PRICE RIGIDITY IN NORWAY IN THE NINETEENTH CENTURY

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Abstract. *This paper analyzes nominal price development in Norway from 1830 to 1920 and fills a gap in the literature on nominal price rigidity in Europe during the nineteenth and the beginning of the twentieth centuries.*

The research question: how did the nominal price rigidity change in Norway during this time period? The focus on Norway is justified because of the availability of historical data and gaps in literature concerning the nominal rigidities.

The analysis of some of the digitized data for Oslo, Bergen and Stavanger during the period of 1830–1913 indicate that: a) The flexibility of prices did not change much during the classical Gold Standard in Norway; b) The change in price rigidity mainly came because of the changing magnitude of price changes; c) The decrease in magnitude might have happened before the Gold Standard took effect in Norway.

Keywords: *price rigidity, nominal rigidity, Norway.*

Introduction

The world average inflation decreased from 26% in 1990 to 3.8% in 2005. Is this strong disinflation a signal of good deflation or a precursor of bad deflation? In order to understand deflations, it is important to turn to history, because deflations were rare in the twentieth century but common during the nineteenth century.

This paper analyzes price developments both in inflationary and deflationary periods in Norway during the nineteenth century. The compiled dataset and research findings will be used in the further analysis of nominal rigidities in deflationary periods.

The literature on nominal rigidities in the US reveals that wage rigidities increased, while price rigidities decreased in the nineteenth and twentieth centuries (Kackmeister 2007; Hanes 2000; Hanes 1993). The research on nominal price rigidities in Europe shows that experience was more variegated on this continent at the end of the twentieth century, while its exploration during the earlier times is very limited. This paper contributes by filling this gap by analyzing how the nominal price rigidities evolved in Norway in the nineteenth and first part of the twentieth centuries.

The main findings of the research presented in this paper show that: a) The flexibility of prices did not change much during the classical Gold Standard in Norway; b) The

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change in price rigidity mainly came because of the changing magnitude of price changes; c) The decrease in magnitude might have happened before the Gold Standard took effect in Norway.

Price Rigidity in Norway, 1830–1920

Focus on Norway is justified for a few reasons. First, there is a bounty of underused historical prices' data for Norway, which allows one to study how price rigidity changed during a very long time span instead of comparing the data for a few years in the nineteenth century to the few years at the end of the twentieth century, like Kackmeister (2007) did.

Second, the available studies on historical price rigidity focus either on non-European countries or on more recent periods if they're focused on European countries. For example, Kackmeister (2007) focuses on the US, and Hickey, Jacks (2011) focus on Canada. Dhyne, Álvarez et al. (2006) and Wulfsberg (2009) focus on European countries but for the latter part of the twentieth century. Dhyne, Álvarez et al. (2006) researches the euro area in 1996–2001 and Wulfsberg (2009) analyzes Norwegian prices in the 1975–2004 period.

Third, there is no study available on how price rigidity evolved in less-developed countries during the 19th century. A Norwegian case study presents a great opportunity to fill this gap. It was an agricultural country in the nineteenth century, the main exports of which were fish and timber.

Literature Review

The literature on nominal rigidities in the US reveals that wage rigidities increased while price rigidities decreased in the nineteenth and twentieth centuries (Kackmeister 2007; Hanes 2000; Hanes 1993).

Kackmeister (2007) showed that prices became more flexible throughout time in the US. He found that in the past, price changes were much less frequent, smaller on average, more narrowly distributed and more permanent in this country. This corresponds well with the statement by Hickey and Jacks (2011) that the common theme in all the more recent studies is that both a high frequency of price changes and a high degree of heterogeneity of those price changes over product categories is underappreciated.

The available research on European countries shows that development in them might not have necessarily corresponded to the developments in the US. Dhyne et al. (2006) analyzed price changes in the euro area and then compared the results with the ones available for the US. This was done for the period from 1996 to 2001. They used monthly data underlying CPI (Consumer Price Index). Their central finding was that both the European and US economies displayed a sizeable degree of nominal price stickiness, but prices seemed to change less frequently in Europe than in the United States. For example, they found that the average duration of a price spell in the euro area ranged from four to five quarters, which was about twice as long as in the United States. Also, they

documented variation across different products. Energy products and unprocessed food exhibited very frequent changes and processed food, non-energy industrial goods and services experienced relatively infrequent changes. Another interesting conclusion was that the data showed no evidence of general downward price rigidity. The authors found that price decreases were not uncommon, except in services.

Overall, the research on nominal rigidities in Europe shows that experience was more variegated on this continent at the end of the twentieth century, while its exploration during earlier times is very limited.

Economic Developments in Norway during 1814–1914

Economic developments in Norway in 1814–1914 can be roughly divided into four distinct periods based on information provided by Grytten (2004) and Grytten and Hunnes (2016): a) The 1814–1843 stagnation and institution building; b) The 1843–1875 Great Boom; c) The poor performance of 1875–1905; d) The heavy industrialization of 1905–1914.

The 1814–1843 period was marked by the struggles expected from a newly founded state. Norway declared independence from Denmark in 1814 and, for its first independent decades, struggled with international recession, deflationary monetary policy and protectionism from the UK. The Central Bank of Norway, established in 1816, introduced a national currency – the spesidaler – which was pegged to silver.

The 1843–1875 period is called the Great Boom by Grytten (2004), as Norway grew significantly up until the middle of the 1870s. This growth was mainly caused by high productivity growth in agriculture and the success of the foreign sector. The main export products to achieve high growth were timber, fish and maritime services. After a wave of industrialization in the 1860s and 1870s, there was a rapid productivity growth in agriculture, food processing and dairy production industries.

The 1875–1905 period in Norway was affected by the depression which lasted from the middle 1870s to the early 1890s. The GDP had stagnated, and the prices fell until 1896. There were three main causes of the significant slowdown: a) Norway's dependence on the international economy; b) The introduction of the international gold standard (Norway adopted gold in 1874), after which there was a deflationary effect in the country; c) The transformation from sailing to steam vessels.

The 1905–1914 period in Norway was exemplified by heavy industrialization, but the primary sector had remained the biggest one. Norway gained full independence from Sweden in 1905.

Data

The data is taken from the Wedervang's archive, which was set up by Professor Ingvar B. Wedervang at the University of Oslo in 1932 in order to establish the best possible cov-

erage of historical wages and prices for Norway. Currently, it is located at the Norwegian School of Economics in Bergen. The data reflects some two-digit million direct observations of wages (1751–1939) and prices (1641–1940) based on private and public records.[1] It is one of the richest archives on wages and prices internationally, yet it is still underused.

The Wedervang's archive contains retail prices from places such as shops, merchant houses and market places, but only some of the material has been processed yet (14 files out of 63 for the prices on goods and 6 out of 17 for the market prices). Market prices and prices on goods were partly taken monthly (or even more frequently), partly quarterly. Grytten presented a new consumer price index for Norway 1516–2003, which was constructed on the basis of monthly and quarterly prices of 47 representative commodities.[2] The index for the period 1830–1871 was constructed using five different sources of high quality, monthly and quarterly, data from the Wedervang's archive.

This paper presents results from an analysis of yet incompletely processed data from the archives; therefore, it provides a first glimpse of the final results that will emerge after the processing of all of the data is complete. The results here are based on no more than about 1/10th of the data that will ultimately be used in the final study.

The results in this paper are based on the data for three Norwegian cities: Oslo, Bergen and Stavanger. These cities were picked for this preliminary analysis as they provided most the exhaustive and applicable price data. The remaining data for the other places or for these same cities for other periods will require more comprehensive work and different methodology than used here because they contain more gaps in the data.

TABLE 1. **Goods for which data are available and were used in certain locations.**

Oslo		Bergen		Stavanger	
Food goods	**Other**	**Food goods**	**Other**	**Food goods**	**Other**
Barley	Straw, oat	Eggs	Vealskin	Bacon	Fir
Oats	Straw, barley	Potatoes	Goatskin	Beef	Birch
Bacon	Straw, rye	Butter	Muttonskin	Oatmeal	
Mutton	Tallow	Sour milk cheese	Birch		
Veal meat	Timothy grass	Goat's-milk cheese (light brown)	Fir		
Beef	Meadow hay	Goat's-milk cheese	Alder		
Potatoes	Birch	Mutton	Tallow		
Butter	Spruce	Beef			
Eggs	Hides, raw	Bacon			

Note: Data from the Norwegian prices' dataset.
There are three main periods covered here: a) 1830, 1834–1848, 1864–1877 (Oslo only); b) 1874–1877 (Stavanger only); c) 1880–1913 (Oslo, Bergen, Stavanger).

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[1] Eitrheim, Klovland et al. (2007), pp. 203–204.
[2] Eitrheim, Klovland et al. (2004), chapter 3.

A complicating issue encountered in processing the data were the differing presentation units. The data were presented in different currencies and in different measurements. Some of the prices were in krone and others in the old currency, such as the speciedaler (also in mark and ort). Data in Speciedaler were converted to krone at the ratio of 4:1, which was actually used when the conversion took place in 1875, when Norway joined the Scandinavian Monetary Union. The mark was equivalent to 16 skillings (or shillings) and the ort to 24 skillings.

The files contained some of the information on what the unusual measurement units were equivalent to, but by no means always. This information from the files, either explicitly stated or inferred from duplicate data (sometimes there was some overlap in the data, which was presented in few different units, such as bpd and kg) was primarily used. If this information was not available, the measurement information was used from other sources, such as Clarke (1891).

Methodology

The frequency of the available data is weekly, but the analysis was done based on monthly data. This was necessitated by gaps in the data. The weekly data contained too many missing observations; therefore, it was not possible to conduct the analysis of the weekly data. Rather, the available observations provided on a weekly basis were used to establish consistent monthly series, and these data were used in the analysis. The prices were not averaged during the month but taken as they were reported for a particular day. Some data were presented as a range with the lowest and highest value available on that day. It was only in this case that the value during that particular day was approximated by taking the average of the two provided values.

The following methodology was used to make monthly series based on weekly observations. The data for the fourth week of the month was used as the primary focus point, and these observations were used first when they were available. If the price observations during the fourth week of the month were missing, the observations were taken from the next closest week that had applicable observations (third week, then second week, and then the first week).

At the end of this process, there was still a very small number of price quotes missing. There were two ways used to deal with this issue. First, the focus of the analysis was made in accordance with the available data, i.e., the months that had missing data were used as the dividing points of the periods under analysis. Second, interpolation was used to fill in the gaps in the data. For example, the same price as in the previous or following months was used for a specific product if the prices were consistent and had not changed for a while before and after the missing observation.

Analysis

The analysis is focused on: a) The share of non-zero price changes; b) The share of price changes that are price increases; c) The average magnitude of price changes. An inspiration for this methodology came from the available literature on price rigidity. For example, Kackmeister (2007) and Wulfsberg (2009) focus on the frequency of price changes and the magnitude of price changes, and Hickey and Jacks (2011) focus on the frequency of price changes, the average size of price changes (in absolute terms) and the share of price increases in price changes.

There seems to be a slight difference in how the statistics were calculated in the papers mentioned above. Kackmeister (2007) is used as the main guide in the present study and the statistics are calculated in the following way: a) The share of non-zero price changes is calculated as the share of observations where the price in time t does not equal the price in time t-1; b) The share of price changes that are price increases are calculated as the proportion of price changes which are positive in value; c) The average magnitude of price changes is calculated as the absolute value of the logarithmic percent change in the price, where cases for which the price was unchanged between time t and t-1 were removed.

Results

The main conclusions from the analysis of some of the digitized data for Oslo, Bergen and Stavanger during the period 1830–1913 are that the flexibility of prices did not change much during the classical Gold Standard in Norway, and the change in price rigidity mainly came because of the changing magnitude of price changes. The decrease in magnitude appears to have happened before the Gold Standard was adopted in Norway.

Some basic, long-term trends can be seen in Figure 1. It presents the magnitude of price changes for all of the pertinent and available data on bacon and beef and therefore combines the data for Oslo, Bergen and Stavanger. These two goods were picked to be presented here because of the data availability. The data for them are available in all of the three locations and also during the Gold Standard, which is the period of the main (though not the only) interest here. It can be seen from the figure that the magnitude of price changes decreased throughout the nineteenth century for both of these products, as the trend is one toward convergence toward zero.

Table 2 presents some statistics for all of the products but only during the Gold Standard period. There is a strong focus on this period in the present paper because of the availability of the data for this time and its historical significance. The data for the other periods are not available either in all of the locations or for many items. The analysis of the data available for the other periods follows below.
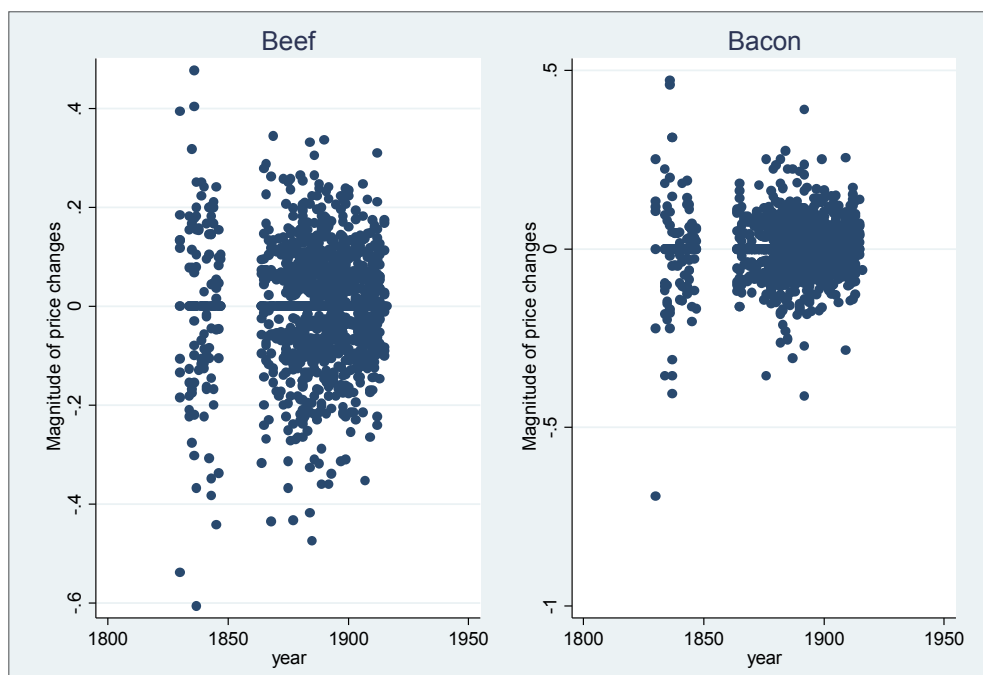
FIGURE 1. **Magnitude of price changes for bacon and beef in Oslo, Bergen and Stavanger combined. Data from the Norwegian prices' dataset.**

Table 2 presents data allowing to assess the validity of the results, such as the number of observations used in the analysis of this period. The share of first differences that are food goods is consistently about 50% which points towards an acceptable range of products. The final two statistics, price changes and price increases, show that there are not any significant differences between the results for 1880–1905, when Norway exhibited poor economic performance and 1905 to 1913, when Norway experienced heavy industrialization in any of the three locations.

Table 3 presents comparative statistics for five goods (fir, birch, bacon, beef, oatmeal) in Stavanger during the Gold Standard. These products and location are chosen to be presented here again because of the availability of the data. Here, we have not only food but other goods as well – but for Stavanger and not for Oslo. These are for a shorter period of time and correspond with the developments in Oslo during these years. These results were similar for both food and non-food goods, i.e., the trends were the same.

The data in the Table 3 show that a break happened in Stavanger around the time the Gold Standard was introduced. Price changes and price increases appear to have decreased considerably in 1880–1990 if compared to the period of 1874–1877, as price changes dropped from 78% to 54% of the observations and price increases dropped from 43% to 29% of the observations.

TABLE 2. **Comparative statistics for all of the products during the Gold Standard.**

Comparative Statistics (all products; GS period)	Oslo			Bergen			Stavanger
	1880 Feb–1904 Jul	1905 Jan–1913 Dec	total	1880 Feb–1904 Jul	1905 Jan–1913 Dec	total	1880 Feb–1900 Feb
Total number of first differences	5292	1944	7236	4704	1728	6432	1210
Number of non-zero price changes	2903	1131	4034	2553	728	3281	658
Number of price increases	1570	627	2197	1330	421	1751	350
Share of first differences that are food goods	50%	50%	50%	56%	56%	56%	60%
Unweighted average absolute size of non-zero first differences of log price	10%	10%	10%	11%	10%	10%	9%
Share of price changes that are price increases	30%	32%	31%	28%	24%	26%	29%

Note: Data from the Norwegian prices' dataset.

TABLE 3. **Comparative statistics for five goods (fir, birch, bacon, beef, oatmeal) in Stavanger during the Gold Standard.**

Stavanger	1874–1877	1880–1900
Total number of first differences	215	1210
Share of non-zero price changes, %	78	54
Share of price changes that are price increases, %	43	29
Average magnitude of price changes, %	8	9

Note: Data from the Norwegian prices' dataset.

Figure 2 exhibits how magnitude of price changes evolved in Oslo for eight goods (oats, oatmeal, meat, mutton, meat, fresh beef meat, potatoes, butter, hay) in 1864–1877. It can be seen that the magnitude did not vary much during the decade before the Gold Standard and it increased at the time the Gold Standard was adopted – at least temporarily.

Table 4 presents information for a longer period and provides a glimpse of what happened with rigidity before the Gold Standard took effect in Norway. The results are only for three food goods (beef, potatoes, butter) and for Oslo only. These three goods were picked here because observations for them are available throughout the nineteenth century in Oslo (with some gaps which necessitated the split of the dates) in the data that is processed already.

The data in Table 4 point towards a conclusion that magnitude decreased throughout the nineteenth century until about the 1860s and then remained constant. The results
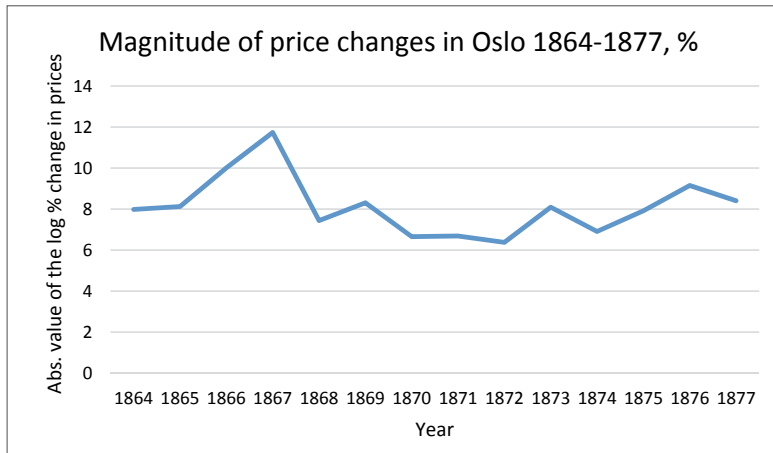
FIGURE 2. **The magnitude of price changes for eight goods (oats, oatmeal, meat, mutton, meat, fresh beef meat, potatoes, butter, hay) in Oslo during 1864–1877. Data from the Norwegian prices' dataset.**

TABLE 4. **Comparative statistics for three food goods (beef, potatoes, butter) in Oslo.**

Oslo	1830	1834–1848	1864–1877	1880–1904	1905–1913
Total number of first differences	33	153	501	882	324
Share of non-zero price changes, %	79	65	73	72	76
Share of price changes that are price increases, %	48	34	40	38	43
Average magnitude of price changes, %	21	19	11	11	11

Note: Data from the Norwegian prices' dataset.

show that there is a bit of variation in the share of non-zero price changes and share of price changes that are price increases, but these are not very pronounced. What is clearly visible in Table 4 is the decrease in the average magnitude of price changes throughout the nineteenth century until the 1860s and stability thereafter. So, this decrease happened before the Gold Standard which was adopted in 1873 in Norway. Other factors appear to have been more important in reducing the magnitude of price changes, at least for food goods.

Prices during Inflations and Deflations

Tables 5 and 6 present comparative statistics for Oslo and Bergen separated into deflationary and inflationary periods. Data for both cities show no major differences between inflationary and deflationary episodes during the Gold Standard period. The question regarding developments before the Gold Standard is left for future research.

TABLE 5. **Comparative statistics for eighteen goods during inflation and deflation in Oslo.**

	1880 Feb–1904 Jul		1905 Jan–1913 Dec	
	Inflation	Deflation	Inflation	Deflation
Total # of first differences	2484	2808	1296	648
Share of non-zero price changes	55%	55%	58%	58%
Share of price changes that are price increases	32%	28%	33%	30%
Average magnitude of price changes	10%	5%	10%	5%

Note: Data from the Norwegian prices' dataset.

TABLE 6. **Comparative statistics for sixteen goods during inflation and deflation in Bergen.**

	1880 Feb–1904 Jul		1905 Jan–1913 Dec	
	Inflation	Deflation	Inflation	Deflation
Total # of first differences	2208	2496	1152	576
Share of non-zero price changes	54%	55%	42%	43%
Share of price changes that are price increases	29%	28%	25%	23%
Average magnitude of price changes	11%	10%	10%	10%

Note: Data from the Norwegian prices' dataset.

Variation across Goods

Table 7 presents the results across different goods and allows one to observe the huge variation among them. The data for the food goods is presented in lighter colour. A quick overview of the results suggests that non-zero price changes were usually more common for food than for non-food goods and the magnitude of price changes tended to be somewhat higher for food goods as well. The main observation we can draw from Table 7 is that goods exhibited considerable variation in the behavior of their prices.

Further information on the variability of the prices' behavior across different goods can be seen from Figures 3 and 4. Figure 3 shows the frequency of a certain percentage change in the prices of butter and tallow in Oslo in 1879–1913. Figure 4 shows a fraction of a certain percentage change in the prices of the food goods in Oslo in two periods: 1864–1877 and 1877–1913. Data in Figure 4 is truncated at 50% changes to provide a better view. Slight change in shape is visible in it, but there is one caveat. The goods are not exactly the same in the two graphs in Figure 4, though both contain only food goods, and so the comparison is rather rudimentary yet.

Comparison with the End of the 20th Century

Table 8 provides statistics of two commodities, potatoes and butter, in two different countries: Norway in the nineteenth and beginning of the twentieth century and Canada in the first part of the twentieth century. Data for Norway is presented from the Norwegian dataset analyzed in this paper and data for Canada is taken from Hickey and Jacks (2011). These comparisons might not be ideal, but they allow one to get a glimpse of

TABLE 7. Comparative statistics for all goods in Oslo and Bergen during Gold Standard.

	Oslo				Bergen			
	# of first differences	Non-zero price changes	Price increases	Magnitude of price changes	# of first differences	Non-zero price changes	Price increases	Magnitude of price changes
Barley	402	40%	22%	6%				
Oats	402	81%	48%	7%				
Meat	402	82%	43%	5%				
Mutton	402	83%	48%	10%				
Vealmeat	402	72%	36%	8%				
Beef	402	82%	45%	7%				
Potatoes	402	71%	41%	20%				
Vealskin					402	28%	14%	14%
Goatskin					402	24%	12%	9%
Muttonskin					402	21%	10%	12%
Eggs					402	80%	46%	13%
Potatoes					402	46%	26%	21%
Butter	402	70%	36%	6%	402	76%	44%	6%
Sourmilk cheese					402	41%	21%	7%
Eggs	402	81%	47%	11%				
Goat's-milk cheese (light brown)					402	16%	9%	14%
Goat's-milk cheese					402	47%	24%	6%
Straw, oat	402	45%	23%	15%				
Straw, barley	402	47%	24%	15%				
Mutton					402	79%	46%	12%
Beef					402	76%	42%	10%
Straw, rye	402	41%	21%	15%				
Meat					402	61%	31%	8%
Tallow	402	11%	6%	10%				
Timothy grass	402	73%	40%	10%				
Birch					402	56%	31%	5%
Meadow hay	402	66%	36%	12%				
Fir					402	48%	27%	7%
Alder					402	48%	27%	8%
Birch	402	16%	9%	7%				
Spruce	402	16%	10%	6%				
Tallow					402	23%	12%	11%
Hides, raw	402	41%	22%	9%				

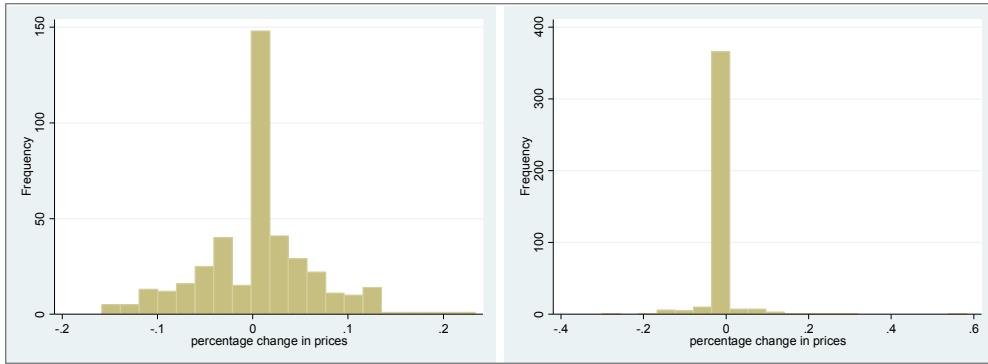*Note:* Data from the Norwegian prices' dataset.

FIGURE 3. **The frequency of x percentage change in the prices of butter (on the left) and tallow (on the right) in Oslo in 1879–1913. Data from the Norwegian prices' dataset.**
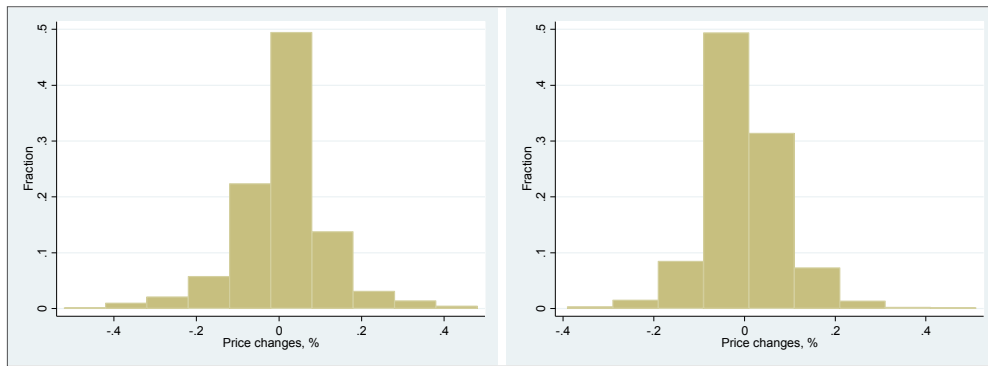

FIGURE 4. **The fraction of x percentage change in the prices of the food goods only in Oslo in 1864–1877 (on the left) and in 1877–1913 (on the right). Data from the Norwegian prices' dataset.**

how the behavior of prices differed in these two centuries even though the statistics are for different countries. Still, potatoes and butter were such an important commodity that this rudimentary comparison provides interesting observations.

Hickey and Jacks found that in their sample of prices in Canada in the first part of the 20th century butter and potatoes exhibited by far the most variation. The result that butter and potatoes are at the high end of distribution with respect to the frequency of price changes distribution was also found in Bils and Klenow (2004) and Kackmeister (2007). In the Norwegian dataset, butter is in the high range of distribution but not the highest. Oats and meat exhibited a higher frequency of price changes, as can be seen from Table 5. It can be either specific to some locations or to Norway or just the sample here. Once the analysis will be extended to the earlier years and to other places, it will be possible to see better if the patterns across products are really different in Norway from the ones found in US and Canada. It might very well be so, because the study conducted

by Dhyne et al. (2006), which focused on the euro area in the later years, concluded that differences in price changes across countries were partly related to the consumption structure and to the statistical treatment of sales. Kackmeister (2007) did not report statistics for these items separately but stated in his analysis that the few goods that had a fairly high frequency of price changes in the 1889–1891 period, such as butter and potatoes, were staple goods and might have been used as loss leaders to bring in customers. He stated that a possible cause of the high frequency of price changes for butter in 1889–1891 might have been the presence of strong seasonality, which has declined as a result of cheaper refrigeration.

TABLE 8. **Comparative statistics for potatoes and butter in Norway (Oslo and Bergen) during the Gold Standard and in Canada.**

Comparative Statistics	**Potatoes**			**Butter**		
	Oslo, 1880–1913	Bergen, 1880–1913	Canada, 1910–1950	Oslo, 1880–1913	Bergen, 1880–1913	Canada, 1910–1950
Share of non-zero price changes	75%	51%	89%	66%	75%	80%
Share of price changes that are price increases	41%	27%	51%	33%	40%	56%
Average magnitude of price changes	20%	18%	13%	6%	6%	4%

Note: Data from the Norwegian prices' dataset and Hickey and Jacks (2011).

A further comparison with the twentieth century can be made using research by Wulfsberg (2009). He analyzed the monthly retail prices in Norway in 1975–2004 and found that both frequency of changes and magnitude of changes exhibited substantial variation among goods. Prices changed on average once every seventh month in the high-inflation period and every twelfth month in the low-inflation period; also, the average size of price changes was negatively correlated with inflation rate. Variation in the inflationary versus deflationary environment was found not to be strong in the dataset presented here, but further analysis is needed of how prices behaved in Norway in the nineteenth century in high versus low inflationary and also deflationary episodes.

It is important to match the data and methodology in order to make a perfect comparison of the results from the dataset presented in this paper and the one used by Wulfsberg (2009). Here, I will only generally compare the results and mention how the methodologies used differed.

Regarding frequency of price changes, Wulfsberg (2009) finds that the frequency of price increases declined markedly from around 20% in the early 1980s to around 12% after 2000. As mentioned above, it is difficult to compare the numbers directly, because his methodology was different, and the items are not matched. For example, when esti-

mating the frequency of price changes, he looked at the monthly frequency (the fraction of the total number of price changes to all price change observations). He then decomposed it into the frequencies of price increases and decreases. In computing the mean, he weighted the items by their current CPI-weight. In the present paper, a simple average of the results for each item was used.

Wulfsberg (2009) determined that there was variation over time in the frequency of price increases which is not evident from the results of the present study of Norwegian prices in the nineteenth century. A preliminary guess would be that there was significant change in environment in the time span that Wulfsberg (2009) is focusing on, and this was not the case in the time span the present study is focusing on. Overall, the percentage of price rises in the current dataset are on average 33%, while in Wulfsberg's dataset, it decreased from 20% to 12%.

Regarding magnitude of price changes, no direct comparisons can be made for the same reasons as above. Wulfsberg (2009) computed the weighted average magnitude of monthly price increases and decreases in percent for each item and year, and in the present study, goods are not weighted and there was no separation made between the magnitude of increases and the magnitude of decreases. Wulfsberg (2009) found that an increase in magnitude from 1975 to 2004 for price increases rose from 11% to 18%, and for price decreases, it rose from 10% to 14%. In the present study, the magnitudes remained almost constant throughout the period, the average being 6%.

A hypothesis that can be built from these results is that the magnitudes of price changes might have been smaller during the classical Gold Standard than at the end of the twentieth century, but the frequency of price rises appears to have been bigger than at the end of the twentieth century.

Conclusions

A case study of nominal price rigidities in Norway during 1830–1920 fills a gap in the literature on historical nominal rigidities in Europe.

The analysis is focused on: a) The share of non-zero price changes; b) The share of price changes that are price increases; c) The average magnitude of price changes in three Norwegian cities, Oslo, Bergen and Stavanger during the period of 1830–1913. The results indicate that the flexibility of prices had remained constant during the classical Gold Standard in Norway. The change in price rigidity came mainly because of the changing magnitude of price changes, and the decrease in magnitude appears to have happened before the Gold Standard was adopted in Norway in 1873.

It is important to extend the analysis to an earlier period and for more goods to be analyzed further on how the change in the rigidities evolved before and after Norway joined the Gold Standard.

PRIMARY SOURCES

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