Explorations in monetary cliometrics: the Reichsbank: 1876-1920
Darne, Olivier; Diebolt, Claude

Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:
GESIS - Leibniz-Institut für Sozialwissenschaften

Empfohlene Zitierung / Suggested Citation:

Nutzungsbedingungen:
Dieser Text wird unter einer CC BY Lizenz (Namensnennung) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier: https://creativecommons.org/licenses/by/4.0/deed.de

Terms of use:
This document is made available under a CC BY Licence (Attribution). For more Information see: https://creativecommons.org/licenses/by/4.0

Diese Version ist zitierbar unter / This version is citable under:
https://nbn-resolving.org/urn:nbn:de:0168-ssoar-31573
Explorations in Monetary Cliometrics.
The Reichsbank: 1876-1920

Olivier Darné and Claude Diebolt

Abstract: The seasonal unit root tests make it possible to determine the nature of the deterministic and stochastic seasonal fluctuations. In this paper, we apply this method to the original monthly series of the Reichsbank monetary stock (constructed in weekly data with 2160 observations) and emphasize deterministic seasonal fluctuations with notably a strong seasonality at the beginning and at the end of the year. This statistical result is closely related to the turning points detected by the historical analysis.

I. Introduction

One of the major characteristics of many economic time series is the presence of seasonal movements. The other main types of movements are the trend, the cycle and the irregular. For Hylleberg (1992), seasonality is the systematic, although not necessarily regular, intra-day movement caused by changes of the weather, the calendar, and timing of decisions, directly or indirectly through the production and consumption decisions made by the agents of the economy. These decisions are influenced by the endowments, the expectations and the preferences of the agents, and the production techniques in the economy. An important part in this definition shows that seasonal fluctuations can be deterministic because of, for example, calendar and weather effects, but they may also be caused by the behaviour of economic agents and may therefore not be constant.

In general, the study of seasonal fluctuations has a long tradition in the analysis of economic time series. Historically, seasonal fluctuations have been considered as a nuisance that obscures the more important components, i.e. the
trend, growth and cyclical components. Consequently, seasonal adjustment procedures have been implemented to eliminate seasonality. Recently, a new viewpoint has emerged, showing that seasonal fluctuations are not necessarily a nuisance. They are an integral part of economic data and should not be ignored or obscured in economic analysis. Therefore, the study of the seasonal behaviour in the series is important for model evaluation and forecasting.

Seasonal movements of economic time series might be deterministic. In this case, they are modelled with seasonal dummies (see Barsky and Miron (1989), inter alia). Another approach is to model seasonality as a non-stationary stochastic process, i.e. seasonality evolves over time by allowing for seasonal unit roots (see, for example, Osborn (1990) and Hylleberg, Jorgensen and Sorensen (1993)).

Beaulieu and Miron (1993) show that imposing a type of seasonality, when the other one is dominant, can involve severe bias and/or a loss of information. Therefore, they suggest distinguishing between deterministic and stochastic seasonality by means of seasonal unit root tests.

In general, when a time series displays non-stationary stochastic seasonality, the seasonal differencing filter \((1 - B^S)\) is applied. The filter used assumes the presence of the \(S\) roots over the unit circle of this polynomial in the autoregressive representation (Box and Jenkins, 1970). Preliminary test procedures have been developed by Hasza and Fuller (1982), Dickey, Hasza and Fuller (1984), and Osbom et al. (1988). These methods make it possible to test unit roots on the whole of seasonal frequencies and not only on some of them. However, when only some seasonal unit roots are present, applying a differencing filter can lead to an over-differencing of the series. Therefore, Hylleberg, Engle, Granger and Yoo (1990) [henceforth HEGY] proposed the testing of non-seasonal and seasonal unit roots separately. This test determines the appropriate differencing filter for making the time-series stationary.

In this paper we present the seasonal unit root test procedure to determine the nature of seasonality (deterministic or stochastic). In Section 2, we define the main seasonal time series models and the seasonal integration notion. We describe the HEGY test procedure in Section 3. In Section 4, we apply this method to monthly Reichsbank monetary stock. Section 5 concludes the paper.

---

1 The most commonly used seasonal adjustment methods are those of Census X-11-ARIMA (e.g. INSEE) and TRAMO/SEATS (e.g. Eurostat).
2 Ghysels et al. (1994) and Abeyesinghe (1994) and others have shown that imposing a deterministic seasonal pattern on a series by using either seasonal dummies or applying the seasonal adjustment methods can lead to serious misspecification problems.
3 These authors have extended the Dickey-Fuller tests to the seasonal context.
4 This test procedure developed for quarterly time series has been extended by Franses (1991) and Beaulieu and Miron (1993) to monthly cases, by Franses and Hobijn (1997) and Feltham and Giles (1999) to biannual cases, by Caceres (1996) to weekly cases, and Andrade et al. (1999) and Duru, Litago and Terraza (1999) to daily cases. Smith and Taylor (1999a, 1999b) also proposed HEGY tests with arbitrary periodicity.
II. Integration and seasonality

We briefly describe the three most commonly used seasonal time series models from the quarterly time series example ($S = 4$).

1. Deterministic seasonal process

The most elementary definition is that of the seasonal dummies model (see Barsky and Miron (1989)). A purely deterministic seasonal process, i.e. seasonality does not change over time, is defined as follows:

$$y_t = \alpha_0 + \sum_{j=1}^{S-1} \alpha_j D_{jt} + \epsilon_t$$

(1)

where $S$ is the order of seasonality, the $D_{jt}$’s are the seasonal dummies and $\epsilon_t$ is a white noise process.

This process is perfectly predictable. The study of the variation of seasonal dummies allows interesting deductions because the factors which produce such variations are often directly recognizable (climate, school calendar, etc.).

2. Stationary stochastic seasonal process

A stationary seasonal process can be generated as follows:

$$\varphi(B)y_t = \mu_t + \epsilon_t \quad \text{with} \quad \epsilon_t \sim i.i.d.\{0, \sigma^2\}$$

(2)

where $\varphi(B)$ is a backshift polynomial operator, with $B^j = y_{t-j}$, which has all of the roots of $\varphi(z) = 0$ lying outside the unit circle, and $\mu_t$ is a deterministic term which can include any combination of a constant, a trend and a set of seasonal dummies. The stationary stochastic seasonality is characterised by peaks at the seasonal frequencies.

3. Non-stationary stochastic seasonal process

A non-stationary stochastic process has a seasonal unit root in its autoregressive representation. This process can be generated as follows:

$$\varphi(B)y_t = \mu_t + \epsilon_t \quad \text{with} \quad \epsilon_t \sim i.i.d.\{0, \sigma^2\}$$

where $\varphi(B)$ polynomial has at least one unit root in its autoregressive representation, and $\mu_t$ is defined as above. The integrated seasonal process has a long memory, i.e. a shock implies a permanent effect on the seasonal model behaviour. These seasonal shifts can be caused by economic movements.

The seasonal integration notion was introduced by Engle et al. (1989). A series $y$ is integrated to $d$ order at the $\theta$ frequency, $y_t \sim I_{\theta}(d)$, if its spectrum takes the form

$$f(\omega) = c(\omega - \theta)^d$$

If the series is only integrated at zero frequency, we obtain the
Standard integration. Moreover, a series can be integrated at one or more seasonal frequencies, \( \omega_j = \pi j / S \), \( j = 1, \ldots, \lfloor S/2 \rfloor \) (where \( \lfloor . \rfloor \) denotes the integer part), \( S \) is the periodicity.

III. Seasonal unit root test procedure

Using the framework of the Dickey-Fuller test, Hylleberg et al. (1990) developed a test procedure for non-seasonal and seasonal unit roots separately.

We consider a series \( y_t \) generated by a general autoregressive process \( \phi(B)y_t = \mu_t + \epsilon_t \). To detect the unit roots at the zero and seasonal frequencies, we must rewrite the autoregressive polynomial according the Lagrange proposition (See Hylleberg et al., 1990, pp. 221-222):

\[
\phi(B) = \sum_{k=1}^S \lambda_k \Delta(B) \frac{1 - \delta_j(B)}{\delta_j(B)} + \Delta(B) \phi^*(B)
\]

with \( \delta_j(B) = 1 / \phi(B) \Delta(B) = \prod_{j=1}^{\lfloor S/2 \rfloor} \delta_j(B) \phi^*(\theta_j) / \prod_{j=1}^{\lfloor S/2 \rfloor} \delta_j(\theta_j) \), \( \phi^*(B) \) is a remainder with roots outside the unit circle, and the \( \theta_j \)'s are the unit roots of the \((1-B^S)\) polynomial, which can be written as follows:

\[
(1-B^S) = (1-B) \prod_{k=1}^{\lfloor S/2 \rfloor} (1-e^{i2\pi k/S}B).
\]

To illustrate this method, we study the quarterly data case \( (S=4) \). We expand the \( \phi(B) \) polynomial around the roots 1, -1, \( i \) and \(-i\), and the expression (4) gives:

\[
\phi(B) = \lambda_1 B(1+B)(1+B^2) + \lambda_2 (-B)(1-B)(1+B^2) + \lambda_3 (-iB)(1-iB)(1-B^2) + \lambda_4 (iB)(1+iB)(1-B^2)
\]

To make estimation possible, we substitute \( \pi_1 = -\lambda_1, \pi_2 0 = \lambda_2, \lambda_3 = (-\pi_3 + i\pi_4)/2 \) and \( \lambda_4 = (-\pi_3 - i\pi_4)/2 \). Finally, we replace the expression (5) in the autoregressive equation, \( \phi(B)y_t = \mu_t + \epsilon_t \), and obtain the auxiliary regression:

\[
\phi^*(B)y_t = \pi_1 y_{t-1} + \pi_2 y_{t-2} + \pi_3 y_{t-3} + \pi_4 y_{t-4} + \mu_t + \epsilon_t
\]

where

\[
y_{t-1} = (1+B+B^2+B^3)y_t = (1+\sum_{j=1}^3 B^j)y_t
\]
\[
y_{t-2} = -(1+B+B^2+B^3)y_t
\]

\[
5 \text{ See the note 4 for the extensions proposed to other periodicities.}
\]
\[ y_{3,t} = -(1 - B^2)y_t \]
\[ y_{4,t} = (1 - B^4)y_t \]

The series \( y_{3,t} \) keeps the unit root at zero frequency and eliminates the seasonal unit roots, while the series \( y_{4,t} \) keeps a unit root at biannual frequency \( \frac{1}{2}(\text{root } - 1) \) and removes the roots at the zero and annual frequencies (roots \( 1, i \text{ and } -i \)). On the other hand, the series \( y_{5,t} \) keeps the complex conjugated roots (roots \( i \text{ and } -i \)) and removes the roots at the other frequencies.

To apply the seasonal unit root tests, equation (6) can be estimated by Ordinary Least Squares (OLS). The test strategy is as follows:

- For zero frequency, one uses a one-sided t-test to test the null hypothesis \( H_0 : \pi_1 = 0 \), against the alternative \( H_1 : \pi_1 < 0 \). If \( t_1 > t_{1, \text{tabulated}} \), \( H_0 \) is not rejected and we have a zero frequency unit root.
- For \( \pi \) frequency, we also use an one-sided t-test to test \( H_0 : \pi_2 = 0 \), against \( H_1 : \pi_2 < 0 \). If \( t_2 > t_{2, \text{tabulated}} \), \( H_0 \) is not rejected and we have a unit root at the biannual frequency (\( \pi \)).
- For the conjugated seasonal frequency, we use an F-statistic\(^6\) to test \( H_0 : \pi_3 = \pi_4 = 0 \), against \( H_1 : \pi_3 \neq \pi_4 \neq 0 \).
- If \( F_{34} < F_{34, \text{tabulated}} \), \( H_0 \) is not rejected and we have a unit root at the annual frequency (\( \pi/2 \)).
- Ghysels, Lee and Noh (1994) proposed F-statistics analogous to those of Dickey, Hasza and Fuller, which make it possible to test the unit roots at all the frequencies simultaneously with or without zero frequency (denoted \( F_{1-4} \) and \( F_{2-4} \), respectively).

In general, this test procedure is estimated with \( \varphi^* (B) = 1 \). However, as shown by Beaulieu and Miron (1993), we must include some lagged dependant variable (i.e. lagged fourth-order differences for quarterly data) in the auxiliary regression to whiten the residuals. Nevertheless, power and size depend on the increase of \( \varphi^* (B) \), as a high number of lags negatively affects the power of the test and a low number of lags implies increasing size up to a significant level. In this case, we have a wrong rejection or acceptation of unit root. For example, information criteria, such as AIC or BIC, or the sequential procedure developed by Otto and Wirjanto (1990) can be applied to select the number of Tags.\(^7\)

---

\(^6\) For complex roots, we can also test \( \pi_4 = 0 \) with a two-sided West, then \( \pi_3 = 0 \) with a one-sided t-test. Dickey (1993) and Smith and Taylor (1999b) advise the use of F-statistics rather than t-statistics because inference problems.

\(^7\) See Taylor (1997) for a detailed discussion.
IV. Application

As an original illustration, we apply the seasonal unit root tests to the monthly monetary stock of the Reichsbank (in thousands of Marks), constructed by Diebolt (in weekly data, with 2160 observations), covering the time period January 1876 to December 1920. Figure 1 displays the series in log form. The main data sources are given in the references. Our analysis begins with a historical description, for a better understanding of the economic transformations in Germany during this period.

1. Historical study

The monetary unification of Germany was decreed on 22 September 1875. From 1 January 1876, the monetary system came into effect. A banking reform set up the Bank of Prussia as the central bank of the Empire, giving it the new name of Reichsbank in order to provide credit for the imperial government and to lead an active discount rate policy.

Before World War 1, the Reichsbank had to give up its statutory reserve because of the difficult economic situation. The period from 1876 to 1894, for example, began with a very long recession (about 6 years) followed by insufficient recovery to surmount a new depression from 1883 to 1887, marked by high unemployment and falling incomes. During these years, the private banks tried to adopt a dominating position on the money market. The Reichsbank was then forced to dip below its rate to keep the control of the market in periods of excessive liquidity. This continued until 1896.

On the other hand, the last five years of the nineteenth century were a period of extraordinary expansion for Germany. In spite of the short depressions of 1901 and 1908, the trend continued until 1913. In fact, the German economy became increasingly interdependent with foreign countries. The balance of current payments nevertheless remained positive due to the excesses of the balance of services. At this time, gold outgoings did not disturb the Mark for the Reichsbank. The general situation was favourable, the company profits increased very quickly in spite of rising prices of raw materials and foodstuffs.
It resulted from intense technical progress and from a very dynamic economic and commercial organization based on a strong vertical and horizontal integration as well as a close connection between the industrial and Banking sectors.

The Mark gradually became one of the strongest gold-backed currencies. However, it was also necessary to prepare for war from a financial viewpoint. From 1911, one notes a convergence of economic and financial reforms towards a definite political purpose. During this period, monetary preparation for the war consisted of disciplining banks so that they increased reserves, persuading the public to use cheques rather than coin (not to use gold reserves) and, for the Reichsbank, to increase its gold reserves. This was the preoccupation of the law that authorized the issuing of 20 and 50 Mark banknotes, and that of the patriotic manufacturers who began paying their workers systematically with small denomination banknotes. Leading citizens and traders in Berlin and administrations followed in order to contribute to the improvement of armament. Furthermore, a war chest was constituted, of which Hume had already spoken ironically in the eighteenth century with reference to the money accumulated by the «king-sergeant», Frederich William I. Nevertheless, the result was fairly extraordinary.

The last balance sheet of the Reichsbank during the peace period, that of 23 July 1914, exceeds all that one can expect, because for the first time the money was covered to 90% by cash in hand (reserves), without counting the Supplement of the war treasure. The margin of non-taxable issue then exceeded 3 billion francs. Financial mobilization was as easy as military mobilization (from the ultimatum of Austria-Hungary to Serbia). The Reichsbank was ready to play its role of «war bank» until the moment when Russian gold was required at Brest-Litovsk. This was followed by accelerated depreciation, total bankruptcy of the Mark (after the World War 1), a unique event in monetary history. It was a period of violent political opposition, great misery and also the enrichment of discriminating investors. We continue our analysis with the presentation of econometric test results.

2. Econometric results

Because the data are monthly, we use the test procedure developed by Beaulieu and Miron (1993), which is an extension of the HEGY test to monthly case. Table 1 Shows that a unit root at zero frequency is not rejected, while the seasonal unit roots are rejected. Therefore, applying a first differences filter makes the series stationary and the seasonal fluctuations are not non-stationary stochastic (i.e. seasonality does not evolve over time). However, study of AIC and BIC information criteria (See Table 2) Shows that the best model is that including seasonal dummies and we then estimate this model on the differenced series (See Figure 2).
Table 2 Shows that almost all the seasonal dummies are significant and that the series includes deterministic seasonality, even if it is very week. It is noted that the seasonal fluctuations of Reichsbank monetary stocks are greater at the beginning and the end of the year since the t-statistics are strongly significant.

V. Conclusion

The seasonal unit root tests developed by Hylleberg et al. (1990) make it possible to determine the nature of the deterministic or stochastic seasonal fluctua-
It also provides additional information concerning the historical analysis of the time series. We apply this method to the original monthly series of the Reichsbank monetary stock and emphasize deterministic seasonal fluctuations, with notably a strong seasonality at the beginning and the end of the year. This statistical result is closely related to the turning points detected by the historical analysis. This displays, once again, the power of the cliometric approach for the interpretation of Economic movements.

References


Archives and Statistical Yearbooks

- Jahrbuch für die amtliche Statistik des preussischen Staates.
- Preussische Gesetz-Sammlung, GR 3600 MF, HA10 Bol00 (Microfiches), Staatsbibliothek zu Berlin – Preussischer Kulturbesitz.
- Statistisches Handbuch für den preussischen Staat.
• Statistisches Jahrbuch für das Deutsche Reich.
• Die Reichsbank, 1876-1900, Berlin, 1900.
• Die Reichsbank, 1901-1925, Berlin, 1925.
• Vierteljahrshefte zur Statistik des Deutschen Reichs.
<table>
<thead>
<tr>
<th>Year</th>
<th>1876</th>
<th>1877</th>
<th>1878</th>
<th>1879</th>
<th>1880</th>
<th>1881</th>
<th>1882</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>443180.25</td>
<td>52366.90</td>
<td>46484.40</td>
<td>490889.05</td>
<td>557755.75</td>
<td>540555.50</td>
<td>529252.50</td>
</tr>
<tr>
<td>2</td>
<td>471694.25</td>
<td>499790.50</td>
<td>510685.25</td>
<td>527096.25</td>
<td>579899.75</td>
<td>577480.75</td>
<td>543438.50</td>
</tr>
<tr>
<td>3</td>
<td>497914.25</td>
<td>551755.75</td>
<td>567017.75</td>
<td>549610.25</td>
<td>580866.75</td>
<td>584646.25</td>
<td>560731.50</td>
</tr>
<tr>
<td>4</td>
<td>509510.50</td>
<td>56598.25</td>
<td>49485.25</td>
<td>540825.50</td>
<td>574515.50</td>
<td>569715.25</td>
<td>553199.75</td>
</tr>
<tr>
<td>5</td>
<td>550700.25</td>
<td>533730.25</td>
<td>505868.50</td>
<td>550725.75</td>
<td>581886.50</td>
<td>576757.50</td>
<td>570416.50</td>
</tr>
<tr>
<td>6</td>
<td>557344.75</td>
<td>554078.75</td>
<td>516355.75</td>
<td>558341.25</td>
<td>593223.75</td>
<td>591155.25</td>
<td>587210.50</td>
</tr>
<tr>
<td>7</td>
<td>533789.50</td>
<td>547036.75</td>
<td>509080.25</td>
<td>544608.25</td>
<td>579512.25</td>
<td>578600.75</td>
<td>562035.75</td>
</tr>
<tr>
<td>8</td>
<td>53887.75</td>
<td>579660.25</td>
<td>510133.75</td>
<td>549744.50</td>
<td>552041.50</td>
<td>566129.75</td>
<td>552649.25</td>
</tr>
<tr>
<td>9</td>
<td>532030.75</td>
<td>484340.75</td>
<td>483403.50</td>
<td>527242.50</td>
<td>525896.75</td>
<td>537052.25</td>
<td>528667.50</td>
</tr>
<tr>
<td>10</td>
<td>492411.25</td>
<td>466092.50</td>
<td>458174.75</td>
<td>497535.25</td>
<td>536808.25</td>
<td>550941.25</td>
<td>549911.25</td>
</tr>
<tr>
<td>11</td>
<td>498107.25</td>
<td>475754.75</td>
<td>468752.75</td>
<td>539918.50</td>
<td>543418.50</td>
<td>523992.75</td>
<td>532976.50</td>
</tr>
<tr>
<td>12</td>
<td>509822.50</td>
<td>475275.75</td>
<td>484021.50</td>
<td>501133.50</td>
<td>535962.75</td>
<td>529536.50</td>
<td>557678.50</td>
</tr>
</tbody>
</table>

Table 3: Reichsbank monetary stock (in thousands of Marks)
<table>
<thead>
<tr>
<th>Year</th>
<th>1904</th>
<th>1905</th>
<th>1906</th>
<th>1907</th>
<th>1908</th>
<th>1909</th>
<th>1910</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1900.06</td>
<td>1033337</td>
<td>928168.50</td>
<td>809758.75</td>
<td>847477.75</td>
<td>1089930.25</td>
<td>1042113.50</td>
</tr>
<tr>
<td>2</td>
<td>943121</td>
<td>1106784.50</td>
<td>985628</td>
<td>889020</td>
<td>928156.25</td>
<td>1102714.25</td>
<td>1096599</td>
</tr>
<tr>
<td>3</td>
<td>924042.50</td>
<td>1093001</td>
<td>973926.50</td>
<td>871599.75</td>
<td>925189.25</td>
<td>1078663.75</td>
<td>1089530.25</td>
</tr>
<tr>
<td>4</td>
<td>903290</td>
<td>1046172.25</td>
<td>960628.20</td>
<td>861698.50</td>
<td>967425.50</td>
<td>1086025</td>
<td>1108799</td>
</tr>
<tr>
<td>5</td>
<td>946666.50</td>
<td>1077040.75</td>
<td>1014035.25</td>
<td>942355.70</td>
<td>970306.50</td>
<td>1075742.50</td>
<td>1122789</td>
</tr>
<tr>
<td>6</td>
<td>952159.75</td>
<td>1052339.25</td>
<td>971428.75</td>
<td>928248</td>
<td>1060922</td>
<td>1097839</td>
<td>1120441</td>
</tr>
<tr>
<td>7</td>
<td>917891.50</td>
<td>971588.25</td>
<td>914538.25</td>
<td>880284.50</td>
<td>1101373.5</td>
<td>1076358.25</td>
<td>1079259</td>
</tr>
<tr>
<td>8</td>
<td>938262.25</td>
<td>958448.25</td>
<td>912890.25</td>
<td>899933.75</td>
<td>113507</td>
<td>1093576.50</td>
<td>1063798.75</td>
</tr>
<tr>
<td>9</td>
<td>838466.50</td>
<td>861590</td>
<td>805184</td>
<td>833280</td>
<td>1103991</td>
<td>1024911</td>
<td>1003409</td>
</tr>
<tr>
<td>10</td>
<td>835407</td>
<td>792278.75</td>
<td>727403.50</td>
<td>764414.25</td>
<td>1068387</td>
<td>937576.50</td>
<td>950578</td>
</tr>
<tr>
<td>11</td>
<td>976502.75</td>
<td>838666.50</td>
<td>774052.50</td>
<td>718210.50</td>
<td>1096004.5</td>
<td>976071.50</td>
<td>1006290</td>
</tr>
<tr>
<td>12</td>
<td>991060</td>
<td>844807.75</td>
<td>723606.50</td>
<td>700335</td>
<td>1044036</td>
<td>960221</td>
<td>982820</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>1911</th>
<th>1912</th>
<th>1913</th>
<th>1914</th>
<th>1915</th>
<th>1916</th>
<th>1917</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1072396.25</td>
<td>1147405</td>
<td>1153950.25</td>
<td>1555968</td>
<td>2185395.7</td>
<td>2489416.25</td>
<td>2393690.75</td>
</tr>
<tr>
<td>2</td>
<td>1159081</td>
<td>1239067</td>
<td>1196451.75</td>
<td>1624132.2</td>
<td>2285558.2</td>
<td>2499235.25</td>
<td>2542594.25</td>
</tr>
<tr>
<td>3</td>
<td>1140523</td>
<td>1213883</td>
<td>1213507</td>
<td>1622067</td>
<td>236488.2</td>
<td>2503649.50</td>
<td>2544540.25</td>
</tr>
<tr>
<td>4</td>
<td>1121715.25</td>
<td>1221185.50</td>
<td>1239600.75</td>
<td>1659962</td>
<td>2404434.5</td>
<td>2504927</td>
<td>2548708.75</td>
</tr>
<tr>
<td>5</td>
<td>1181741.25</td>
<td>1251299</td>
<td>1309006.75</td>
<td>1662903.7</td>
<td>2426359.7</td>
<td>2550774.75</td>
<td>2558314</td>
</tr>
<tr>
<td>6</td>
<td>1182359.50</td>
<td>1264023.5</td>
<td>1373634</td>
<td>1670076.7</td>
<td>2439344.2</td>
<td>2449036</td>
<td>2548870.75</td>
</tr>
<tr>
<td>7</td>
<td>1159620.25</td>
<td>1279708.75</td>
<td>1416585.50</td>
<td>1628532</td>
<td>2448062.7</td>
<td>2496829.50</td>
<td>2501224</td>
</tr>
<tr>
<td>8</td>
<td>1159423.50</td>
<td>1278492</td>
<td>1421053.5</td>
<td>1597222.5</td>
<td>2516867</td>
<td>2495809.50</td>
<td>2491526.50</td>
</tr>
<tr>
<td>9</td>
<td>1099555.75</td>
<td>1222209.75</td>
<td>1429495.25</td>
<td>1678162.6</td>
<td>2469369</td>
<td>2495335.75</td>
<td>2507411.50</td>
</tr>
<tr>
<td>10</td>
<td>1049415.30</td>
<td>1156609.75</td>
<td>1457584.75</td>
<td>1840658.5</td>
<td>2462357.2</td>
<td>2517904</td>
<td>2513809.50</td>
</tr>
<tr>
<td>11</td>
<td>1105055</td>
<td>1113626.25</td>
<td>1508052.50</td>
<td>1976772.5</td>
<td>2479625.7</td>
<td>2532399.25</td>
<td>2556431.50</td>
</tr>
<tr>
<td>12</td>
<td>1056243.25</td>
<td>1034964</td>
<td>1471348.50</td>
<td>2100933.7</td>
<td>2475165</td>
<td>2535676</td>
<td>2564499</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>1918</th>
<th>1919</th>
<th>1920</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2519753.25</td>
<td>2276337.5</td>
<td>1101096.25</td>
</tr>
<tr>
<td>2</td>
<td>2522301.75</td>
<td>2269211</td>
<td>1113650.5</td>
</tr>
<tr>
<td>3</td>
<td>2536651.50</td>
<td>2167907.5</td>
<td>1125966.25</td>
</tr>
<tr>
<td>4</td>
<td>2496306</td>
<td>1894230.50</td>
<td>1121816.75</td>
</tr>
<tr>
<td>5</td>
<td>2466920.50</td>
<td>1650315.50</td>
<td>1091451.75</td>
</tr>
<tr>
<td>6</td>
<td>2666590</td>
<td>1120203.75</td>
<td>1090545.25</td>
</tr>
<tr>
<td>7</td>
<td>2467781.25</td>
<td>1132006.75</td>
<td>1096812.5</td>
</tr>
<tr>
<td>8</td>
<td>2467705.75</td>
<td>1125270.75</td>
<td>1098695.25</td>
</tr>
<tr>
<td>9</td>
<td>2512840.30</td>
<td>1118179.25</td>
<td>1094829.25</td>
</tr>
<tr>
<td>10</td>
<td>2647204</td>
<td>1114392.50</td>
<td>1098544</td>
</tr>
<tr>
<td>11</td>
<td>2651900.25</td>
<td>1112201.50</td>
<td>1098379.50</td>
</tr>
<tr>
<td>12</td>
<td>2304460.50</td>
<td>1108990</td>
<td>1097658</td>
</tr>
</tbody>
</table>