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Milja van Tielhof

*After the Flood. Mobilising Money in Order to Limit  
Economic Loss (the Netherlands, Sixteenth-Eighteenth Centuries)*

Until the mid-twentieth century, the Netherlands was frequently affected by flooding. Disastrous floods resulted in the loss of thousands of lives, such as those of 1570, 1686, 1717 and 1953. Most floods claimed a much smaller number of victims, but did great damage to infrastructure, buildings, livestock and crops. In the sixteenth and seventeenth centuries, the Netherlands experienced strong demographic and economic growth. This gave the population greater means to build effective dikes and dams, but when a breach did occur, it could do even more damage. Lying just behind the sea and river dikes were intensively cultivated agricultural land and cities such as Amsterdam, Dordrecht and Vlissingen.

In the debate about resilient societies, it has been established that flood risk management should combine various strategies, including (1) strategies for flood risk prevention, focused on keeping people away from water, for example by spatial planning; (2) strategies for flood defence; (3) strategies to reduce the impact of flooding, also called flood risk mitigation; (4) strategies to manage floods when they do occur, called flood preparation and response (including warning systems and evacuation plans); and (5) strategies for flood recovery, including reconstruction and rebuilding plans.<sup>1</sup> In the twenty-first century, many countries, including the Netherlands, are focusing on flood defence, but the other strategies are just as important. By studying the financing of repair works after floods, this article addresses an important element of flood recovery, the fifth strategy. When a dike, dam or sluice burst, it was important to the regional economy to repair the damage swiftly and effectively. A new storm surge would magnify the damage and push the cost of reconstruction higher.<sup>2</sup> It was often difficult to organise and finance repair works. Floods caused chaos in the flooded region and the residents prioritised repairing damage to their own buildings and land. While landowners had to write off any

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<sup>1</sup> P.P.J. DRIESSEN, D.L.T. HEGGER, M.H.N. BAKKER, H.F.M.W. VAN RIJSWICK, Z.W. KUNDZEWICZ, *Toward more resilient flood risk governance*, in "Ecology and Society", 21, 2016, n. 4, pp. 2-3; A. MORRISON, C.J. WESTBROOK, B.F. NOBLE, *A review of the flood risk management governance and resilience literature*, in "Journal of Flood Risk Management", 2017, DOI: 10.1111/jfr3.12315. I would like to thank Marjolein 't Hart, Petra van Dam, Heleen Kole and the participants of the Datini conference 2017 for their valuable comments on an earlier draft of this paper.

<sup>2</sup> Several of the most damaging floods occurred in pairs like in 1530 and 1532, A.M.J. DE KRAKER *Flood events in the southwestern Netherlands and coastal Belgium, 1400-1953*, in "Hydrological Sciences Journal", 51, 2006, 5, pp. 913-929, 918.

personal losses, they also had to contribute additional, large sums to fund repairs to communal waterworks.

In this article, I wish to show how a new form of financing for the reconstruction of infrastructure after major flood disasters was developed in the Netherlands in the early modern period. This involved long-term loans at low rates of interest that were agreed by water authorities with parties who owned land in the district and thus had a stake in the works. This method of taking on long-term debts was apparently inspired by the example set by local and provincial governments. In the Netherlands in the late Middle Ages and the early modern period borrowing practices by cities and provinces are well-known and even villages had “public debts”.<sup>3</sup> Most studies on the financing of water management in the Netherlands have neglected long-term debts. They focused on other instruments, such as water management levies that were imposed on the landowners involved; short-term loans at relatively high interest rates; government subsidies; and charity from unaffected regions.<sup>4</sup> A recent research project on stakeholders’ participation in water management in the Netherlands has drawn attention to the role of borrowing practices.<sup>5</sup> In particular, the in-depth study of the history of two water authorities over the long term (Bunschoten polder and Mastenbroek polder) has demonstrated how borrowing became part of their financial strategies.<sup>6</sup> In the following, I attempt to explain why long-term loans at a low rate of interest did not appear before the sixteenth century, and why they appeared in most, but not in all water districts. An examination of the creditors and their motives is part of the explanation.

I will first briefly reflect on the ways in which the reconstruction of dikes, dams and sluices was financed in the early sixteenth century, before the introduction of the long-term loans (part 1); subsequently, I describe the rise of the new form of

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<sup>3</sup> J.D. TRACY, *A Financial Revolution in the Habsburg Netherlands. Renten and renteniers in the County of Holland, 1515-1565*, Berkeley-Los Angeles-London 1985; W. FRITSCHY, *A “financial revolution” reconsidered: public finance in Holland during the Dutch Revolt, 1568-1648*, in “Economic History Review”, LVI, 2003, n. 1, pp. 57-89; M. ‘T HART, *Public loans and moneylenders in the seventeenth century*, in “Economic and Social History of the Netherlands”, 1, 1984, pp. 119-139; M. ‘T HART, *Mutual advantages: state bankers as brokers between the city of Amsterdam and the Dutch Republic*, in *The Political Economy of the Dutch Republic*, O. GELDERBLOM ed., Farnham 2009, pp. 115-142; M. VAN DER HEIJDEN, *Geldschieters van de stad. Financiële relaties tussen stad, burgers en overheden 1550-1650*, Amsterdam 2006; J. ZUIJDERDIJN, *Village-indebtedness in Holland in the fifteenth and sixteenth centuries*, in *Credit and the rural economy in North-western Europe, c. 1200-c. 1850*, Ph.R. SCHOFIELD, T. LAMBRECHT eds., Turnhout 2009, pp. 39-62.

<sup>4</sup> For example, T. SOENS, *Floods and money: funding drainage and flood control in coastal Flanders from the thirteenth to the sixteenth centuries*, in “Continuity and Change”, 26, 2011, n. 3, pp. 333-365; A. DE KRAKER, *Dijkaanleg en dijkherstel in noordoost-Vlaanderen tijdens de zestiende eeuw*, in “Tijdschrift voor Waterstaatsgeschiedenis” 2, 1993, pp. 26-37; C. DEKKER, R. BAETENS, *Geld in het water. Antwerps en Mechels kapitaal in Zuid-Beveland na de stormvloed in de 16<sup>e</sup> eeuw*, Hilversum 2010; A. FRANSEN, *Dijk onder spanning. De ecologische, politieke en financiële geschiedenis van de Diemerdijk bij Amsterdam, 1591-1864*, Hilversum 2011; G.R. BOOMSMA, P.J.E.M. VAN DAM, *Historisch onderzoek naar de donormotieven bij watersnoden in de negentiende eeuw*, in “Tijdschrift voor Waterstaatsgeschiedenis”, 24, 2015, n. 1, pp. 24-37.

<sup>5</sup> *In search of the poldermodel: participation and representation in Dutch water-boards in the pre-democratic era*, funded by the Netherlands Organisation for Scientific Research (NWO) as grant GW 360-53-160.

<sup>6</sup> H. KOLE, *Polderen of niet? Participatie in het bestuur van de waterschappen Bunschoten en Mastenbroek voor 1800*, Hilversum 2017.

borrowing (part 2); I then focus on the identity of the moneylenders (part 3) and their motives (part 4); and finally, in the conclusion, I will summarize the findings and identify the advantages and disadvantages of this form of financing.

## 1. FINANCING REPAIRS AFTER FLOODS IN 1507-1509, 1530 AND 1532

Before it became preferred practice to take out long-term loans from landowners, several other methods were used to obtain funding for repairing flood damage. This can be illustrated with examples from various Dutch provinces in the wake of the floods of 1507, 1508, 1509, 1530 and 1532. The basic approach was to apportion the costs between the landowners in the water district by means of one or more water management levies, and sometimes contributions delivered in kind. During the Middle Ages, it was common for special projects, such as dike reconstruction or the building of new sluices, to be financed by monetary levies. A landowner would pay a sum in proportion to the area of his land. In most water districts, rates for extraordinary expenses were combined with a system of maintenance in kind for routine work. Standard maintenance was thereby carried out by the landowners, who were each assigned a specific stretch of dikes and watercourses. Although the contributions for extraordinary situations such as dike breaches were mainly monetary, it could still happen that landowners were called upon to come and spend a number of days working on reconstruction. One example from the Province of Utrecht concerns repairs made to the dike works after the storm surges of 1507, 1508 and 1509. Landowners from the southern part of the Province of Utrecht travelled 30 kilometres to the north to assist with the reconstruction of the Diemerdijk,<sup>7</sup> a dike that was located in Holland but that also protected low-lying land in Utrecht.

Short-term loans were also important, as an example from Rijnland (Province of Holland) illustrates. Dike reconstruction here appeared to be under threat after the floods of 1508 and 1509, as it was extremely difficult to obtain loans. The dike between Haarlem and Amsterdam, known as the Spaarndammerdijk, was breached in 1508 and again in 1509. The dike was under the control of Rijnland's regional water authority, which was administered by seven trustees and a dike reeve, all of them large landowners in the region. They faced the challenge of securing credit for the expensive dike repairs, but the individual trustees had to give a personal guarantee to the moneylenders. As such, they needed to be very wealthy individuals with an excellent reputation. In those catastrophic years, this proved a shaky basis for financing. The Habsburg ruler, Emperor Maximilian I, suspected the trustees of mismanagement and dispatched a commissioner, who suspended all seven trustees from their duties in 1510.<sup>8</sup> The principal reason for this deep humiliation is likely to have been financial mismanagement. The trustees failed to obtain enough credit. In the sixteenth century, money was difficult to come by in the traditional aristocratic

<sup>7</sup> A. FRANSEN, *Dijk onder spanning*, cit., p. 48.

<sup>8</sup> P.J.E.M. VAN DAM, *Digging for a dike. Holland's labour market ca. 1510*, in *Peasants into farmers? The transformation of rural economy and society in the Low Countries (middle ages-19<sup>th</sup> century) in light of the Brenner debate*, P. HOPPENBROUWERS, J.L. VAN ZANDEN eds., Turnhout 2001, pp. 220-255, 227.

networks of the trustees, but more easily available in the rapidly growing towns. In 1510 and 1511, the water authority became completely dependent on short-term loans from three city governments, namely those of Amsterdam, Leiden and Haarlem. The cities lent at least 12,000 guilders,<sup>9</sup> and it is likely that the rate of interest on these short-term loans was high. These loans enabled a start to be made on dike reconstruction in the summer of 1510; at times, more than 900 men were working on the dike simultaneously.<sup>10</sup> It is likely that the loans from the cities were redeemed later, by imposing rates on the landowners of Rijnland.

An example from the Province of Flanders shows that loans to cover the most pressing needs after the flood could take the form of advances from the provincial government, for example from tax collectors. This would only happen in the case of major disasters, and the advances had to be paid back within one or two years. De Kraker has researched the financing of dike reconstruction in and around the Land van Saeftinghe (Northeast Flanders) after the major flooding on 5 November 1530. In the first months after the disaster, money was only available thanks to several private loans, agreed with burghers from Antwerp and large landowners in the flooded region. Somewhat later, the region received advances from tax collectors, which were much larger sums. Only in July 1531, eight months after the disaster, did money become available from the first of three water management levies imposed on landowners. By means of these three levies the total cost of reconstruction was finally paid by the landowners.<sup>11</sup> Private moneylenders charged high rates for short-term loans in these years. The Cistercian abbey Ter Duinen paid an interest rate of 16% for loans to repair the dikes on her lands, also in Northeast Flanders, in the years 1530-1532.<sup>12</sup>

In the Province of Zeeland, recourse was made to several of the abovementioned methods after the major storm surges of 1530 and 1532: water management levies imposed on the landowners, short-term loans from private individuals (mainly merchants from Antwerp), and support from the government in the form of significant advances. But in this case the government also gave subsidies in the form of tax exemptions. Without generous support from the government, no recovery would have been possible in Zeeland from the disasters of 1530 and 1532. In addition, in Zeeland an extraordinary method was applied, the conclusion of forced loans, but this seems to have happened only on a small scale.<sup>13</sup>

Smaller water authorities could find themselves completely dependent on loans from one or more wealthy individuals, who obtained abandoned land in return for credit. On a small island in the southern part of the Province of Holland (Putten), the damage wreaked by the storm surges of 1530 and 1532 was so huge that the government appointed an extraordinarily rich individual, Andries van Bronchorst,

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<sup>9</sup> Or 2,000 pound Flemisch. NATIONAAL ARCHIEF, Den Haag, *Hof van Holland* (3.03.01.01), inv.nr. 14107, f. 3, 6, 7.

<sup>10</sup> P.J.E.M. VAN DAM, *Digging for a dike*, cit., pp. 247-249.

<sup>11</sup> A.M.J. DE KRAKER, *Dijkaanleg en dijkberstel*, cit., pp. 28-31.

<sup>12</sup> IDEM, *Landschap uit balans. De invloed van de natuur, de economie en de politiek op de ontwikkeling van het landschap van de Vier Ambachten en het Land van Saeftinghe tussen 1488 en 1609*, Utrecht 1997, p. 272.

<sup>13</sup> C. DEKKER, R. BAETENS, *Geld in het water*, cit., p. 64.

as the temporary dike reeve. He was responsible for paying the dike costs of those who were unable to do so. Many poor landowners went into default and abandoned their land. Traditional regulations prescribed that abandoned land fell into the hands of the dike reeve, who thereby became the largest landowner on the island.<sup>14</sup> In this case, then, private lending resulted in the transfer of land, thereby creating a sudden and large concentration of land ownership within the territory of the Putten water authority. Other places also saw a concentration of ownership as a direct consequence of storm surges, because many poor landowners were unable to shoulder the costs of reconstruction.<sup>15</sup>

## 2. THE INTRODUCTION OF LONG-TERM LOANS AND ITS ECONOMIC BACKGROUND

The sixteenth and seventeenth centuries saw the rise of a new form of financing for reconstruction: the agreement of long-term loans at low rates of interest. The water authorities started to use this form of borrowing at different times. Rijnland (Holland), for example, began to take out such loans on a regular basis from 1556; the Lekdijk Bovendams (Utrecht) from 1617; Bunschoten polder (Utrecht) from 1625; Mastebroek polder (Overijssel) from 1665; and Arnhem polder (Gelderland) from 1666.<sup>16</sup> The phenomenon only occurred if two conditions were met, one economic and one social. I will address the second condition (the presence of wealthy landowners who were willing and able to lend money) in part 3. The economic precondition was the monetisation of a substantial part of maintenance work. As mentioned above, during the Middle Ages, dikes and other waterworks were mostly maintained by landowners in kind, whilst a monetary levy was raised only in exceptional circumstances. This changed because the water authorities took over the standard routine maintenance from the landowners. The monetisation of daily maintenance work did not take place overnight, and certainly not everywhere simultaneously. In Flanders, the transition to a fully monetary system occurred as early as the fourteenth and fifteenth centuries, whereas in Holland and Utrecht, the shift occurred in the course of the sixteenth and

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<sup>14</sup> J.L. VAN DER GOUW, *De Ring van Putten. Onderzoekingen over een hoogbeemraadschap in het Deltagebied*, 's-Gravenhage 1967, pp. 81-82.

<sup>15</sup> T. SOENS, *The social distribution of land and flood risk along the North Sea coast: Flanders, Holland and Romney Marsh compared (c. 1200-1750) in Rural societies and environments at risk. Ecology, property rights and social organisation in fragile areas (Middle Ages – twentieth century)*, B. VAN BAVEL, E. THOEN eds., Turnhout 2013 (*Rural History in Europe* 9), pp. 147-179, 165; C. DEKKER, R. BAETENS, *Geld in het water*, cit., p. 95; D.R. CURTIS, *Danger and displacement in the Dollard: The 1509 flooding of the Dollard Sea (Groningen) and its impact on long-term inequality in the distribution of property*, in "Environment and History", 22, 2016, n. 1, pp. 103-135.

<sup>16</sup> M.H.V. VAN AMSTEL-HORÁK, R.W.G. LOMBARTS, *Regestenboek van het hoogbeemraadschap van Rijnland*, Leiden 1992, from p. 79; M. VAN VLIET, *Het hoogbeemraadschap van de Lekdijk Bovendams: een onderzoek naar de beginselen van het dijkecht in het hoogbeemraadschap, voornamelijk in de periode 1537-1795*, Assen 1961, p. 270; H. KOLE, *Polderen of niet*, cit., pp. 87, 123, Figure 4.3 (Bunschoten), p. 211 (Mastebroek); GELDERS ARCHIEF, Arnhem (GA), *Archief Zeepolder en polderdistrict Arnhembeem (AZPA)*, inv.nrs. 457, 459, accounts from the years 1666 and 1671.

seventeenth centuries, and in Friesland, only in the eighteenth century. In any case, monetisation was linked to the rise of commercial agriculture.<sup>17</sup> Furthermore, the process was dependent upon a number of factors and strongly determined by local conditions. At the Rijnland water authority, monetisation was largely complete in the sixteenth century; at other water authorities (Lekdijk Bovendams, Bunschoten polder, Mastenbroek polder), some routine maintenance work continued to be carried out in kind until into the nineteenth century. Nevertheless, a substantial amount of annual income was raised by means of water management levies from the seventeenth century.

The monetisation of dike maintenance had major consequences for the financial policies of the water authorities. They began to collect water management levies every year, rather than just in exceptional circumstances. By spreading the costs over the estates on a routine basis, the water authorities obtained control over important revenues as regularly as clockwork. Their creditworthiness increased drastically as a result. It became possible to agree loans with the future income as collateral, resulting in a funded or consolidated debt. The debt was funded in the sense that there was a regular source of revenue from which interest payments could be made.<sup>18</sup> This led to a high degree of trust on the part of the moneylenders. Alternative ways of financing repairs to infrastructure, like provincial subsidies and short-term loans at high interest rates, lost their importance. Water authorities with funded debts had recourse to these alternative methods in exceptional cases only.<sup>19</sup>

Most of the long-term loans were either *losrenten* (redeemable annuities) or *obligaties* (obligations or bearer bonds), while *lijfrenten* (life annuities) were also sold but this was more unusual. In the case of redeemable annuities the buyer would, for example, pay a principal of 1,000 guilders, for which he would gain the right to an annual interest payment of 50 guilders (5%). This right was transferable and negotiable.<sup>20</sup> Thus the provision on interest could continue in perpetuity, but in most cases, the water authority could end the interest payments by free will, by paying back the principal. In exceptional cases the claimants had to give their consent.<sup>21</sup> Redeemable annuities were intended for investors who were looking for a secure source of income over the longer term. Theoretically *obligaties* were different because these were loans whereby it was the intention of both the buyer and the seller that the principal would be redeemed as soon as possible. They were often intended to last for a maximum of six months. It was not the intention that

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<sup>17</sup> P. VAN CRUYNINGEN, *State, property rights and sustainability of drained areas along the North Sea coast, sixteenth-eighteenth centuries*, in *Rural societies and environments at risk. Ecology, property rights and social organisation in fragile areas*, cit., pp. 181-206, 197; T. SOENS, *Floods and money*, cit., p. 337.

<sup>18</sup> J.D. TRACY, *A financial revolution*, cit., p. 8.

<sup>19</sup> For example, the Province of Holland exceptionally granted Rijnland a subsidy for reinforcing the shores of a big lake in the eighteenth century. M. VAN TIELHOF, *Financing water management in Rijnland, 1500-1800*, in *The Political Economy of the Dutch Republic*, ed. O. GELDERBLOM, Farnham 2009, pp. 197-222, 200-201.

<sup>20</sup> W.N. GOETZMANN, K.G. ROUWENHORST, *Perpetuities in the stream of history. A paying instrument from the golden age of Dutch finance*, in *The origins of value. The financial innovations that created modern capital markets*, W.N. GOETZMANN, K.G. ROUWENHORST eds., Oxford 2005, pp. 177-188, 183.

<sup>21</sup> M. VAN VLIET, *Lekdijk Bovendams*, cit., pp. 272-273.

the bond should end up in the hands of someone other than the original creditor, although this could happen, for example in the case of the death of the creditor. The water authority could end the interest payments on the bond at any time by repaying the principal. In practice, the differences between bonds and annuities were minor, because bonds were often tacitly renewed again and again every six months. The terms *losrenten* and *obligaties* were often even used interchangeably.<sup>22</sup> The bottom line is that water authorities took on these debts and obligations for a period of time that was in practice unlimited. As briefly mentioned in the introduction, the water authorities did not invent this financing method. Selling bonds and redeemable annuities had been used earlier by towns, provinces and even villages in the Netherlands.<sup>23</sup>

The water authority of the Lekdijk Bovendams in the southern part of the Province of Utrecht offers a good example of the increasing importance of long-term borrowing. The Lekdijk Bovendams had the crucial task of managing the northern bank of the Lek, a branch of the Rhine, over a 33 km-long stretch. When this dike burst, a large part of the Province of Utrecht would flood, as well as part of the Province of Holland. The water authority began to conclude loans on a large scale after the dike breaches of 1616, 1624 and 1638. In 1638-1639 alone, the Lekdijk Bovendams borrowed 161,300 guilders. Although repayments were occasionally made, the total debt increased rapidly to 438,412 guilders around 1650. Between 1704 and 1738, the size of the debt was almost halved to 234,000 guilders, but thereafter the level of debt remained above 200,000 guilders for the rest of the eighteenth century.<sup>24</sup> Around the mid-seventeenth century this level of debt was extremely burdensome in comparison to the regular revenues, which came to between 40,000 and 50,000 guilders a year.<sup>25</sup> The amount of debt – at that time, 438,412 guilders – was thus ten times as large as the annual revenues! Given that the interest rate was 5%, the water authority had to devote around half of its annual income to meeting its interest obligations. As the water authority later managed more or less to halve its debt and lower the rate of interest, a more balanced relationship was achieved between the debt and the regular revenues.

Issuing bonds and annuities allowed the water authorities to acquire money quickly, usually within a few months or even weeks. On 15 January 1624, the Lekdijk Bovendams started to sell bonds (*obligaties*) to finance the reconstruction of a dike that had burst at the village of 't Waal two weeks earlier, on New Year's

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<sup>22</sup> Like in urban debts. M. VAN DER HEIJDEN, *Geldschieters*, cit., p. 121. On the differences and resemblances between *losrenten* and *obligaties*: *ibid.*, pp. 24-26, M. 'T HART, *Mutual advantages*, cit., p. 118, and W. FRITSCHY, *A "financial revolution" reconsidered*, cit., pp. 76-79. It was also common to use a simple generic term to cover loan transactions, like *kapitalen op rente* (money borrowed at interest).

<sup>23</sup> J.D. TRACY, *A financial revolution*, cit.; W. FRITSCHY, *A "financial revolution" reconsidered*, cit.; M. 'T HART, *Public loans and moneylenders*, cit.; M. VAN DER HEIJDEN, *Geldschieters*, cit.; J. ZUIJDERDIJN, *Village-indebtedness in Holland*, cit.

<sup>24</sup> M. VAN VLIET, *Lekdijk Bovendams*, cit., pp. 270-272.

<sup>25</sup> The total surface being 27.835 *morgen* and the levy amounting to 1,5 guilder per *morgen*. M. VAN VLIET, *Lekdijk Bovendams*, cit., pp. 268, 271.

Day.<sup>26</sup> During the winter of 1675-1676 Rijnland smoothly collected large sums of money. After the major dike breach of 4-5 November 1675, on 12 November 1675, Rijnland decided to borrow 100,000 guilders. After a second damaging storm surge on 4-5 December, on 23 December, dike reeve and trustees decided to borrow an additional 100,000 guilders. On 5 January 1676, the first bonds worth 66,000 guilders were signed, and within four months of the first breach, the entire sum of 200,000 guilders had been collected.<sup>27</sup>

Aside from the rapidity with which loans were agreed, another important factor was how much interest the water authorities had to pay. In the institutional economy, the interest rate on government bonds is considered as an indication of the confidence people have in the government. When a government is considered to be stable and trustworthy, investors are prepared to settle for a low rate of interest. Fears of a national default, however, can drive up the interest rate. For this reason, historians attach great value to the rate of interest that the Dutch provinces and the States General had to pay in the time of the Dutch Republic (1581-1795).<sup>28</sup> The interest on *obligaties* and *losrenten* in the Province of Holland was the most important interest rate in the Republic, for Holland enjoyed great economic and demographic superiority over the other provinces. Holland also dominated the capital markets, because the province had a large and permanent debt. During the first decades of the Dutch Revolt against Spanish rule (1572-1609), the Province of Holland often had to pay relatively high rates of interest: from 7.1% to 12.5% and sometimes much more.<sup>29</sup> Investor confidence returned during the 'Twelve Years' Truce (1609-1621), and from 1611, Holland paid 6.25%, the rate that had been standard before the Revolt. During the rest of the early modern period interest rates were further lowered. They were remarkably low from an international perspective. A comparison of the public loan systems in Holland, France and England in the seventeenth century reveals many significant differences, including the interest rates.<sup>30</sup> From 1611 until the end of the eighteenth century, the rate of interest on the government debt of Holland was also lower than that in Spain, Russia and Sweden.<sup>31</sup> The low rates expressed a great degree of trust between the state and its creditors.

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<sup>26</sup> Y. SLAGTER, *Waterbeheer gefinancierd. Het hoogheemraadschap Lekdijk Bovendams, 1467-1795* (unpublished bachelor thesis, Utrecht University), p. 14.

<sup>27</sup> HOOGHEEMRAADSCHAP VAN RIJNLAND, Leiden (HHR), *Oud Archief Rijnland, 1255-1857* (OAR), inv.nrs. 10347 and 9709 a.

<sup>28</sup> M. 'T HART, *Public loans and moneylenders*, cit., p. 120; IDEM, *Mutual advantages*, cit., pp. 140-142; J.L. VAN ZANDEN, *The long road to the Industrial Revolution. The European economy in a global perspective, 1000-1800*, Leiden-Boston 2009, pp. 222-223.

<sup>29</sup> R. LIESKER, W. FRITSCHY, *Gewestelijke financiën ten tijde van de Republiek der Verenigde Nederlanden IV: Holland (1572-1795)*, Den Haag 2004, p. 381; W. FRITSCHY, *A "financial revolution" reconsidered*, cit., p. 74.

<sup>30</sup> M. 'T HART, *Mutual advantages*, cit., pp. 137-141.

<sup>31</sup> J.L. VAN ZANDEN, *The long road*, cit., pp. 222-223.

Tab. 1. Interest rates on long-term loans (*losrenten* and *obligaties*)

Water authority	Province	Period	Interest rate
Rijnland	Holland	1556-1609 #	6.25%
		1614-1650	5%
		1655-1700 #	4%
		1723	3%
		# Higher rates in 1573-1575 and 1675-1676	
Bunschoten polder	Utrecht	1604-1611	6%
		1612-1720	4% - 5%
		1721-1770	3%
		1771-1778	2.5%
Lekdijk Bovendams	Utrecht	1617-1642	6.25%
		1644-1699	5%
		1700	3.5%
Walcheren polder	Zeeland	c.1650	5%
		1657	4%
Schieland	Holland	1662-1678	3% - 4%
		1679-1733	3%
Arkemheen polder	Gelderland	1741-1749	3%
		1750	3.5%
		1751-1753	3%
		1777-1778	2.5%
<b>Government debt in Holland</b>		1571	6.25%
		1574-1608 #	7.1% - 12.5%
		1611-1635	6.25%
		1640-1652	5%
		1655-1794	4%
		# Higher rates in 1575-1577	

Sources: Rijnland: M.H.V. VAN AMSTEL-HORÁK, R.W.G. LOMBARTS, *Regestenboek*, cit., pp. 79-239 (1556 - 1637); HHR, *OAR*, inv.nr. 9684 (account 1650); HHR, *OAR*, inv.nr. 9759 (resolution 22 April 1723); Bunschoten: H. KOLE, *Polderen of niet*, cit., appendix A-8 on p. 287; Lekdijk Bovendams: Y. SLAGTER, *Waterbeheer gefinancierd*, cit., p. 18; M. VAN VLIET, *Lekdijk Bovendams*, cit., pp. 270-271; Walcheren: M. T HART, *Een boerenopstand op Walcheren. De strijd om het waterschap 1655-1657*, in "Tijdschrift voor Sociale Geschiedenis", 20, 1994, 3, pp. 265-281, 279; Schieland: M. VAN TIELHOF, *De financiering van de bouw van het Schielandsbuis*, in "Rotterdams Jaarboekje", 12<sup>e</sup> reeks, 2, 2014, pp. 204-234, 213-214; Arkemheen: GA, *AZPA*, inv.nrs. 290-294, 808, 809; Government debt in Holland: R. LIESKER, W. FRITSCHY, *Genestelijke financiën IV: Holland*, cit., pp. 381-382.

A comparison with the interest rate on government bonds for the Province of Holland reveals that the water authorities were often paying the same rate of interest, and sometimes a lower one (see Table 1). In 1571 – that is, before the start of the Dutch Revolt (1572-1648) – Holland was paying 6.25% and at that time, the water authority of Rijnland was paying the same rate. The water authority of

Blankenberge (in the Province of Flanders) likewise agreed a loan at this rate (6.25%) in 1570, after the catastrophic All Saints' Flood of the same year.<sup>32</sup> Between 1572 and 1609, the Province of Holland had to pay higher rates of interest, as a result of the abovementioned fact that investors had little confidence in a provincial government that was revolting against its ruler. The political situation also caused credit problems for Rijnland, but these were of a much shorter duration. Rijnland found itself embroiled in a serious internal crisis, because some of its officials supported the Revolt and some did not. Although the water authority had to pay much higher rates on loans between 1573 and 1575 – 12% and 16% – the situation was already back to normal three years later.<sup>33</sup> In 1578, 1581, 1589, 1594, 1596, 1598 and 1600, Rijnland paid just 6.25%.<sup>34</sup> In other words, the water authority was often able to borrow more cheaply than the Province of Holland in this period. During the Twelve Years' Truce and after, the rates again developed in parallel. Just like the rate of interest paid by Holland, the rate paid by water authorities slowly fell from 6.25% in the second decade of the seventeenth century, to 5% and then 4% after 1655. Later, the interest rates paid by water authorities fell even to 3.5% or less. Only in exceptional cases did the water authorities have to pay relatively high rates of interest. In the wake of the flooding disasters of November and December 1675, for example, Rijnland briefly had to pay an interest rate of 6%, and thereafter 5%, but the rate quickly normalised again (back to 4%). Based on the development of interest rates in the early modern period, we can conclude that water authorities were generally considered to be very creditworthy.

In exceptional cases, the water authorities sold life annuities (*lijfrenten*) rather than redeemable annuities or bearer bonds. These carried a much higher rate of interest, namely 9% or 10%, but the conditions were also different. Life annuities were typically intended for moneylenders who wanted to invest their money for the long term. The principal was never repaid; instead, interest payments were made for as long as the person for whom the annuity had been taken out remained alive. The water authority was thus unable to redeem the debt at will. Modern historians doubt if selling life annuities was a relatively costly method of borrowing, but contemporaries probably thought so and apparently tried to prevent it.<sup>35</sup> Walcheren polder (Province of Zeeland) began to sell life annuities in 1657, having previously only sold redeemable annuities at a rate of 5%. The polder was going through an exceptionally difficult period, because the landowners were dissatisfied with the management of the board, and had even refused to pay their levies in 1655. Landowner revolts against the administration of water authorities are rare exceptions in the history of Dutch water management. The revolt in Walcheren polder between 1655 and 1657 was caused largely by a significant crisis of confidence in the board's financial management. It was said that the board had been mismanaged for years and that enormous sums had been wasted. In such an

<sup>32</sup> T. SOENS, *Floods and money*, cit., p. 345.

<sup>33</sup> HHR, *OAR*, inv.nr. 9609 (1573/1574) and 9611 (1574/1575).

<sup>34</sup> M.H.V. VAN AMSTEL-HORÁK, R.W.G. LOMBARTS, *Regestenboek*, cit., pp. 111, 114-115, 129-131, 139-140, 148, 154, 156.

<sup>35</sup> M. 'T HART, *Mutual advantages*, cit., pp. 134-135.

atmosphere of distrust, it proved impossible to agree enough loans at a low rate of interest, whereupon the polder decided to start selling life annuities.<sup>36</sup> In the period between 1702 and 1715, Rijnland likewise sold life annuities, despite having traditionally opted to borrow at a low rate. A total of 143,000 guilders of life annuities were sold at a rate of 9-10%. It was not until 1780 that the last person died for whom a life annuity had been taken out.<sup>37</sup> The reason to sell life annuities in 1705, was the fear of the dike reeve and trustees of Rijnland that the water authority would lose the confidence of investors.<sup>38</sup> To find sufficient money, they apparently felt compelled to resort to this form of borrowing, which saddled the next generation with a financial burden.

The officials were originally personally held liable for the loans that were taken out by water authorities, but this situation changed when the water authorities were able to raise regular monetary levies. From then onwards, these revenues were used as surety for investors. In Rijnland, the board members, with all their private property, were held liable for all loans until 1572. After 1597, it was merely the property of the water authority that acted as surety. The 25 years between 1572 and 1597 were a period of transition: sometimes it was only the property of the water authority that acted as surety, and sometimes both the property of the water authority and that of the trustees.<sup>39</sup> It was during this period of transition that the water authority assumed control of the Spaarndammerdijk, the dike between Amsterdam and Haarlem. The maintenance duty in kind was replaced by annual monetary contributions by landowners, thereby creating a firm basis for entering into consolidated or funded debt. Other water authorities in the seventeenth and eighteenth centuries officially retained the principle of the personal liability of the board members or the steward. In the case of the Lekdijk Bovendams, for example, the *cameraer* or steward (as well as his descendants) was held to be personally liable for the loans.<sup>40</sup> In practice, though, this personal liability was of no consequence. For moneylenders, it was enough to know that the water authority was in receipt of annual water management levies.<sup>41</sup> Even if this was not formally recorded, in practice interest payments took precedence over other forms of payment, meaning that investors bore very little risk at all.

### 3. THE CREDITORS: THE COMMUNITY OF LANDOWNERS

Who were the moneylenders? Many water authorities borrowed mainly from their own landowners; the creditors were private landowners who owned land within the district. They lived in the region and knew the board members. Indeed,

<sup>36</sup> M. 'T HART, *Een boerenopstand*, cit., p. 272, 279.

<sup>37</sup> M. VAN TIELHOF, *Financing water management*, cit., pp. 216-217.

<sup>38</sup> Resolution of 3 July 1705. HHR, *OAR*, inv.nr. 10348.

<sup>39</sup> See, for example: M.H.V. VAN AMSTEL-HORÁK, R.W.G. LOMBARTS, *Regestenboek*, cit., p. 69 (1545), p. 80 (1556), p. 111 (1578), p. 148 (1596), p. 154 (1598).

<sup>40</sup> W.N. GOETZMANN, K.G. ROUWENHORST, *Perpetuities*, cit., p. 178.

<sup>41</sup> The levies were often pledged as collateral in the loan contract. See, for example, a bond for the widow Aris van Beek (1-8-1778, 1000 guilders, 2.5%). GA, *AZPA*, inv.nr. 809.

the trustees themselves were often among the moneylenders, as were dike reeves.<sup>42</sup> In addition, family members and others from the officials' own networks frequently lent money.<sup>43</sup> To a lesser extent, credit was also obtained from religious and charitable institutions that owned land in the territory administered by the water authority. Among the private individuals, large noble landowners sometimes played a dominant role, but the main lenders tended to be town-dwellers: members of the patriciate and of the wealthy middle classes. They were often absentee landowners, who lived in nearby towns, not in the polder. The moneylenders were often rich individuals who lent large sums; loans ranging from 3,000 to 10,000 guilders were not uncommon. In 1738, the debt of the Lekdijk Bovendams was composed exclusively of loans of 1,000 guilders or more.<sup>44</sup> In the seventeenth century, this water authority had also sold bonds worth between 300 and 800 guilders, but not in large numbers, and they were also redeemed the fastest. Salaries of skilled labourers give an idea of the relative value of these bonds. From the middle of the seventeenth to the middle of the eighteenth century yearly salaries for skilled labourers were more or less constant at about 375 guilders (Holland) and 285 guilders (Eastern Netherlands).<sup>45</sup> To buy a bond of 1000 guilders such a labourer had to save his total salary for at least three consecutive years. Compared with the towns and provinces, water authorities attracted relatively large investors.<sup>46</sup>

For the water authority of Schieland (Province of Holland) we have detailed information on the identity of its investors in the early modern period. Between 1662 and 1673, Schieland took out large loans in order to build a new and prestigious office in Rotterdam, where it held most of its meetings. In this case the debt had nothing to do with a flood, but it is likely that the water authority went about finding creditors in a similar way to water authorities that needed to fund reconstruction in the wake of a disaster. Between 1662 and 1673, 79 individuals and institutions bought bonds (*obligaties*) from Schieland, worth over 235,000 guilders in total. Most of the creditors were rich individuals who each lent, on average, almost 3,000 guilders. Most of them lived in Rotterdam or in the surrounding area. Given the ample guarantees, the risk of these bonds was very small. The steward of Schieland, Bernard Swaardecroon, declared himself personally liable for the amount borrowed and the bonds were signed by himself, the dike reeve and one or two trustees. At the same time, the property of the water authority of Schieland was also put up as surety. It must have been really easy to obtain credit. As the rich were willing to lend, there was no need for the steward to appeal to a much larger

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<sup>42</sup> Examples from Bunschoten polder: H. KOLE, *Polderen of niet*, cit., p. 105 (a sum of 4,500 guilders lent by trustee Merten Meerman, 1692), p. 135 n.62 (a sum of 9,500 guilders lent by dike reeve Anthonie van Goudoever, c. 1720).

<sup>43</sup> M. VAN TIELHOF, P.J.E.M. VAN DAM, *Waterstaat in stedenland. Het hoogheemraadschap van Rijnland voor 1857*, Utrecht 2006, p. 238.

<sup>44</sup> M. VAN VLIET, *Lekdijk Bovendams*, cit., pp. 271-272. Total debt amounted to 233,700 gulden.

<sup>45</sup> J. DE VRIES, A. VAN DER WOUDE, *The first modern economy. Success, failure and perseverance of the Dutch economy, 1500-1815*, Cambridge 1997, pp. 617, 620.

<sup>46</sup> The Province of Holland and cities in Holland (only Amsterdam excepted) sold bonds of a few hundred to thousand guilders more often. M. 'T HART, *Public loans and moneylenders*, cit., pp. 130-131.

number of creditors with smaller means; and as enough moneylenders were found in a geographically restricted area, there was no need to look further.<sup>47</sup>

The analysis of the group of people buying bonds from Schieland shows how much social networks mattered for credit transactions. Many creditors turned out to belong to the personal network of the steward, Bernard Swaardecroon. The latter belonged to a religious minority, the Remonstrants, a group to which many of the moneylenders also belonged. This is not surprising, as members of the Remonstrant Church are also known as very important investors in the public debt of the Province of Holland.<sup>48</sup> Through his church community, Swaardecroon rapidly found willing investors. These included, for example, a member of the town council of Rotterdam (Jacob Voorburg), a painter (Ludolf de Jongh), and a naval officer (Aert van Nes). There were personal contacts between the painter and a number of other creditors, whose portraits he painted. Besides the community of Remonstrants, the Admiralty of Rotterdam apparently was also used as a network for spreading the news that Schieland was looking for credit. Eventually fifteen bonds amounting to 47,900 guilders were sold to naval officers or their widows.<sup>49</sup>

Some water authorities were unable to appeal to their own community of landowners, or their appeals proved insufficient. As a result, they were compelled to approach the provincial government to ask for subsidies. The water authority of the Diemerdijk (Province of Holland) was dependent on subsidies from the States of Holland throughout the seventeenth and eighteenth centuries. Its territory lay partly in Holland and partly in Utrecht. Due to the permanent state of conflict that this produced, the water authority was unable to develop into a reliable party in which to invest. There was continuous conflict between the provinces of Holland and Utrecht about the water authority's policy. Some of the trustees hailed from Holland and some from Utrecht, and it is likely that their loyalties lay primarily with their provinces and not with the water authority. The latter thereby lacked a community of landowners that were prepared to lend money. In the case of flood disasters and major investments, money was borrowed from the city government of Amsterdam, which was willing to lend only on condition that the States of Holland acted as guarantor. Amsterdam exercised considerable influence over the provincial government and eventually, these loans were often transformed into subsidies. Between 1676 and 1678, for example, the city government granted over 400,000 guilders of subsidies, mainly to repair the damage inflicted by the storm surge of November 1675.<sup>50</sup> The costs were therefore borne by taxpayers from the entire Province of Holland. The water authority clearly profited from the fact that the Diemerdijk was important for the prosperous city of Amsterdam.

When both the landowners and nearby cities lacked the necessary capital to provide credit at short notice, water authorities suffered two kinds of consequences. They would almost certainly lose part of their autonomy, which they highly valued, and they had to wait long for credit, bringing the risk that the

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<sup>47</sup> M. VAN TIELHOF, *De financiering*, cit., p. 224, 234.

<sup>48</sup> M. 'T HART, *Mutual advantages*, cit., pp. 130-132.

<sup>49</sup> M. VAN TIELHOF, *De financiering*, cit., pp. 222-223, 231.

<sup>50</sup> A. FRANSEN, *Dijk onder spanning*, cit., p. 207.

dikes might not be repaired in time for the next storm season. One example of such a case is that of Mastenbroek polder in the Province of Overijssel in the eastern Netherlands, in the wake of the storm surges of 1775 and 1776. In the towns to the east of the Netherlands, the patriciate and the middle classes were much smaller than those to the west. Only a small governing elite was wealthy enough to lend large amounts of money. During the Golden Age, the members of this elite were often sufficiently wealthy to be able to lend the required sums. After the floods of 1651, 1670 and 1672, for instance, the financing for reconstruction was provided by private individuals. In this period Mastenbroek polder gradually became dependent on (long-term) credit from private individuals, like many water authorities in the western Netherlands.<sup>51</sup> However, in the much less favourable economic climate of the eighteenth century, landowners and administrators could not provide enough money to repair the damage after the major flood disasters of the 1770s. In the night of 14-15 November 1775, the dikes in Mastenbroek polder burst and seventeen people in the polder died. The water authority failed to obtain financing to mend the five holes in the dikes. In the night of 21-22 November 1776, there was another large flood, and another five people died. The local elite was unable to lend the sums of money that were needed to repair the damage. These sums must have been huge, considering that repairing the damages in Mastenbroek and the neighbouring region of Vollenhove together was estimated at 600,000 guilders. The polder therefore became wholly dependent on subsidies and credit from the States of Overijssel. Repairs to the waterworks were delayed for years and the water authority also lost a great deal of its autonomy to the province. Dike reinforcement and dike improvement were carried out under the supervision of the States of Overijssel.<sup>52</sup>

Private moneylenders were probably right to put their trust in the water authorities. Even during difficult periods, interest payments were made on time, for example during the “year of disaster”, 1672, when the Republic was attacked on three fronts simultaneously and chaos reigned in the countryside.<sup>53</sup> The Lekdijk Bovendams issued *losrenten* that could only be redeemed with the buyer’s permission, and in a few instances they became permanent. Even today, the water authority is still paying annual rent on several loans that were agreed in 1634 and 1648! The promissory notes, which are by now almost 400 years old, have become a curiosity; they are among the oldest still-active promissory notes in modern capital markets.<sup>54</sup> Although the interest pays less than 14 euros per annum (2.5%), because they are fascinating evidence of the seventeenth-century capital market, they have become extraordinarily valuable. In 2000, the annuity of 1634 was auctioned at Christie’s for the massive sum of 47,000 dollars.<sup>55</sup>

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<sup>51</sup> H. KOLE, *Polderen of niet*, cit., p. 188 (floods), pp. 211 (loans).

<sup>52</sup> *Ibid.*, pp. 241-242.

<sup>53</sup> M. VAN TIELHOF, *De financiering*, cit., p. 226.

<sup>54</sup> W.N. GOETZMANN, K.G. ROUWENHORST, *Perpetuities*, cit., p. 178.

<sup>55</sup> <http://www.christies.com/lotfinder/Lot/financial-history-stocks-and-bonds-lekdijk-bovendams-1965498-details.aspx>, viewed on 6 February 2017.

It is striking that the wealthy landowners in these cases, including absentee landowners, behaved differently from how they had done in Flanders and Zeeland in the fifteenth and sixteenth centuries. Then many large landowners stepped back at times when major costs threatened for the reconstruction of sea walls. After a destructive storm surge, they would sell or abandon their land. Their properties were dispersed over a wide area and maintaining locations that demanded high water management levies, was relatively unattractive. Many of the wealthier landowners in fifteenth- and sixteenth-century Flanders and Zeeland showed little commitment to the region and a long-term strategy was lacking; as a result, large areas along the coast were lost.<sup>56</sup> As monasteries owned much land in this area, the decline of the catholic church was partly to blame for the retreat of the big landowners from coastal areas. Another difference must have been that the risk of definitively losing the land, sooner or later, was much bigger in Flanders and Zeeland in the fifteenth and sixteenth centuries than in the northern provinces in the sixteenth to eighteenth centuries. Furthermore, it is likely that the rich landowners in the northern provinces had their property more strongly concentrated in one or only a few water districts.

#### 4. THE CREDITORS' MOTIVES

People were not explicit about their motives, but an important reason to lend money must simply have been the wish to have the water works repaired and well-maintained. Many creditors owned land in the water district and good care for the infrastructure was in their own well-understood interest. Other motives should also be considered, however, based on the rich historiography on credit in preindustrial societies produced in the past decades. These studies show the universal presence of credit in all layers of society, and they also show that social relationships impacted heavily upon all kinds of early modern credit arrangements.<sup>57</sup> Credit relations could be motivated by anything ranging from purely economic to purely non-economic considerations. In the following we discuss three possible motives moneylenders could have had (besides the care for the infrastructure): social obligation, the search for attractive investments, and rent-seeking in the sense of the search for benefits at other's expense.

We should consider the fact that credit was granted to water authorities as the result of a social obligation, as many early modern credit agreements can in fact be

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<sup>56</sup> T. SOENS, *The social distribution of land*, cit., pp. 162-163, 167-168. About the collapse of water management in the south-western Netherlands in the fifteenth-sixteenth centuries, see also P. VAN CRUYNINGEN, *From disaster to sustainability: floods, changing property relations and water management in the south-western Netherlands, c. 1500-1800*, in "Continuity and Change", 29, 2014, n. 2, pp. 241-265, 245-247.

<sup>57</sup> L. FONTAINE, *Antonio and Shylock: credit and trust in France, c. 1680-c.1780*, in "Economic History Review", LIV, 2001, n. 1, pp. 39-57; P.T. HOFFMAN, G. POSTEL-VINAY, J.-L. ROSENTHAL, *Des marchés sans prix. Une économie politique du crédit à Paris, 1660-1870*, Paris 2001; PH.R. SCHOFIELD, T. LAMBRECHT, *Introduction. Credit and the rural economy in North-western Europe, c.1200-c.1850*, in *Credit and the rural economy in North-western Europe, c.1200-c.1850*, PH.R. SCHOFIELD-T. LAMBRECHT eds., Turnhout 2009, pp. 1-18; D. STASAVAGE, *States of credit. Size, power, and the development of European politics*, Princeton-Oxford 2011.

explained in this way. Wealthy noblemen in France in the eighteenth century, for example, could not refuse credit to the members of their family and to their friends, nor to their labourers and tenant farmers. The situation was not much different for merchants at the time, who had to lend to their family and friends, to fellow merchants and to people living in their home village. The economic returns of these agreements were often bad, but this was considered irrelevant.<sup>58</sup> In early modern Dutch towns a sense of duty played its part too, when during emergencies the political elite lent money, expecting modest returns at best.<sup>59</sup> Likewise, landowners lending money to water authorities in the aftermath of a flood may have felt obliged to do so. In specific cases, this was probably true for dike reeves, trustees, stewards or other officials who were indeed expected to advance money in case of emergencies.<sup>60</sup> For this reason, only wealthy people qualified for these offices. Such motives, however, cannot have been predominant, because interest was charged that was in line with the prevailing market rates. Most of the loans were thus not the result of a social obligation, let alone acts of charity.<sup>61</sup>

The historiography on urban public debt in the early modern period suggests that bonds and annuities issued by towns were seen as attractive investments by local elites. Rates of interest were reasonable, although not very high, and the risk was low because of the influence these elites had on local debts policies.<sup>62</sup> Loans by water authorities must have provided favourable investment opportunities for wealthy people for the same reasons. Especially after 1650, there were often few investment opportunities which were both safe and profitable for the many people who had grown rich during the Dutch Golden Age. The needs of water authorities to a certain extent solved their problem. Interest payments were considerable and could claim a large part of a water authority's regular revenues. This was the case in Bunschoten polder (Province of Utrecht) just after the middle of the seventeenth century. The polder managed a 10-km stretch of dike along the Zuider Zee which was severely damaged during the St Peter's Flood of 1651. Its debts multiplied rapidly and in 1656, the water authority paid 2,392 guilders in interest to creditors, around 30% of its annual revenues.<sup>63</sup> Situations such as these, whereby between a fifth and a third of regular revenues were transferred to investors, were not uncommon. Investors certainly appreciated this kind of reliable and regular income.

As the loans were provided by a regional elite who also had considerable influence over the water authorities' financial policies, we should consider rent-seeking as a possible motive. After all, the loans had the effect of a structural transfer of wealth: the annual interest payments were made by the whole

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<sup>58</sup> L. FONTAINE, *Antonio and Shylock*, cit., pp. 46-48.

<sup>59</sup> M. VAN DER HEIJDEN, *Geldschieters*, cit., pp. 196-197.

<sup>60</sup> Like the dike reeves in the county of Lincolnshire in the early modern period, who advanced substantial sums of money. See the article by John Morgan in this volume.

<sup>61</sup> On real charity initiatives to help victims of floods from about 1740, see G.R. BOOMSMA, P.J.E.M. VAN DAM, *Historisch onderzoek naar de donormotieven*, cit., pp. 27-28.

<sup>62</sup> D. STASAVAGE, *States of credit*, cit., p. 117, 124, 131; VAN DER HEIJDEN, *Geldschieters*, cit., pp. 165, 196-203.

<sup>63</sup> H. KOLE, *Polderen of niet*, cit., p. 124.

community of landowners, but they benefitted a limited number of them, the rich moneylenders. In a reaction to the influential school of the New Institutional Economics, social and economic historians argued that procedures often were applied or remained in place not because they were inherently efficient, but because they proved to be efficient for the groups that wielded the most power.<sup>64</sup> The land reclamation project in Kalloppolder (Province of Flanders) in 1649-1652 serves as an example. An analysis of the financing of this project has shown that a small number of rich participants profited from the fact that the project ran into liquidity problems. The problems were solved by allowing some of the participants, mainly the big investors, to give advances. The rates of interest of these advances were relatively high (between 6.25% and 8%) compared with those on the government bonds of Holland at the time (4%-5%). According to Soens and De Graef these participants solved the polder's liquidity problems, but not because they feared the failure of the project but because the advances offered them attractive investment opportunities.<sup>65</sup> If these advances were not agreed for the short term (which would explain their relatively high rates), but for the long-term, the relatively high rates confirm the specific character of this kind of drainage projects. Land reclamation projects were speculative ventures, seen by many investors as a possibility to get rich quickly. The advances may have been part of this attitude and be considered rent-seeking.

The practices that we have considered so far, however, that is borrowing by water authorities administering existing lands in the northern provinces during the Dutch Republic, can hardly be explained by rent-seeking. For one thing, the modest interest rates suggest that the creditors were not out to make a quick profit.<sup>66</sup> But also the repayment policies pursued suggest that the loans were not in the first place intended as a means of benefitting the creditors. An interesting result from the study by Kole on the financial policies of Bunschoten polder (Province of Utrecht) and Mastenbroek polder (Province of Overijssel) in the seventeenth and eighteenth centuries is that these water authorities sooner or later learned to develop sensible borrowing practices. They borrowed in order to spare landowners the burden of having to pay for total reparation costs soon after a flood disaster. At the same time they tried to avoid excessive borrowing and sometimes even saved money to be prepared for large, unexpected expenses. When possible, debts were redeemed, because board members considered it undesirable when the water authority had to pay large sums in interest.<sup>67</sup> During the agricultural depression that began around 1650, several water authorities were compelled to remain indebted for many years. This was not to satisfy investors, but was due to the impossibility of

<sup>64</sup> See, for example, S. OGILVIE, "Whatever is, is right"? *Economic institutions in pre-industrial Europe*, in "Economic History Review", 60, 2007, n. 4, pp. 649-684.

<sup>65</sup> T. SOENS, P. DE GRAEF, *Polder mania or marsh fever? Risk and risk management in early modern drainage projects: the case of Kalloppolder, Flanders, 1649 to 1662*, in "Agricultural History Review", 62, 2014, n. 2, pp. 231-255, 242-244.

<sup>66</sup> In 1776, about half of the creditors of Arkemheen polder accepted lowering of the interest rates on existing loans (from 3% to 2.5%), though better investment opportunities were available. GA, AZPA, inv.nr. 808.

<sup>67</sup> H. KOLE, *Polderen of niet*, cit., pp. 122, 227.

imposing additional burdens on agriculture.<sup>68</sup> The indebtedness of the water authorities therefore fluctuated significantly over time, mainly determined by water management needs and the agrarian economic climate.<sup>69</sup> The repayment policies they pursued offer no reason to assume that large landowners encouraged structural indebtedness just to enjoy secure investments.

Although the bonds and annuities were transferable and negotiable, it is likely that most of the sums borrowed were repaid to the original moneylenders or their direct descendants. As a result of inheritance and sales, they sometimes fell into the hands of people other than the original creditors. The fact that some of the annuities issued by the Lekdijk Bovendams are still active and in American hands, is fascinating but should not be taken as proof of an active secondary market. There were no stock market listings for the promissory notes issued by water authorities.<sup>70</sup> They were favourable, safe investments but their popularity was apparently also limited.

In short, I deduce from the modest interest rates in combination with the repayment policies that the most important motive must have been the wish to have well-maintained waterworks as these decisively influenced the value and productivity of the land. The estates of the moneylenders themselves were dependent on the maintenance of the dikes and the drainage system. A second, but nevertheless important, motive would have been the wish to profit from attractive investment opportunities. It is less likely, however, that the creditors were generally motivated by rent-seeking or (only) because they felt obliged to help the people living and working in the flooded region.

## CONCLUSION

In summary, in the sixteenth and seventeenth centuries, many water authorities began to borrow money from landowners in the district on a long-term basis. This became the preferred method of financing repairs to infrastructure after large flood disasters. The loans were taken out at low rates of interest, sometimes even at a rate that was slightly lower than the prevailing market rate. It became unnecessary to pursue alternatives such as subsidies or forced loans. Credit at high rates of interest was only agreed in exceptional cases.

The conclusion of this kind of loans on a large scale became possible, first, thanks to the (complete or partial) monetisation of maintenance of water works, whereby water authorities received annual revenues that acted as guarantees for future obligations. As a result, most water authorities were considered to be very creditworthy. A second explanation lies in the nature of social relations: it was necessary for a large group of wealthy landowners to be willing and able to make their money available. The moneylenders themselves had land in the territory,

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<sup>68</sup> The Lekdijk Bovendams redeemed very little between 1653 and 1704. M. VAN VLIET, *Lekdijk Bovendams*, cit., p. 271. The same was true for Schieland between 1675 and 1713. M. VAN TIELHOF, *De financiering*, cit., pp. 224-226.

<sup>69</sup> H. KOLE, *Polderen of niet*, cit., Figures 4-3 and 7-1.

<sup>70</sup> W.N. GOETZMANN, K.G. ROUWENHORST, *Perpetuities*, cit., p. 183.

giving them an interest in an effective communal infrastructure. Maintaining a good system of water management was probably their primary motive for lending money, because this increased the value and productivity of their land. It is clear that here we are dealing with landowners who were not looking for a quick profit, but for whom land ownership formed part of a long-term strategy. Furthermore, they received a decent rate of interest and their investment carried little risk.

When water authorities were afflicted by a high degree of internal conflict, as was the case for the water authority of the Diemerdijk, no loans were concluded with landowners. Evidently, there was too little social cohesion and trust between the members of the board and the landowners to be able to find a mutual solution to the financial problems. Plagued by disunity, the water authority of the Diemerdijk resorted to financing methods that had still been common in many places in the early sixteenth century: short-term loans from large towns (in this case, Amsterdam) and subsidies from provincial governments (in this case, Holland). Likewise, when the members of a regional elite were not wealthy enough to provide sufficient sums, as was the case in Mastenbroek polder in Overijssel in the late eighteenth century, the water authority became dependent on the government.

Turning to the advantages and disadvantages of long-term borrowing from landowners, the system had first of all a downside: the loans resulted in a structural transfer of wealth from the collective of landowners to a small number of them who were already rich: the moneylenders. The advantages were more numerous, however. The landowners won more time to pay for the repair costs after catastrophes, which was especially important for the poor among them. The costs could be spread over ten to twenty years – sometimes even longer – rather than a few years, meaning that fewer landowners were forced by poverty to abandon their land. Borrowing from the landowners had several other advantages over alternative forms of financing. As the transactions were voluntary and the water authorities made use of existing social networks, the transaction costs were low. There was no need for long and difficult negotiations with government agencies or with external private moneylenders. Loans could thus be agreed easily and quickly. The loans were also relatively cheap. Furthermore, the loans brought a high degree of flexibility to financial management, because they were (in practice) concluded for an indefinite period. A final important advantage concerned the preservation of autonomy. Water authorities that were able to solve their own problems and never received subsidies from provincial states or loans from towns did not have to accept any meddling by these parties. Having a high level of creditworthiness thereby strengthened the institutional power of the water authorities.

The willingness of wealthy landowners to put their hands in their pockets suggests that they had confidence in the dike reeve and trustees. In its turn the loans strengthened the social community, because due to their land and to their loans, the creditors had an interest in maintaining the infrastructure in future. In this way these loans contributed to the resilience of coastal societies that had to accept floods as a fact of life.