>	Note that the gold that this letter mentions has not been received by the council in this year 1524 but earlier than stated by the letter and is a conversion to 4 gulden annuity and was issued for Ludeke van dem Hagen, citizen of Hildesheim.

Source: Stadtarchiv Braunschweig, B I 12 Weddeschatbücher, vol. 5, fol. 168v.

Annuity books, and particularly ledgers, give information on later changes – splits, transfers, cessions, reissues, conversions – and (partial) redemptions. Nuremberg offers an example of a ledger containing particularly rich information on the life of a contract. As the example illustrates, all changes to the contracts regarding ownership, capital or payout were brought before the officials in the so-called *Losungsstube*, the department administering annuities, and were registered in the ledgers beneath the original entry.

Table 3: Annuity letter for Peter von Al, 1501

Margin	Page
26. Peter von Al unnser Burger hat In sein Ainshannnd mit xxv^c gulden landswerung von unns erkauf^t j^c gulden gemainer landswerung ewigsgelts ye ein pro xxv fl. Geben losung. Zezalen halb Walpurgis und halb Martini. Anzetreten media so Martini schierst. Actum Quarta Fabiani et Sebastiani Anno Domini 1501.	26. Peter von Al, our citizen, has in his own hand with 2.500 gulden Landeswährung bought from us 100 gulden common Landeswährung annuity, one gulden for 25 gulden. Has paid taxes. To be paid half on Walpurgis, half on St. Martin's Day, beginning with half a payment coming St. Martin's Day. Given on Quarta of St. Fabiani et Sebastiani in the year 1501.
Habet litteram.	Has a letter.
Nota nach absterben des obgenten Peter von Al ist Hanns Mair ammm markt wonende als ein vormund des benanten Peter von Als geschefft ammm pfintzttag nach oculi Ao 1516 In der losung stuben erschynen und mit ime Caspar Pusch und mit dem benanten geschefft angezeigt das dise 100 fl ewigsgelts und aber 100 ewigsgelts posta 75 seinen zweyen tochttern, nemlich Barbara Merein Gratzin und Martha Caspar Puschin und Iren payden kyndern zu geleich tail zu steen sollen, und den selben Irer aller kynder von Inen unverruckt und unverkauft beleiben lassen, und dazu noch 80 fl ewigsgelts hernach posta 101 den gemelten zweyen tochttern zu geleich tail Ir yeden 40 fl ewigsgelts In ir ainshandt damit zethun und zelassen was sie will.	Note that after the death of the abovementioned Peter von Al, Hans Maier, who lives at the market, became custodian of aforementioned Peter von Al's testament. He came to the <i>Losungsstube</i> on Pentecost after Oculi anno 1516 and with him was Casper Pusch and has announced with the said testament that the 100 gulden annuity and another 100 gulden annuity from entry 75 of this book are given to his two daughters, namely Barbara Mayerin Gratzin and Marha Casper Puschein and their two children to equal parts and [the annuities] shall remain unchanged and unsold for their children, and another 80 gulden annuity as stated hereafter in number 101 for those two daughters in equal parts, each 40 gulden annuity in their own hand, to do with it whatever they please.
...	...

Source: Staatsarchiv Nürnberg, *Losungamt*, Vol. 70, fol. 11v, no. 26.

Figure 2: Annuity ledger of the city of Nuremberg. No. 26 concerns the letter for Peter von Al
Source: Staatsarchiv Nürnberg, Losungamt, vol. 70, fol. 11v–12r. © Staatsarchiv Nürnberg.

In many cities, the sale of annuities was not centralized. Thus, the central accounts, on which the data set is largely based, do not document all the sales of annuities in a given year. Furthermore, the aim in collecting the data was not to gather information on every annuity sold in a given year or city – although this is the case in some cities, especially those in which few annuities were recorded – but rather to take a representative sample of annuities sales.

The diverse information given by the various sources could not be fully exploited but has much potential for further studies on annuity markets, transaction costs for capital, and the institutional framework and practices. In addition to the information recorded for this project, contracts give names, social and geographical origin of the individual buyer, dates and sometimes place of payouts, conditions of redemption and cancellation periods, and finally the date.

3. Data overview

As seen in Table 1, the dataset represents over 35,000 observations from 103 cities, of which 72 are north of the Alps and 31 are in Italy. About 33,000 of these observations were used to compute comparable yearly means. In total, there are 5,063 yearly means for heritable and 1,521 yearly means for life annuities. The geographical distribution of all rates is shown in Figure 3 and the chronological distribution of yearly means of life and heritable annuities is shown in Figure 4. The map highlights that the coverage is particularly good in northern Germany, the Netherlands and northern Italy, possibly reflecting the prosperity of cities in these areas. Figure 4 shows that there is an increase in the number of observations until the middle of the seventeenth century, after which the number of observations decreases. In the Holy Roman Empire, this may have been due to the very different political and economic situation which emerged after the Peace of Westphalia in 1648.

Figure 3: Interest rate observations (all rates) of both heritable and life annuities, 1240–1809: Geographical distribution

Source: Datasets.

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Finally, Figure 5 shows the yearly mean interest rates on heritable and life annuities over the entire period. From this, it can be seen that the interest rates of both life annuities and heritable annuities declined in urban Europe, but this decline was not steady. Two main periods of decline can be identified: the mid-thirteenth to mid-fifteenth centuries, and the mid-seventeenth to mid-eighteenth centuries. At other times, mean interest rates were stagnant and indeed life annuities detect a rise in the sixteenth century. Figure 5 also shows that, as is well-known, rates on life annuities were higher than on heritable annuities, in the order of twice as high. There are a few exceptions in the thirteenth and fourteenth centuries, when the rates on heritable annuities were pushed up by the presence of Italian forced loans, whose market yields were exceptionally high due to a high-risk premium.

Figure 4: Chronological distribution of data. *Source: Datasets.*

Figure 5: Nominal interest rates on heritable and life annuities in the Holy Roman Empire and Italy, 1240–1809 (yearly means, in percent). *Source: Datasets.*

4. A guide to the data tables

When using the tables, we ask that you also reference the project that financed the data compilation.¹¹

This data publication gives three different data sets:

- 1) Set 1: This table gives the annual means of interest rates organized by annuity-selling market and year. Rates are divided into heritable annuities, life annuities and a combined series in which rates on life annuities have been converted into means comparable with those of heritable annuities in years when rates on heritable annuities are not available.
- 2) Set 2: These tables give the complete raw data, including all collected observations per market. For each entry they include year, type (heritable, life, forced loan), capital/payout in the currency given in the records when available, the source reference for the observation, a column saying if the observation was included in the computation of the yearly means, and a comment section.
- 3) Set 3: This table gives data on capital flows between places north of the Alps, including the distance as the crow flies, and the size of capital of each investment when available, measured in the currency given in the record, grams of silver and commodity baskets.

Further notes to set 1: The data set uses yearly means, as the date of transactions could not be identified in all cases. In general, we have not converted years into modern calendar years, but keep the year given in the source, nor have fest days been converted into calendar dates. When urban accounts gave only the account year, we assume that the annuity was sold in the first calendar year (e.g., when the fiscal year was 1525/1526, we assume the sale to have taken place in 1525). Capital and payout have been recorded in the currency stated in the source.

Ideally, the securities compared would have identical conditions of purchase. In reality, there were differences, not all of which are stated in our sources. For instance, at times the rate of return was taxed, whereas in other instances it was exempt. Whenever it was explicitly stated, we used the rate of return net of tax to compute the yearly means. Term annuities were popular in Venice. Here it was necessary to convert rates on short-term annuities using typical ratios with the return on long-term annuities to make them directly comparable with the rest of the dataset and use them to compute yearly means. There is some evidence that in some places it was easier for investors to redeem the capital lent than in others, but the evidence is far from sufficient to enable us to take into account how this affected the liquidity premium. At times, the rate of return changed depending on the reliability of the tax revenue to which they were earmarked. As long as the record survival is not systematically biased, however, this should not be a problem for the representativeness of the yearly means. We also included in the computation of yearly means rates paid on annuities issued in a previous year. Given the secular ten-

11 See fn.1.

dency towards declining rates (see Figure 6), this inclusion may potentially introduce a positive bias. However, this is expected to be small: if the rate on new issues was significantly different from the paid one, urban authorities had an incentive to convert the annuity, by telling investors to either accept a lower rate or have the capital redeemed.

The rates on German annuities are based on individual transactions. It is therefore legitimate to treat them as primary market rates. In markets in the Low Countries, we relied on edicts as well as actual sales, but found a close match between the two types of sources when they overlapped. Secondary markets for forced loans have been relatively well covered by historians of Italian capital markets. There were big differences between nominal and market rates: the latter were much higher than the former. For this reason, the yearly means of rates on forced loans are based only on market yields. This was not a viable approach for the subsequent period, and most of the available Italian data refers to nominal rates from edicts.¹² Nonetheless, the available evidence demonstrates that the difference between market (both primary and secondary) and nominal rates shrank with the advent of the primary market. This is as expected, otherwise coercion would have been redundant for forced loans. In addition, secondary market rates tended to magnify differences between nominal rates, but did not alter their hierarchy. Typically, risky securities were sold at below par, and safe securities were sold at above par.¹³ Whenever available, we also rely on market yields for early modern Italian annuities to compute the yearly means. In the raw dataset, we provide the nominal rate and the market price of the bonds used to compute the yield under the comments section.

For ease of comparison, as a rule only life annuities on one life were employed to compute the yearly means on life annuities.¹⁴ While it is not always explicitly stated in the sources how many lives each life annuity covered, it is relatively straightforward to identify rates of return that obviously deviated from the norm. In fact, annuities on multiple lives typically commanded a rate of return that was significantly lower than that on annuities on one life only.

In the combined series, missing years from the series of heritable annuities have been extrapolated based on the rates of life annuities in the same city, using the same approach as for term annuities. The approach has been that of looking for a typical ratio of return between heritable and life annuities. This does not need to be constant across places and years. For instance, in Antwerp in the 1640s, the rate on heritable annuities was five percent and that on life annuities was ten percent, implying a normalizing rate of 0.5. In the 1650s, the rate on life annuities was reduced to nine percent, but that on

12 The only case where a long series of Italian secondary market yields is available is Genoa's S. Giorgio's bonds. However, primary issues were partly forced and the secondary market price was kept artificially high by compulsory purchases by religious institutions – the so-called *moltiplichi*. Moreover, from the seventeenth century onwards nearly all new issues were directly managed by the republic, rather than by the Banco di S. Giorgio: Chilosi (2015). We therefore prefer to rely on republican annuities to compute the yearly means from early modern Genoa. Nevertheless, we make both series available in the raw dataset.

13 Chilosi (2014), pp. 889–892; Chilosi (2015), section 5.

14 In some selected cases rates on annuities on multiple lives were used, too, either because they exhibited very similar rates to those on one life only, or because the difference was sufficiently stable to normalize their rates. Details can be found in the list of sources.

heritable annuities remained the same, implying a normalizing rate of 0.55. In practice, rates of return were often too idiosyncratic to allow meaningful extrapolation before the mid-fifteenth-century. Hence, the procedure was usually applied only for later data. Details on the extrapolations used in each city/year can be found in the list of sources.

Further notes to set 3: In order to be able to make comparisons across such a long time period, the capital investment has also been converted into baskets of consumables expressed in silver weights. The ‘respectable’ Strasbourg basket has been used, because it offers the most complete series of price data for the Empire. Because the Strasbourg data begins in 1386, earlier investments have been extrapolated using London prices, which begin in 1264.¹⁵ The resulting series has been filtered with an Epanechnikov kernel to capture long-term price changes, rather than short-term price fluctuations. This deflationary procedure produces a smooth price index and is the appropriate one for long-term investments.

We used the information on foreign buyers and the data on capital to identify and quantify capital flows between pairs of cities. We recorded the place of origin of the buyer whenever stated in the records. Not all places could be identified. When there were two likely locations, preference was given to the one closest to the selling market. Rarely, buyers of the same annuity came from two different cities. In these cases, both observations were included in the dataset on inter-city links. This was taken into account when calculating the size of capital, dividing the capital in half.

Information on foreign investors (those from outside the city in which the annuity was purchased) was observed for 52 of the markets north of the Alps. Only links between cities outside each other’s hinterland were compared,¹⁶ leaving 4,541 observations for 915 city pairs. For the purpose of comparison over time, the capital was converted into consumption baskets, leaving 4,095 observations for which this conversion could be made.

Datasets

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¹⁵ Data from Allen/Unger, <http://www.gcpdb.info/>, accessed 21/05/18.

¹⁶ Markets were considered to be within the hinterland of the closest city or town with at least 5,000 inhabitants at any point during the period covered by the project.

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