

# WORKING PAPER

## The decentralised central bank: regional bank rate autonomy in Norway, 1850-1892

20 | 2015

AUTHOR:  
JAN TORE KLOVLAND  
AND LARS FREDRIK  
ØKSENDAL

NORGES BANK'S  
BICENTENARY PROJECT



NORGES BANK

**Working papers fra Norges Bank, fra 1992/1 til 2009/2 kan bestilles over e-post:**

servicesenter@norges-bank.no

Fra 1999 og senere er publikasjonene tilgjengelige på [www.norges-bank.no](http://www.norges-bank.no)

Working papers inneholder forskningsarbeider og utredninger som vanligvis ikke har fått sin endelige form. Hensikten er blant annet at forfatteren kan motta kommentarer fra kolleger og andre interesserte. Synspunkter og konklusjoner i arbeidene står for forfatterens regning.

**Working papers from Norges Bank, from 1992/1 to 2009/2 can be ordered by e-mail**

FacilityServices@norges-bank.no

Working papers from 1999 onwards are available on [www.norges-bank.no](http://www.norges-bank.no)

Norges Bank's working papers present research projects and reports (not usually in their final form) and are intended inter alia to enable the author to benefit from the comments of colleagues and other interested parties. Views and conclusions expressed in working papers are the responsibility of the authors alone.

ISSN 1502-8143 (online)

ISBN 978-82-7553-887-9 (online)



# The decentralised central bank: regional bank rate autonomy in Norway, 1850-1892

Jan Tore Klovland<sup>1</sup> and Lars Fredrik Øksendal<sup>2</sup>

## Abstract

Before 1893 the regional branches of Norges Bank set their own bank rates. We discuss how bank rate autonomy could be reconciled with the fixed exchange rate commitments of the silver and gold standard. Although the headquarters of the bank was in Trondhjem, we find that the Christiania branch played the key role in providing leadership in bank rate policy. Foreign interest rate impulses were important for bank rate decisions, but there was also some leeway for responding to idiosyncratic shocks facing the Norwegian economy.

**Keywords:** bank rate, gold standard, monetary policy

**JEL codes:** E58, N23

---

<sup>1</sup> Norwegian School of Economics and Norges Bank. *Email:* [Jan.Klovland@nhh.no](mailto:Jan.Klovland@nhh.no)

<sup>2</sup> Norges Bank and Norwegian School of Economics . *Email:* [Lars-Fredrik.oksendal@Norges-Bank.no](mailto:Lars-Fredrik.oksendal@Norges-Bank.no)

## Introduction

Until 1893 the different regional branches of the central bank of Norway, Norges Bank, enjoyed a surprisingly semiautonomous status. Each branch was lead by officers elected by the Norwegian parliament, *Stortinget*, as was the national Board of Directors. The lending resources allotted to each branch basically reflected the geographical dispersion of the original tax-receipts collected to fund the bank. For long these resources were *de facto* earmarked for a particular district rendering the different branches a fair amount of latitude. Most importantly, bank rate setting was a branch prerogative. In consequence, no countrywide bank rate was in place. At times, the bank rate differentials could become quite substantial. The counterpart to branch autonomy was a rather weak central leadership under the Board of Directors, which was even further diminished by the choice of Trondhjem, a remote city in the middle of the country, rather than the commercially more vibrant city of Bergen or the administrative nucleus of Christiania, as bank headquarters. In terms of funds, the Christiania branch surpassed the headquarters by a wide margin.

In international monetary history, such a high level of *central bank* branch autonomy is unprecedented, making the Norwegian case a puzzling anomaly. A case can be made for seeing the early Federal Reserve System as a possible parallel to the Norwegian experience. Until 1935 each constituent reserve bank had a high degree of autonomy including the right to set discount rates. However, autonomy was matched by monetary policy obligations – for instance gold backing rules for the notes issue of every reserve bank – making the federal system more symmetric. It was also well established that New York had the primary responsibility for international monetary relations.<sup>3</sup> No symmetry existed in Norway, where the responsibility for monetary policy rested solely with the headquarters.<sup>4</sup> A somewhat related, but still quite different, case is Japan, where the Bank of Japan established branch offices in the 1880s and 1890s. Here, the purpose was to promote capital market integration by facilitating funds transfers

---

<sup>3</sup> Friedman and Schwartz, *Monetary History*, p. 380.

<sup>4</sup> Friedman and Schwartz, *Monetary History* pp. 442-44. Moreover, bank rates continued to differ between reserve banks well into the war years.

between regions.<sup>5</sup> However, the discount rate was common to all branches.

Nonetheless, the decentralized nature of the central bank corresponds to a certain degree to realities in early 19<sup>th</sup> century Norway. With a population of 1.4 million (1850), she was among the small nations of Europe, but surpassed Great Britain in terms of land mass. More important than size was distance: the outer coastline ran for 25,000 kilometres, and mountains effectively divided the more populous southern part of the country. The economy reflected the geography: an open economy where the pillars were the local and global level rather than the national. Regions were more strongly integrated with their overseas markets than the neighbouring regions across the mountains. An integrated national economy was fostered – not least through improvements in communication technology – in the course of the 19<sup>th</sup> century, but was not present at its dawn. In consequence, to use modern parlance, Norway would hardly fulfil the criteria for an optimal currency area. The regions were to some extent exposed to different business cycle shocks, displayed dissimilar patterns of seasonal demand for money and varied in their credit requirements as well as in the loan types desired.

This notwithstanding, the puzzling anomaly remains: Norges Bank was chartered in 1816 with a *de facto* note issuing monopoly in order to provide monetary stability in the aftermath of the inflationary years of the Napoleonic wars. In the 19<sup>th</sup> century, monetary stability was associated with a fixed exchange rate commitment through the pledge of the bank of issue to honour her notes in silver or gold. Norway attained *de facto* silver convertibility in 1842 and adopted the gold standard in 1874. Such a commitment evidently calls for strong leadership; i.e. a bank equipped to maintain the credibility of the currency, and if necessary, a bank ready to defend its convertibility. Intuitively, both the level of regional autonomy and the choice of Trondhjem as headquarters went contrary to this requirement.

In this article we set out to explore the workings of Norwegian central banking under the constraint of considerable branch autonomy. The key question addressed is how a fixed exchange rate commitment could be reconciled with the branch bank rate prerogative. At the forefront in answering that problem are three interrelated further questions: what drove individual branch bank rate decisions, how did the interconnectedness between decisions play out and can we

---

<sup>5</sup> Mitchener and Ohnuki, 'Capital Market Integration in Japan'.

identify a leadership function or transmission agent within this decentralised system.

### An outside view from the inside

In a way the story told here is a strangely domestic one, brought about by the particulars of nation building and fostering economic integration for a new country on the periphery of Northern Europe. At the same times it forms part of a much bigger story: the 19<sup>th</sup> century evolution of international money from fragmentation in the years after Waterloo to a truly international monetary system knitting the world together through a common anchor. No other international regime has received more attention from economic historians than the pre-war gold standard, reflecting partly its success, partly the lasting enigma of how to reconcile theory and empirics. Fifty years ago, starting with Arthur Bloomfield, a generation of scholars arrested the old theory driven notions of how the regime functioned centred on semi-automatic price adjustments and concepts like the rules of the game.<sup>6</sup> In the aftermath, a second generation of scholars made path breaking inroads into the understanding of the regime, either by adopting a systemic approach or by building new bridges to reconcile theory and empirical findings.<sup>7</sup> Inspired by these studies and with a certain overlap in time and scholars, a third wave of research has turned the attention to how the gold standard regime was built from below, stressing the variety of gold standard experiences with an emphasis on the need for more single countries studies and a broader approach than just the core gold standard.<sup>8</sup> Perhaps the best summary of the point of departure of this new generation is suggested by Marc Flandreau and Harold James: *“that each country’s record as a member of the gold club must be assessed not from the point of view of rules that never existed but from the point of view of each country’s needs, constraints and potentials (...).”*<sup>9</sup> In addition to a broader geographical range and single country studies, the new strand of

---

<sup>6</sup> Bloomfield, *“Monetary Policy”*; Ford, *“Britain and Argentina”*; and Triffin, *“Historical Reappraisal”*. The present and following notes are not intended as an exhaustive listing of the research frontier, but as an eclectic reference to key studies capturing the prevailing trend of each “generation” of gold standard scholars.

<sup>7</sup> Kindleberger, *World in Depression*; Eichengreen, *Golden Fetters*; Bordo and Kydland, *“Commitment mechanism”*; Bordo and MacDonald, *“Interest rate interactions”*, and Bordo and Rockoff, *“Good Housekeeping.”*

<sup>8</sup> Martin-Acena and Reis, *“Paper, Silver and Gold”*, and Reis, *“An ‘art’, not a ‘science.’”*

<sup>9</sup> Flandreau and James, *“Introduction.”* p.8.

literature offers a fresh light on the operational aspect of monetary policy.<sup>10</sup>

Our study represents a contribution within the latter approach, but it is also influenced by the second, not least the literature on the gold standard as a target zone. We examine the particular constraints, how to accommodate the domestic reality of a decentralised economy with a desire to be part of an international monetary system. What Norway did on the international scene, i.e. integrating, the different economic regions had to do within the nation state at the same time. The unique story told emphasis the richness of variety in 19<sup>th</sup> century fixed exchange rate experience.

### The political economy of a decentralised bank of issue

Norges Bank was chartered by *Stortinget* in 1816 to restore monetary confidence after the inflationary havoc of the Napoleonic wars and the monetary turmoil of the interregnum year 1814.<sup>11</sup> The new bank was granted what became a *de facto* note issuing monopoly. *De jure* the notes were redeemable in silver, but currency convertibility at par value was only achieved in 1842 after a prolonged period of cautious monetary policy. This notwithstanding, the new *spesiedaler* note was soon established as unit of account and monetary reference, perhaps reflecting the long established tradition of “talking and counting in paper”.<sup>12</sup> Norges Bank was the first domestic bank and continued to enjoy a dominant position in the credit market. The first savings banks were established in 1822 and the first commercial bank in 1848. Only in 1855 did the deposits of the combined banking sectors surpass the liabilities (notes and deposits) of Norges Bank.<sup>13</sup>

Chartering the bank was a part of the institution-building facing the young nation. In this respect

---

<sup>10</sup> Ugolini, “Quest for Monetary Independence”; Flandreau and Ugolini, “Where It All Began”; and Ugolini, “World gold market-maker”.

<sup>11</sup> As a consequence of European high politics, the King of Denmark-Norway had to cede the northern part of the dual monarchy to Sweden in January 1814. The interregnum created a window of opportunity for Norway: in the spring of 1814 a national assembly gave a liberal constitution and declared independence. Following a short war, Sweden accepted the new constitution as the Norwegian basis for entering a personal union under a common king. Foreign policy was to be jointly decided by a Swedish dominated council, but all domestic issues were left for the Norwegians and their newborn institutions. One of these issues was the question of currency.

<sup>12</sup> Before 1814, the currency of Norway had been that of Denmark. For more than fifty years the circulating medium of exchange as well as unit of account had been non-redeemable paper notes while silver – the nominal coin of the realm – was in short supply. Until the late 1790s, the fiat money had enjoyed a certain degree of stability, but the war-years 1807-14 put the leash off the money press.

<sup>13</sup> Klovland, “Monetary Aggregates”; and Eitheim, Gerdrup and Klovland, “Monetary Developments.”

what was political imperative went hand in hand with the economic necessity of having a credible currency.<sup>14</sup> Economic realities, however, were far from ideal for establishing the new bank. Peace came with falling demand for Norwegian exports, notably so for timber, leading to widespread hardship. Establishing Norges Bank turned into an uphill struggle: the subscription for shares failed and in the end she had to be funded by forced contributions (the silver tax).

Reflecting the economic structures and geography of the country, Norges Bank was given a decentralised structure with substantial power vested in the four initial branches. Surprisingly, the branches did not only enjoy close to full operational freedom, but were given responsibilities, like bank rate decisions, which today would be regarded squarely as being within the realm of monetary policy. The decentralised character of the bank was strengthened by the fact that the bank had to be funded through tax contributions. First, under a “forced” bank the tax-payers found themselves as shareholders in the bank, but with no influence. Supervision and appointment of bank officers came to rest with Stortinget, the body representing the propertied voting classes upon which tax had been levied. This strengthened the political character of the bank, including an assured sensitivity to the voices of local interests. Second, the forced nature of the funding segmented the distribution of lending resources. Although further increases in the bank’s funds throughout the century gave some leeway for the Board of Directors, the initial distribution reflecting the “silver-tax” continued to give strong guidance as to the allocation of further lending capacity as well. In consequence, rigidity led to situations where branches in eastern Norway had all but exhausted their ability to grant credit while the western branches might have troubles finding profitable investment outlets for their money. Third, either as a result of political presumption or haphazard, Trondhjem rather than Christiania became bank headquarters.<sup>15</sup> Thus, nominal hierarchal power was not matched by economic resources.

---

<sup>14</sup> Establishing a credible currency was seen as a litmus test for the new nation. Not until the late 1820s was the constitutional arrangement of 1814 safe from further Swedish. A failed restoration would have implied that Norway did not possess the ability to stand alone.

<sup>15</sup> Foreseeing that the subscription for shares might fail, two bank charters were submitted for parliamentary approval in 1816. Stortinget decided that the “voluntary” bank was to be led from the Christiania branch. However, when Stortinget voted over the charter for the “forced” bank on the next day, Trondhjem received majority support. It has been argued that a “forced” bank implied more risk of government dabbling and that this led to the choice of Trondhjem, literarily establishing distance between bank and government. This might very well have been the case, but only if anyone actually changed preferences between the two votes. That this actually happened is not obvious from the number of votes and changing number of absentees at the two divisions.

Initially three branches (Christiania, Bergen and Christiansand) were established together with the Trondhjem headquarters, which also functioned as the local branch for the northern counties. Quite early calls for additional branches were voiced both by commercial interests and members of parliament. In the 1830s, two new branches were established, in Drammen and Skien, both important timber cities. When a new branch was set up, lending capacity was transferred from other branches in accordance with the original “silver tax” contribution of the area. After 1837, no new branches were established. However, a number of *offices* were established and for most practical purposes, including bank rate decisions, they enjoyed the same status as the branches proper. However, they tended to be smaller. By the end of the period of extended branch autonomy in 1892 the number of branches in operation had increased to 13. In this study we limit our explorations to the “original” six branches – including the Trondhjem headquarters – in operation by 1850.

*Map 1: The branches of Norges Bank*



### The branches and branch data – an overview

Three of the branches, Trondhjem, Bergen and Christiania, were situated in the most important cities of the country. In terms of regional economy, they were quite different. In Bergen, situated on the western coast, the fisheries obviously were the most import export industry and source of the business cycle fluctuations. Christiania and the two other cities with branches in the eastern part of the country, Drammen and Skien, were heavily dependent on timber exports. In Christiania, the annual peak in the demand for discounting facilities regularly corresponded with the major midsummer timber market. Moreover, both Drammen and Christiania were situated at

the inner Christiania fjord basin with only 40 kilometres as the crow flies separating the two. Thus, both proximity and economic structure connected the two. Accordingly, there was a western coast and an eastern interior with different seasonal patterns of demand which were exposed to partly unrelated business cycle shocks. Trondhjem, situated in the middle of the country, covering the vast area stretching from the Dovre mountains to the border with Russia in the high north, enjoyed a more balanced export structure with timber and fisheries as well as copper ore playing important roles. Christiansand, in the very south of the country, was in the 19<sup>th</sup> century more important as an administrative nucleus than as a commercial centre. Compared to the rest of the country, Christiansand stands out as rather sheltered, with a branch that for long held long-term mortgages as its most important balance sheet item. Moreover, shipping, the most vital export industry of the southern coast, tended to be financed outside the banking system.<sup>16</sup>

The branches lent directly to the public.<sup>17</sup> Initially, lending was dominated by long-term mortgages, but from the early 1850s short-term discounting started to play an increasingly more prominent role. Branch lending capacity was dictated by the funds allotted to each branch as well as the deposits kept at the branch. Our analysis is based on monthly balance sheet data from each branch, reporting funds, deposits, mortgage loans, discount loans and claims on bankruptcy estates. In the table below, the monthly averages for each of these five variables are reported, giving an indication of relative size as well as direction of activity. In terms of total lending capacity, Christiania is by far the most important branch, while Skien and Christiansand stand out as the smaller branches. Compared to the other branches, Trondhjem and Christiania had a smaller portion of its lending capacity locked up in mortgages. Moreover, the weight of deposits in the overall lending capacity varied strongly.<sup>18</sup> For Drammen, Skien and Christiansand, deposits did not contribute much. In contrast, for Christiania deposits played a very important role; constituting on average one third of overall lending capacity in the 1858-1892 period. Bergen and Trondhjem fell somewhere between the smaller branches and Christiania, but in a manner where major shifts in deposits occasionally had strong impact on lending capability.

---

<sup>16</sup> Nordvik, "The Banking System."

<sup>17</sup> Only in connection with major crisis like 1857 would Norges Bank in a very limited capacity rediscount for savings banks. To our knowledge, the discount window was never open for commercial banks until the close of the century.

<sup>18</sup> Lending capacity of each branch was determined by the sum of its funds and deposits.

Table 1: Average Unutilized branch resources (*UBR*) over the period 1858-1892: Components and summary statistics

	Trondhjem	Christiania	Bergen	Drammen	Skien	Christiansand
Funds	4970	7176	4247	3971	3158	3011
Deposits	851	3666	950	300	132	200
Discount loans	3112	5078	2171	1959	1781	1361
Mortgage loans	2055	3421	2069	1943	1361	1538
Claims on Bankrupt estates	49	13	155	111	67	28
<i>UBR</i>	605	2330	802	258	81	284
<i>UBRP</i> average	10.4	21.5	15.4	6.0	2.4	8.8
<i>UBRP</i> minimum	-12.8	-16.1	-19.9	-9.6	-15.4	-11.3
<i>UBRP</i> maximum	50.3	71.4	62.0	31.0	18.9	34.6
<i>UBRP</i> variability	10.3	13.9	11.4	7.0	5.9	6.7

*UBR* is computed as Funds + Deposits – Discount loans – Mortgage loans – Claims on Bankrupt estates. *UBRP* is *UBR* as a percentage of the lending limit (funds + deposits). The variability of *UBRP* is the standard deviation of the 12-month change in *UBRP*.

Equipped with the balance data summarised in the table above, we have constructed a measure of the monthly position of each branch with respect to its unutilized resources which we apply in our analysis:

$$\text{Unutilized branch resources (UBR)} = (\text{Funds} + \text{Deposits}) - (\text{Mortgages loans} + \text{Discount loans} + \text{Claims on bankrupt estates})$$

*UBR* as a percentage of the lending limit (funds + deposits), is referred to as *UBRP* in this study. From the table we can observe key differences in *UBRP* both with regard to average level and variability. The branches in the three major cities, most notably Christiania, have on average both higher *UBRP* and a greater level of variability, reflecting the more active nature of the local money market. Note that *UBRP* is influenced by changes in the nominator as well as in the

denominator: With allotted funds more or less stable over time and mortgage loans displaying a steady downward trend, the most important sources of monthly changes in *UBRP* were changes in deposits and changes in discounting.

*UBRP* reflects the branches' potential for additional lending. However, *UBRP* might also serve as a proxy for the state of the local money market. This assumption is based on three observations. First, in the beginning of the period under investigation, the 1850s, Norges Bank was the only institutional actor in the market for short-term commercial credit of some note. Even with the coming of the private banking sector, the branches of Norges Bank continued to be the major single source of short-term loans well into the 1870s in most regions. Second, the branches operated in the same market for short-term discounting as the private banks. Third, private banks kept their cash reserves as deposits with Norges Bank. Increased demand for discounting or withdrawals in the private banks would lead to reduced bank deposits in Norges Bank and, in consequence, reduction of *UBR*. Thus, a tightening or an ease of the liquidity position of the private banks would be reflected in the balance sheet of Norges Bank.

### Mapping regional money market differences, 1850-92

In the early 1850s, short-term lending began to play a more prominent role in the business activities of Norges Bank. Although discounting had for a long time played a prominent role in the daily operations of the bank, mortgages had dominated the portfolio.<sup>19</sup> The calamities of the financial crisis in the revolutionary year 1848 had accentuated the risk involved for a bank of issue of having its resources tied-up long-term. Moreover, both the crisis of 1848 and, more profoundly, the crisis of 1857 led to increased demand for domestic discounting facilities at the expense of the traditional links to the banking houses of Hamburg. In consequence, with an increasing portfolio of short-term loans, bank rate policy entered a new phase. Bank rate changes became much more frequent and the branches began in earnest to make use of their policy autonomy: Before 1850, a unified bank rate across the country had been the norm despite branch

---

<sup>19</sup>Although placing the bulk of a central bank's resources long-term does not make much sense from a modern monetary policy perspective, this reflected both the demand for credit in the 1820s as well as the perceptions of lending risk the early Norwegian bankers harboured. As Sejersted has pointed out, satisfying the strong demand for long-term credit might have been the most efficient way of bringing the notes into circulation given the structure of the economy. See Sejersted, "Monopolbank."

autonomy, in the course of the new decade it became more of an exception.

In this section we set out to map the regional money markets in Norway. Although all 13 branches and offices in existence by 1892 enjoyed bank rate autonomy and exercised this right, we have limited our study to the six branches that were in operation in 1850. Although “the gang of six” over time lost some resources as new branches were setup, they represented more than 85 per cent of total lending capability until 1877 and close to three quarters in 1892. We do not believe any vital insights are lost by the omission of the seven newer and smaller branches.

Writing in 1889, Professor Aschehoug, the leading Norwegian economist at the time claimed that: “(...) to talk about Norges Bank as one unit is quite erroneous. Rather it is an association of several smaller banks (...) which operate fairly independently of each other”.<sup>20</sup> An eyeball glance at the development of branch bank rates indicates that Aschehoug was right. In only a sixth of the monthly observations 1850-92 did all five keep the same bank rate as the headquarters, in close to half of the observations one or two branches deviated while in more than one third of the observations three or more branches had different bank rates. In a striking 8.5 per cent of all observations *no* branch follows the lead provided by Trondhjem. In a third of the observations, neither Christiania nor Bergen followed the lead.

*Table 2: Bank rates: number of branches in deviation of Trondhjem*

Number of branches in deviation of Trondhjem	Observations	Percentage
0	92	17,8
1	130	25,2
2	113	21,9
3	75	14,5
4	62	12
5	44	8,5
	516	100

Although all branches pursued a more active bank rate policy after 1850, they differed strongly in how much more active they became. Both Christiania (101 changes) and Bergen (115 changes)

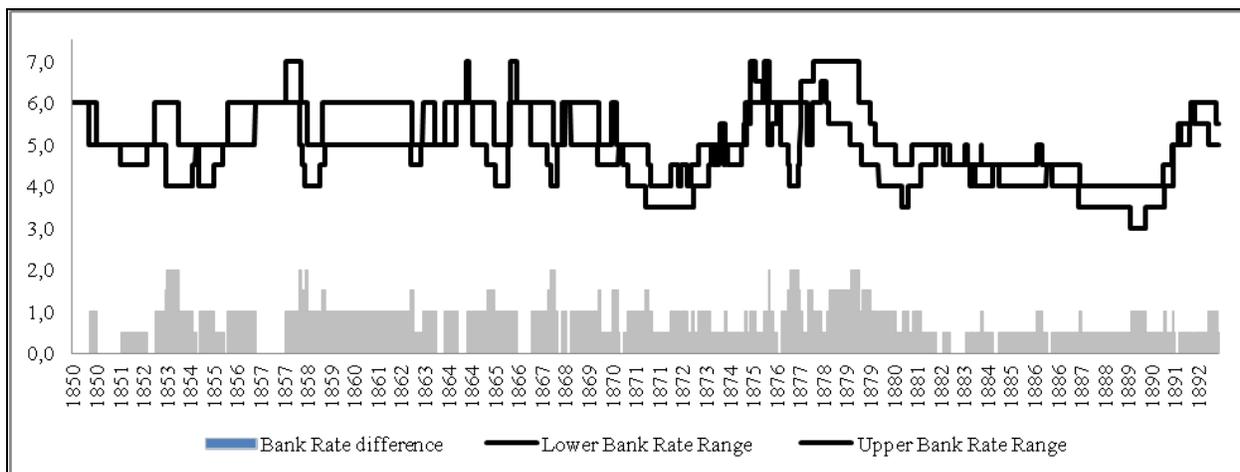
---

<sup>20</sup> Cited in Rygg, *Norges Bank*, p.134.

were more active than Trondhjem (72 changes). Even Drammen with 80 changes surpassed the headquarters, a level of activity which might be understood in light of that city's proximity to the capital. In contrast, the branches in Skien and Christiansand changed bank rate only 50 and 42 times, respectively. The strongly differing number of changes observed reflected diverse economic structures, varying exposure to the money markets and local style in the approach to bank rate setting. The two smaller of the six branches, Skien and Christiansand, stand out as sheltered compared to the other four. In periods with frequent bank rate changes elsewhere, they often tended to maintain the same rate. The most important commercial cities, Christiania and Bergen, were obviously the most active ones, reflecting the size of the money market and the stronger exposure to international financial markets.

An obvious implication of branches exercising bank rate autonomy is that bank rates varied across the country. Hence, to write about the bank rate in the singular sense for this period renders little meaning. What might be more fitting is to refer to *the prevailing bank rate level*; i.e. the band between the highest and lowest bank rate applied in the country. In the figure below the upper and lower bank rates 1850-1892 are displayed using daily data as well as the difference between the two.

Figure 1: Upper and lower bank rate 1850:1-1892:12



A look at the bank rate difference (i.e. the size of the bank rate band) tells us something about the development over time. The 1850s displayed the longest period where the bank rate *de facto* was uniform across the county. From the late 1850s until around 1880, the difference regularly stayed

at one percentage point for long periods of time, and in the distress of the late 1870s even beyond that. From the early 1880s, as interest rates tended downwards, half a percentage point difference became the normal situation, one percentage the exception. Although the financial markets in Norway were not fully integrated in the period under scrutiny, the gradual narrowing of the bank rate difference indicate a movement towards a more integrated money market.

Table 3: *Difference - lowest to highest bank rate 1850-92 (daily observations in percentage points)*

Difference in percentage points	Days	Percentage
0,0	2.849	18,2
0,5	5.334	34,0
1,0	6.143	39,1
1,5	893	5,7
2,0	476	3,0
	15.695	100

The table above summarises the bank rate differences based on daily data. A uniform bank rate, i.e. no difference, is seen in 18.2 per cent of observations for the whole period, but with a much higher frequency for the years before 1858. Differences of one half to one percentage points were obviously the order of the day, being the case in close to three quarter of all observations. Differences above one percentage point were quite seldom, constituting 8.7 per cent of all observations.

### Understanding branch autonomy under a fixed exchange rate commitment

The essential argument for rendering autonomy to branches was the need to accommodate local interests in an economy that was far from integrated. As the mapping above illustrates, branches exercised this authority and bank rates varied across the country. The key role of regional market conditions in bank rate settings was clearly recognised at the time as well. In 1859, the Board of Governor tellingly reflected on the interest rate level: *“The discount rate for bills of exchange and roll-over medium terms credits at each of the bank’s branches has varied according to the*

*circumstances and the larger or lesser demand on the bank's available resources.*"<sup>21</sup> That sentiment is supported by our preliminary examination of the data. In the table below, correlation coefficients between the percentage of unutilized branch resources, *UBRP*, and branch bank rates are reported for all six branches. We can identify a strong inverted relationship between the monthly position of *UBRP* and bank rate for all branches, the weaker *UBRP*, the higher the bank rate and vice versa. With the exception for Skien, the tendency becomes even more pronounced when we introduce a one month time lag from *UBRP* to bank rates. This indicates, in concurrence with the argument for branch autonomy, that local market conditions in fact were important for bank rate setting.

*Table 4: UBRP and branch bank rate 1858-1892 monthly observations*

Correlation coefficients between <i>UBRP</i> and branch bank rate 1858-1892 (monthly observations)		
	One month time lag	
<b>Trondhjem</b>	-0,70	-0,73
<b>Christiania</b>	-0,64	-0,68
<b>Bergen</b>	-0,58	-0,64
<b>Drammen</b>	-0,64	-0,68
<b>Skien</b>	-0,51	-0,51
<b>Christiansand</b>	-0,63	-0,66

However, how was it possible to accommodate branch autonomy with a fixed exchange rate regime? Under the specie standards of the 19<sup>th</sup> century – first silver, then gold – the commitment to fixed exchange rates was made operational through the obligation of the bank of issue to honour their notes in specie on demand. In consequence, banks of issue needed both to have ample metallic reserves and keep a careful watch on the note issue. In many countries, including Norway, legal rules dictated the relationship between metallic reserves and note issuing capacity. In traditional accounts of monetary policy under the gold standard, banks of issue were seen as changing the bank rate in accordance with the state of metallic reserves: in the face of a drain on the reserves, the bank rate was increased; in times of gold abundance, the bank rate was lowered.<sup>22</sup> Newer accounts have emphasised that bank rate setting was multifaceted, but that the bank rate still was the core policy instrument. For Norway, Øksendal has suggested that the key

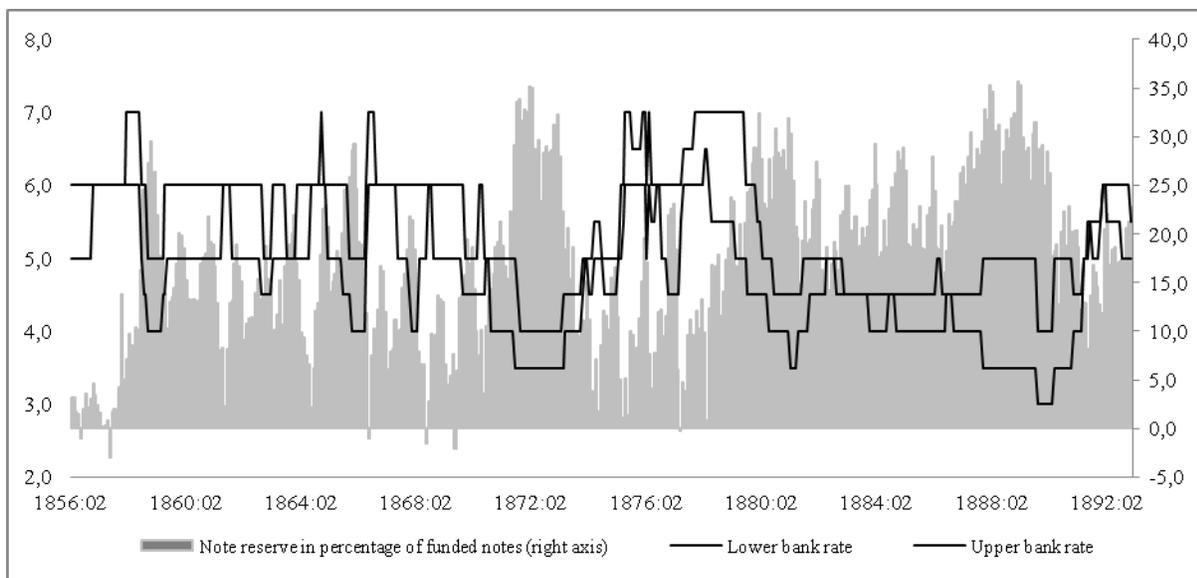
<sup>21</sup> Norges Bank Board of Directors, "Triannual Report 1 January 1857 to 1 October 1859."

<sup>22</sup> Bordo, "Traditional Approach."

monetary target for Norges Bank was the so-called note reserve, i.e. legally backed notes not in circulation, rather than the flows of gold in isolation. His findings for the gold standard period indicate a neat relationship between the note reserve and bank rate: in times of a low note reserve, the bank rate went up and vice versa.<sup>23</sup>

The note issue of Norges Bank fell under the jurisdiction of the Board of Governors. They had to ensure that the legal bindings on the note issue were not violated, a task that involved following the state of the note reserve closely. In case of a weak note reserve, credit had to be tightened. In the course of the 1850s, the bank rate became the prime monetary policy instrument.<sup>24</sup> Nonetheless, the Governors only had the authority to set the bank rate for the Trondhjem branch and had no apparent power to enforce the chosen bank rate on the rest of the country. Branches were free, at least in theory, to take only local conditions into account in their bank rate settings and undermine the efforts of the headquarters to tighten credit. As the earlier discussion indicated, branches strayed from the guidance provided by Trondhjem for extended periods of time.

*Figure 2: Bank rate band and note reserve in percentage of funded notes, 1856:1-1892:12*



However, the data does not indicate a conflict between branch autonomy and fixed exchange rate

<sup>23</sup> Øksendal, “Gold standard experience.”

<sup>24</sup> Earlier, policy had a more blunt character: in the summer of 1848, faced with a major violation of the legal note issuing rights, the bank just stopped discounting.

commitment expressed by the note reserve as monetary target. The figure above maps the development of the notes reserve and the prevailing bank rate level (i.e. lower and upper bank rate) based on end of month observations. An eyeball examination indicates an inverse relationship between the variables: a low note reserve is associated with high bank rates and the other way around. The correlation coefficient between the note reserve level and the average bank rate weighted by the outstanding loans of the various branches is -0.72. If a one month time lagged response from note reserve to bank rates is inserted, the tendency strengthens further to a correlation coefficient of -0.76. For all the three major branches the reported correlation coefficients between their respective bank rates and the national note reserve, both with and without a time lag, correspond strongly with this overall image. For the three smaller branches the relationship is also clearly inverted, but with somewhat weaker results. Although both the lower and upper bank rates show an inverse relationship with the note reserve, the strength of this bias differs. While the correlation coefficient (lagged response) for the note reserves versus lower bank rate is -0.77, the corresponding result for the upper bank rate is -0.63.

The key to explain these seemingly contradictory observations is arbitrage opportunities which ensured that no branch or regional money market was an island. A branch could not deviate *too* much from the prevailing interest rate level in the country and paid close attention to bank rate decisions of others. How much is *too much*? In a situation with no currency risk, like the Norwegian, arbitrage opportunities are defined by transaction costs; in this case the cost to obtain short-term credit in another city than your domicile. If the prospective gain of a lower bank rate exceeded transactions costs, an opportunity existed. Transaction costs in Norway in the second half of the 19<sup>th</sup> century reflected the geography and the available communication opportunities. Travel took time and was costly for persons, goods and postal services. In the period in question, communication technology improved vastly with railroads, steam ship and the telegraph gradually knitting the country closer together as an economic unit. In consequence, communication costs fell. The falling tendency observed for the bank rate band, i.e. difference between lower and upper bank rate, testify to the impact of this process. Thus, falling transaction costs promoted integrating financial markets.

Transaction costs, however, are not limited to the actual monetary outlays of travel or lost

working days. Fundamentally credit is personal. As a general rule, reflecting the problem of asymmetric information, most economic agents would obtain a better credit rating in their home city than in another. Local bankers knew the business of their costumers intimately and could assess the risk involved. The more unknown, the higher the price the costumer had pay to bridge the information gap. In practice, this involved *a name*, someone of repute who acted as agent and co-signed the discounted paper. This might be a close business contact or undertaken as acceptance business by a private banker against a commission. Obviously this added to transaction costs. It is likely that this aspect of the transaction costs displayed a falling tendency as well due to improved communication and new sources of information like newspapers. Moreover, branches probably displayed a certain local bias which went beyond the actual information gap reflecting the prevailing perception that credit was a resource in short supply best kept accommodating local interest.<sup>25</sup> After all, branch administrators were local merchants and civil servants serving the bank in a part-time capacity and formed parts of local elites who knew where their interest lay.

In consequence, the fixed exchange regime commitment and the state of the most important regional money markets shaped the prevailing bank rate level. Transaction costs created a band in which branches could accommodate local conditions without undermining the commitment to a fixed exchange rate. If the administrators deemed the regional money market to be particularly easy, the branch positioned itself in the lower end of the band and vice-versa. When the prevailing bank rate changed, a branch would tend to follow the general move, but if its own situation had not changed materially, it maintained the same position within the band. The closer a branch was to the “arbitrage points”, the stronger the encouragement to follow a general move in the prevailing bank rate. A useful analogy is the leeway the gold points created for national currencies experienced under a traditional international fixed exchange regime like the gold standard.<sup>26</sup> However, one puzzle remains: who had the ultimate responsibility for setting the prevailing bank rate band? The puzzle will be addressed in the next section.

---

<sup>25</sup> Øksendal, “Dividend policy.”

<sup>26</sup> Bordo and MacDonald, “Interest rate interactions.”

## The question of leadership

Branches positioned themselves within the prevailing bank rate band according to local conditions. What remains to address more properly is what drove the prevailing bank rate. One important observation to make from the onset is that bank rate decisions were interconnected. A bank rate change in one branch had the potential of influencing the bank rate setting of others and did so frequently. We believe that the question of leadership is crucial for understanding the formation of the prevailing bank rate level and the dynamics of interconnected bank rate changes. Following the formal hierarchy, the Trondhjem headquarters logically stands out as *the* obvious candidate for leadership. As the only governing body with a mandate beyond its geographical circumference, it had the sole responsibility to maintain the fixed exchange rate commitment. Thus, one would in isolation expect the branches to look to Trondhjem for leadership. However, a number of points make us hesitant to accept that Trondhjem – at least alone – exercised leadership in the bank rate formation. First, the question of size: Christiania had more funds at its disposal than Trondhjem; if deposits are taken into account Christiania had on average close to two times the resources of the headquarters. Moreover, also Bergen was close to Trondhjem in terms of gross available resources. Second, the question of market exposure: Both Bergen and in particular Christiania were more lively trading cities than Trondhjem, with more active money markets and stronger exposure to international markets. Moreover, in the course of the 19<sup>th</sup> century Christiania went from being a quiet market town of 10,000 people to a commercial and industrial nucleus of 250,000 people, while the two other cities in comparison suffered modest growth. With the words of a contemporary source, “*life pulsed more vibrantly in Christiania*”. Intuitively, Christiania stands out as a strong leadership candidate.

In order to capture the question of leadership, we have analysed the bank rate decisions 1850-92 of the five original branches as well as the Trondhjem headquarters. To address the question we apply a first mover approach: which branch was the first to change the bank rate. In our analysis, such a move has to be followed by at least one other branch. However, the follower or followers do not need to move to the same level or with the same strength. To take one example: Christiania moves from a bank rate of 5 per cent to 5.5 per cent and is followed by Skien from 4.5 per cent to 5 per cent. Thus, the key is not level but direction: an increase in Christiania is

followed by an increase in Skien. The more followers, the stronger was the impact of the first mover.

To qualify as a follower, the bank rate decision would have had to come within 90 days of the first move. In a number of cases this time limit is cut short by a branch moving to a new level outside the prevailing band. Particularly in times of distress, a series of decisions could move the bank rate band upwards within a very short time frame. To take one rather pregnant example: in the course of Overend Gurney crisis in the spring of 1866, four first mover observations, eventually taking the highest bank rate to 7 per cent, are found within five weeks. Here the time frame to respond to the first mover was as narrow as down to four days in one observation: two branches actually did so before an even higher upper bank rate level was set.

Following the first mover approach we have found 91 occasions where a leadership role can be identified. On 29 occasions only one branch responded to the first mover. Here 13 of the observations dealt with the interplay between the major branch in Christiania and the smaller branches in southeast Norway. In particular, the eight occasions involving Drammen reflects an intricate positioning in the inner Christianiafjord money market rather than being a part of a countrywide interest rate move. On 12 of these occasions, Christiania, Trondhjem and Bergen responded to a move from one of the other major branches. Thus, we are left with 62 occasions with two or more branches responding, 52 of which involves two or all three of the major branches. On only 23 occasions, five or all branches were involved.

Around 70 per cent of all the 460 bank rate changes were captured by using the approach with first movers and respondents. Of the rest, some formed part of a general move initiated by the first mover but fell outside the 90 days limit: Trondhjem for instance followed the general move to lower bank rates instigated by Christiania 28 August 1850 in 96 days. Other decisions might have moved the lower or upper bank rate, i.e. widening the bank rate band, but without attracting other followers. Christiania, for instance, reduced the bank rate to 4.5 per cent 3 November 1850, but no other branch followed. However, the overwhelming number of the changes that did not form part of a general move was branches positioning themselves within the prevailing bank band. For instance, 9 April 1859 Bergen reduced the bank rate with a half percentage point to 4.5 per cent while Christiania increased the bank rate with one percentage point to 5 per cent four

days later. A closer look at the branches' position by the end of March explains the differing course of action. With deposits at record high level and discounting significantly lower than at the end of March 1857 and March 1858, reflecting the standstill nature of the local economy in these years, Bergen displayed unutilized branch resources at 30 per cent; in comparison, Christiania was down to 0.5 per cent and had to continue tightening credit through the course of the spring.

*Table 5: First move bank rate changes with more than one follower 1850-92*

	Number of observations	Genuine first mover	First mover, strong Christiania influence
Trondhjem	7	3	4
Bergen	10	7	3
Christiania	39	39	0
Skien	1	0	1
Complex	5		2
	62	49	10

In relation to the major question in this section, who provided leadership, the answer is indisputably Christiania. In 53 out of 92 observations, Christiania was the first mover. If the single response observations are removed from the sample, Christiania was the first mover in 39 out of 62 instances. In comparison, Trondhjem and Bergen was first mover on seven and ten occasions, respectively. However, even those figures overestimate the direction provided. In four out of seven observations where Trondhjem has been identified as the first mover, most of the other branches responded only after Christiania had followed the initial lead.<sup>27</sup> To take the two last episodes as examples: On 7 September 1882 Trondhjem lowered the bank rate by a half percentage point to five per cent. Bergen responded to this first move in ten days while Christiania waited for 79 days. Within a week of Christiania lowering the bank rate, Drammen, Skien and Christiansand followed. Here the first mover according to our definition probably influenced Bergen, while it is pretty obvious that smaller branches in south-eastern Norway waited for Christiania before moving. On 17 November 1891 Trondhjem increased the bank rate with a half percentage point to 5.5 per cent. Christiania waited for 13 days before she followed, then and only then, did Bergen and Christiansand follow in a matter of a couple of days. Thus, on

---

<sup>27</sup> Response to bank rate change Trondhjem 25 May 1866, 4 April 1877, 7 September 1882 and 17 November 1891.

only three occasions did other branches follow the headquarters without the first-move having to be strengthened by Christiania.<sup>28</sup> In comparison, Bergen had to have the first-move strengthened by Christiania on three occasions and was a genuine first mover on seven occasions. However, all but one of these seven episodes is concentrated within a period, 1875-82, where the situation in Bergen was particularly tight. Thus, leadership might here not reflect strength, but rather weakness. Skien is noted as first mover once, in January 1858 following the financial crisis of 1857, but here as well Christiania had to follow before a general move was instigated. A number of observations has been categorised as complex, in practise meaning that we observe tandem movements where it is hard to single out a first mover.

If both genuine first mover observations as well as observations where a strong influence coming from the capital are detected, the Christiania branch played a leading role in more than three quarters of the general moves in the bank rate level. In comparison the role played by the headquarters, the nucleus of formal monetary policy authority, has more likening to a weak second fiddle. At best, Trondhjem played a role in a shared leadership function together with Christiania and possibly Bergen.

### An econometric model of the individual branches' bank rates

So far we have presented a model for understanding how branch autonomy could be reconciled with a fixed exchange rate regime based on qualitative methods and more informal quantitative analysis. What remains is to test some of our assumptions regarding branch behavior more formally within an econometric framework.

The analysis above has suggested that in setting the bank rate the individual branches placed more emphasis on their unutilized branch resources (*UBR*) than the aggregate note reserve of the central bank. We now suggest testing this proposition within the framework of a set of reaction functions for bank rates set by the six branches.

The variables we use for this purpose are unutilized branch resources as a percentage of the lending limit (*UBRP*) and the aggregate note reserve of the bank as a percentage of the funded

---

<sup>28</sup> Response to bank rate change Trondhjem 20 May 1868, 29 March 1873 and 6 November 1876.

note circulation, capped at ten percent (*NOTERESX*). The hypothesis is that there is an asymmetric response to the actual course of the note reserve: when it is above ten percent, which it was most of the time, it is less likely that the individual branches take this measure into consideration in setting the bank rate; the lower the note reserve fell below some critical level the more likely is it that the branches felt a pressure from the main office to set a bank rate that ensured that there was no unnecessary drain on reserves.<sup>29</sup>

The branches are assumed to increase the bank rate when these two reserve measures are falling. If the note reserve takes on a significantly negative coefficient, this may be interpreted as an indication that the branch administrators were systematically influenced by ‘bank wide’ circumstances in setting the bank rate as well as their own position. Thus we are looking for leadership behavior among the branches in the sense of being responsible for the bank’s total reserve position, which may only partly overlap with leadership in the sense of being the first to adjust the bank rate in the case of new information.

In addition this framework also lends itself to estimate the response to foreign discount rates, which we know were a major factor involved in bank rate discussions, at least in the major branches. Our model may be able to show how pervasive the foreign influence was throughout the branch network.

We use an average of the discount rates in Sweden, Denmark, UK and Hamburg/Berlin as the foreign bank rate (*RW*).<sup>30</sup> Although the importance of the individual foreign financial markets may have differed slightly, also varying somewhat over time, the foreign average discount rate is a fair summary measure of the interest rate impulses coming from abroad. These four countries were of most importance to Norwegian foreign trade and financial affairs throughout the period.

Finally, the model may to some extent take into account the effects of the leader-follower

---

<sup>29</sup> The note reserve percentage was below ten percent in 66 out of the 420 months of the sample period 1858 to 1892. It was even negative, i.e. the note circulation exceeded the legal maximum, on four occasions, three of which were June observations between 1866 and 1869. This was basically a seasonal phenomenon, which the directors knew would soon be rectified. The fourth occurrence is in April 1877, reflecting the persistent strain on the bank’s reserves in the second part of the 1870s.

<sup>30</sup> No discount rate is available for Hamburg before 1861; hence *RW* is computed as the average of the three other rates in the period 1858-1860.

relationships discussed in detail above. Because our branch balance sheet data are confined to end-of-month figures, we may miss part of the immediate bank rate reactions found in the daily data, but we may nevertheless be able to identify some important relationships even on a monthly basis. In order to implement these relationships we include in the model a test for any response of the discount rate ( $RB_i$ ) of a particular branch from the discount rate gaps in the previous period between the branch rate and the ones set by the main office in Trondhjem ( $RB_{i,t-1} - RTRO_{t-1}$ ) and Christiania ( $RB_{i,t-1} - RCHA_{t-1}$ ). If the branch discount rate was higher than the Trondhjem or Christiania rate in the previous period – a positive gap – the branch discount rate is expected to be reduced in the present period, if there is any systematic follower-leadership behavior. In the equations for Trondhjem and Christiania we include the gap against Bergen.

The model thus comprises a set of six equations of the following general format:

$$RB_{i,t} - RB_{i,t-1} = a_1 UBRP_{i,t-1} + a_2 NOTRESX_{t-1} + a_3 (RW_t - RW_{t-1}) + a_4 (RB_i - RW)_{t-1} \\ + a_5 (RB_i - RTRO)_{t-1} + a_6 (RB_i - RCHA)_{t-1} + constant + seasonals$$

Where, as noted above, the Bergen discount rate enters the equations for Trondhjem and Christiania. The model thus predicts that monthly changes in the branch discount rate are negatively influenced by unutilized branch resources and the capped note reserve ratio ( $a_1, a_2 < 0$ ), positively by foreign discount rates ( $a_3 > 0, a_4 < 0$ ), and negatively by the previous period's discount rate gaps against other branches ( $a_5, a_6 < 0$ ).

Note that the model only includes explanatory variables dated  $t-1$ , except foreign interest rates. It is fairly safe to assume that the latter were basically exogenous to Norwegian discount rates, as Norwegian financial conditions hardly mattered much for foreign interest rates. Although discount rate moves in Norway sometimes might have a slight effect on decisions in Sweden and Denmark, the influence on the average discount rates of European countries must have been negligible.

It is likely that the development of the branches' balance sheet items *within the month* also influenced the end-of-month discount rate, not only the situation at the end of last month. However, incorporating responses to such factors in the model would have required a

simultaneous model of discount rates and the reserve aggregates. This would have made the estimates more vulnerable to specification errors, and we believe that there are no obvious a priori gains from this complication with respect to examining the discount rate decisions of the branches.

The model is estimated on monthly data from February 1858 to December 1892, using the seemingly unrelated regressions (SUR) method. The results are reported in Table 6. Constant terms for individual branches and seasonal dummies are included in the estimation but not reproduced in the table.

*Table 6: Reaction functions for branch bank rates February 1858 – December 1892*

*Coefficient estimates with absolute values of t-statistics in parentheses.*

	Trondhjem	Christiania	Bergen	Drammen	Skien	Christiansand
$UBRP_{i,t-1}$	-.006 (5.09)	-.003 (4.08)	-.004 (4.86)	-.007 (4.63)	-.002 (0.90)	-.005 (4.30)
$NOTRESX_{t-1}$	-.020 (2.56)	-.019 (1.99)	-.011 (1.39)	-.019 (2.39)	-.015 (2.21)	-.003 (0.43)
$RW_t - RW_{t-1}$	.116 (2.95)	.247 (5.04)	.169 (4.01)	.211 (5.09)	.133 (3.65)	.064 (1.98)
$(RB_i - RW)_{t-1}$	-.111 (6.77)	-.134 (6.68)	-.094 (5.43)	-.081 (4.78)	-.050 (3.11)	-.056 (4.16)
$(RB_i - RTRO)_{t-1}$		-.021 (0.56)	-.035 (1.09)	-.018 (0.59)	-0.005 (0.18)	-.034 (1.39)
$(RB_i - RCHA)_{t-1}$	-.153 (5.26)		-.130 (4.20)	-.182 (5.53)	-.143 (5.18)	-.100 (4.34)
$(RB_i - RBER)_{t-1}$	.025 (0.91)	-.001 (0.04)				
R-squared	.274	.223	.237	.243	.207	.196
Durbin-Watson	1.77	2.07	1.83	2.14	2.08	2.16

The dependent variable is the change in the individual branches' bank rate ( $RB_i$ ) from the previous month, see text for model specification. The equations are estimated by the seemingly unrelated regressions (SUR) method. The R-squared statistic is from OLS-regressions.

In general, the coefficient estimates correspond well to our textual discussion of bank branch behavior above. The coefficients on unutilized branch resources  $UBRP$  and the capped notes

reserve ratio *NOTERESX* are negative in all cases, as predicted by the model. The response to *UBRP* is strongly significant in all cases except for the Skien branch.<sup>31</sup> The influence of the aggregate note reserve is somewhat less firm, but still significantly negative for all branches except Bergen and Christiansand. Interestingly, the note reserve variable exerted the strongest and most significant response from the main office in Trondhjem.

The influence of foreign interest rates was pervasive and generally highly significant. It is also very much in accordance with our notion of bank branch behavior that the response is strongest in Christiania, followed by Drammen (which tended to act much in line with Christiania) and Bergen. These were the branches that had the most extensive contacts with foreign financial markets, more so than Trondhjem.

Finally, the results regarding the spread of discount rate influence from other branches are very clear: no significant impulses emanated from Trondhjem and Bergen to other branches, but all branches responded to Christiania in a very persistent manner. This supports our more informal analysis on the daily data.

### Conclusive remarks: the story

In combining a qualitative approach with traditional quantitative methods and econometrics, a consistent story emerges that solves the puzzle the Norwegian anomaly represented. Branch bank rate autonomy could be reconciled with a fixed exchange rate regime for the very same reason that autonomy was granted in the first place, the disintegrated character of the domestic money markets. To the extent that capital market integration failed, transaction costs enabled branches to position themselves within the bank rate band according to regional circumstances without undermining the fixed exchange rate commitment. Bank rate decisions were interconnected: the potential for triggering arbitrage opportunities ensured that branches could not stray too far from the rest of the pack. Over time improved communications led the regional financial markets to become more integrated. Situated in the most important domestic money market, the Christiania branch played the key role in providing leadership in bank rate setting, including transferring

---

<sup>31</sup> Skien branch was a bit atypical in the sense that it operated in violation of its lending constraint for sustained periods of time.

impulses from foreign markets. As such Trondhjem functioned as headquarters in name only.

## REFERENCES

- Bloomfield, Arthur. *Monetary Policy under the International Gold Standard 1880-1914*. New York: Federal Reserve Bank of New York, 1959.
- Bordo, Michael D., “The Gold Standard traditional approach”, chapter 2 in *The gold standard and related regime. Collected Essays*. 39-124. Cambridge: Cambridge University Press, 1999.
- Bordo, Michael D., and Finn E. Kydland. “The gold standard as a commitment mechanism” in *Modern Perspectives on the Gold Standard*, edited by Taminm Bayoumi, Barry Eichengreen and Mark P. Taylor, 55-100. Cambridge: Cambridge University Press, 1996.
- Bordo, Michael D. and Ronald MacDonald. “Interest rate interactions in the classical gold standard, 1880-1914: was there any monetary independence?” *Journal of Monetary Economics*. 52, no. 2 (2005): 307-327.
- Bordo, Michael D. and Hugh Rockoff, “ The Gold Standard as a "Good Housekeeping Seal of Approval.” *The Journal of Economic History* 56, no. 2 (1996): 389-428.
- Eichengreen, Barry. *Golden Fetters. The Gold Standard and the Great Depression 1919-1939*. Oxford: Oxford University Press 1992.
- Eitrheim, Øyvind, Karsten Gerdrup, and Jan T. Klovland, “Credit, banking and monetary developments in Norway 1819–2003,” in *Historical monetary statistics for Norway*, edited by Øyvind Eitrheim, Jan T. Klovland, and Jan F. Qvigstad, 377-407, Oslo: Norges Bank Occasional Papers no. 35, 2003.
- Flandreau, Marc and Harold James, “Introduction”, in *International Financial History in the Twentieth Century. System and Anarchy*, edited by Marc Flandreau, Carl-Ludwig Holtfrerich, and Harold James. 1-16. Cambridge: Cambridge University Press 2003.
- Flandreau, Marc and Stefano Ugolini, “Where It All Began: Lending of Last Resort and the Bank of England during the Overend-Gurney Panic of 1866.” CEPR Discussion Paper 8362. <http://www.cepr.org/pubs/new-dps/dplist.asp?dpno=8362>.
- Ford, Alec. *The Gold Standard, 1880-1913. Britain and Argentina*. Oxford: Oxford University Press, 1962.
- Friedman, Milton and Anna J. Schwartz, *A Monetary History of the United States, 1857-1960*. Princeton: Princeton University Press, 1963.
- Kindleberger, Charles. *The World in Depression, 1929-1939*. Berkeley: University of California Press, 1984.
- Klovland, Jan T. “Monetary aggregates in Norway 1819–2003,” in *Historical monetary statistics for Norway* , edited by Øyvind Eitrheim, Jan T. Klovland, and Jan F. Qvigstad, 181-240. Oslo: Norges Bank Occasional Papers no. 35, 2003.

Martin-Acena, Pablo and Jaime Reis, *Monetary Standards in the Periphery. Paper, Silver and Gold 1854-1933*. London: Macmillan, 2000.

Mitchener, Kris James and Mari Ohnuki, “Institutions, Competition, and Capital Market Integration in Japan,” *Journal of Economic History* 69, no. 1 (2009): 138-171

Nordvik, Helge W. “The Banking System, Industrialization and Economic Growth in Norway, 1850-1914.” *Scandinavian Economic History Review* 20, no. 1 (1993): 51-72.

Reis, Jaime, “An ‘art’, not a ‘science’? Central bank management in Portugal under the gold standard 1863-87.” *The Economic History Review* 60, no.4 (2007): 712–741.

Rygg, Nicolai, *Norges Banks historie, (part 2)*. Oslo: Norges Bank, 1954.

Sejersted, Francis, “ Fra Monopolbank til seddelbank, ” *Historisk tidsskrift* 47, no. 2 (1968), 149-72.

Triffin, Robert. *The evolution of the international monetary system: Historical Reappraisal and Future Perspectives* Princeton: Princeton University Press, 1964.

Ugolini, Stefano. “The Origins of Foreign Exchange Policy: The National Bank of Belgium and the Quest for Monetary Independence in the 1850s”. *European Review of Economic History* 16, no.1 ( 2012):51-73.

Ugolini, Stefano. “The Bank of England as the world gold market-maker during the classical gold standard era, 1889-1910.” Norges Bank Working Paper 2012/15.

Øksendal, Lars Fredrik, “Freedom for manoeuvre - the gold standard experience of Norway, 1874-1914,” in *The Gold Standard Peripheries: Monetary Policy, Adjustment and Flexibility in a Global Setting*, edited by Anders Ögren and Lars Fredrik Øksendal, 35-57 . London: Palgrave Macmillan, 2011.

Øksendal, Lars Fredrik, “Dividend policy in Norwegian banking before 1914,” *Financial History Review* 18, no. 2 (2011): 217-41.