BANK OF ENGLAND

Annual analysis of revisions to money, credit and effective interest rates data (2014-16)

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Each year the Bank publishes analysis of the revisions to its monthly data on money, credit, and effective interest rates produced by the Data and Statistics Division (DSD). This year's analysis shows that the revisions can be considered as immaterial for most series tested. This is the same broad conclusion as the 2018 analysis of 2013-15 data[1] and the 2017 analysis of 2012-14 data[2].

Revisions are a normal part of the data production process. There are several reasons why data might be revised after its initial publication. Reporters of data to the Bank may submit corrections to earlier data if they discover errors or make improvements to their data systems. In addition, the Bank might change the methodology it uses to produce the data. Also, the seasonal adjustment process can lead to revisions to an entire series, as each new data point provides new information about the seasonal pattern of the data.

Revisions analysis gives users an indication of how much weight to place on data when it is first released. Early releases of data that tend to receive few revisions can be regarded as less noisy and more reliable.

Revisions can be measured in different ways. The tables below show a variety of metrics for the money and credit and effective rates data. Tables 1 and 2 illustrate the size of revisions, showing the mean revision, mean absolute revision and average published outturn. Tables 3 and 4 present metrics to analyse bias in the data. For each series, a T-test is conducted. This is the simplest test for bias, and is a function of the mean and standard deviation of the revisions, and the number of observations. However, this test is only properly valid when the sample of revisions is independently and identically distributed, and fails if revisions are subject to autocorrelation or to non-constant variance (heteroskedasticity). Tables 3 and 4 inlcude alternative tests for bias that control for this. The adjusted t-test takes into account any first order autocorrelation in the revisions; and the Newey-West test is valid when heteroskedasticity and autocorrelation is present in revisions to the previous two months of data. Tables 5 and 6 provide further analysis of the revisions, showing the root mean squared revision, the ratio of this to the mean of the revised data, and ratio of the mean squared revision to the variance of the revised data.

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[1] 'Annual analysis of revisions to money, credit and effective interest rates data (2013-15)', by Paige Benattar, Hannah Phaup and Alister Ratcliffe, Bank of England *Bankstats (Monetary & Financial Statistics)*, June 2018.
[2] 'Annual analysis of revisions to money and credit aggregates and effective interest rates data (2012-14)', by Andrew Feeney-Seale, Amy Lawford, Becky Sanders and Dominic Tighe, Bank of England *Bankstats (Monetary & Financial Statistics)*, June 2017.

Table 1: Revisions to money and credit data (one-month growth rate, unless stated) [a]

Series	Non-seasonally adjusted data			Seasonally adjusted data		
	Mean revision	Mean absolute revision	*Mean outturn*	Mean revision	Mean absolute revision	*Mean outturn*
Notes and coin	0.00	0.00	0.54	0.06	0.13	0.54
Household Divisia money [b]	n.a.	n.a.	n.a.	0.04	0.13	0.61
M4	0.03	0.04	0.16	0.04	0.11	0.14
M4, excluding intermediate OFCs	0.03	0.06	0.43	0.03	0.13	0.43
M4, retail	-0.01	0.05	0.45	0.00	0.09	0.45
M4, wholesale	0.09	0.13	-0.58	0.10	0.44	-0.56
M4, households	0.01	0.02	0.39	0.02	0.04	0.38
M4, PNFCs	0.02	0.08	0.72	0.07	0.18	0.71
M4, OFCs	0.06	0.11	-0.61	0.04	0.37	-0.61
M4, NIOFCs	0.11	0.33	0.30	0.04	0.84	0.29
M4 lending	0.01	0.08	0.02	0.03	0.08	0.03
M4. lending excluding intermediate OFCs	0.04	0.09	0.31	0.06	0.10	0.31
M4, lending to households	0.00	0.00	0.27	0.01	0.02	0.26
M4. lending to PNFCs	0.03	0.33	0.07	0.04	0.34	0.07
M4, lending to OFCs	0.04	0.09	-0.47	0.04	0.09	-0.47
M4, lending to NIOFCs	0.23	0.48	1.11	0.23	0.48	1.11
Lending to individuals (secured)	0.01	0.01	0.22	0.01	0.03	0.21
Lending to individuals (consumer credit)	0.08	0.12	0.65	0.08	0.14	0.67
Total value of all mortgage approvals, £mn [c]	175	176	18,379	176	270	18,383
Number of mortgage approvals for house purchase, 000's [d]	0.37	0.37	67	0.00	1.0	67
Net finance raised by PNFCs, £mn [e]	116	184	2,050	179	936	2,039

Definitions: see Annex

(a) Revisions calculated two years after publication of first estimates for data published 2014 to 2016.
(b) Estimates for Household Divisia money were published as seasonally adjusted data only for the period covered.
(c) Total value of all mortgage approvals is reported as monthly flows, in £mn.
(d) Number of mortgage approvals for house purchase is reported in 000's.
(e) Net finance raised by PNFCs is reported as monthly flows, in £mn.

Table 2: Revisions to effective annual interest rates, by product and sector, NSA [a]

Series	Mean revision (percentage points)	Mean absolute revision (percentage points)	*Mean outturn (%)*
Rates on outstanding businesses			
Interest-bearing sight deposits (households)	0.00	0.01	0.73
Time deposits (households)	-0.01	0.01	1.63
Loans secured on dwellings to households	0.00	0.00	3.05
Credit card loans to households[b]	0.17	0.17	18.09
Other loans to households	0.01	0.01	7.07
Overdrafts to households	0.03	0.03	9.87
Interest-bearing sight deposits (PNFCs)	0.00	0.00	0.36
Time deposits (PNFCs)	-0.03	0.03	0.68
Overdrafts to PNFCs	0.01	0.01	3.46
Other loans to PNFCs	0.00	0.00	3.11
Interest-bearing sight deposits (OFCs)	0.00	0.00	0.50
Time deposits (OFCs)	-0.01	0.01	0.94
Other loans to OFCs	-0.02	0.02	1.72
Rates on new businesses			
New time deposits (households)	0.00	0.01	1.41
Loans secured on dwellings (new advances to households)	0.00	0.00	2.69
Other loans (new advances to households)	0.00	0.01	7.19
New time deposits (PNFCs)	0.00	0.00	0.45
Other new loans to PNFCs	0.00	0.02	2.61

Definitions: see Annex

(a) Revisions calculated two years after publication of first estimates for data published 2014 to 2016.
(b) From January 2016, series CFMHSDG was discontinued and replaced with CFMZ6IR. For further details, see 'Developments in Effective Rates statistics', Bank of England *Bankstats (Monetary and Financial Statistics),* December 2016.

Table 3: Evidence for bias in money and credit data (based on one-month growth rates) [a]

Series	Non-seasonally adjusted data			Seasonally adjusted data		
	Evidence for bias: t-tests [a]	Evidence for bias: Newey-West test	Conclusion on bias	Evidence for bias: t-tests [a]	Evidence for bias: Newey-West test	Conclusion on bias
Notes and coin	no	no	Unbiased	yes	no	Inconclusive
Household Divisia money [b]	n.a.	n.a.	n.a.	no	no	Unbiased
M4	yes	yes	Biased	no	no	Unbiased
M4, excluding intermediate OFCs	yes	no	Inconclusive	no	no	Unbiased
M4, retail	no	no	Unbiased	no	no	Unbiased
M4, wholesale	yes	yes	Biased	no	no	Unbiased
M4, households	no	no	Unbiased	no*	no	Unbiased
M4, PNFCs	no	no	Unbiased	no	no	Unbiased
M4, OFCs	yes	yes	Biased	no	no	Unbiased
M4, NIOFCs	no	no	Unbiased	no	no	Unbiased
M4 lending	no	no	Unbiased	no	no	Unbiased
M4. lending excluding intermediate OFCs	no	no	Unbiased	yes	yes	Biased
M4, lending to households	no	no	Unbiased	no	no	Unbiased
M4. lending to PNFCs	no	no	Unbiased	no	no	Unbiased
M4, lending to OFCs	no	yes	Inconclusive	no	yes	Inconclusive
M4, lending to NIOFCs	no	no	Unbiased	no	no	Unbiased
Lending to individuals (secured)	yes	yes	Biased	no	no	Unbiased
Lending to individuals (consumer credit)	yes	yes	Biased	yes	yes	Biased
Total value of all mortgage approvals, £mn [c]	no*	yes	Inconclusive	no*	yes	Inconclusive
Number of mortgage approvals for house purchase, 000's [d]	no*	no	Unbiased	no*	no	Unbiased
Net finance raised by PNFCs, £mn [e]	yes	yes	Biased	no*	no	Unbiased

Definitions: see Annex

(a) Tests are assessed using a 95% confidence interval. Revisions calculated after two years to first estimates for the period 2014 to 2016. Evidence of bias is judged by the t-test when there is no significant evidence of first order autocorrelation of revisions according to a chi-squared test. Where autocorrelation is significant, the reported outcome represents the result of the adjusted t-test and is indicated as (*).
(b) Estimates for Household Divisia money were published as seasonally adjusted data only for the period covered.
(c) Total value of all mortgage approvals is reported as monthly flows, in £mn.
(d) Number of mortgage approvals for house purchase is reported in 000's.
(e) Net finance raised by PNFCs is reported as monthly flows, in £mn.

Table 4: Evidence for bias in annualised effective interest rates data, NSA [a]

Series	Evidence for bias: t-tests	Evidence for bias: Newey-West test	Conclusion on bias
Rates on outstanding businesses			
Interest-bearing sight deposits (households)	no	no	Unbiased
Time deposits (households)	yes	no	Inconclusive
Loans secured on dwellings to households	no	no	Unbiased
Credit card loans to households[b]	no*	no	Unbiased
Other loans to households	no	no	Unbiased
Overdrafts to households	no	no	Unbiased
Interest-bearing sight deposits (PNFCs)	no	no	Unbiased
Time deposits (PNFCs)	no*	yes	Inconclusive
Overdrafts to PNFCs	no	no	Unbiased
Other loans to PNFCs	no*	no	Unbiased
Interest-bearing sight deposits (OFCs)	no	no	Unbiased
Time deposits (OFCs)	no*	no	Unbiased
Other loans to OFCs	no*	no	Unbiased
Rates on new businesses			
New time deposits (households)	no*	no	Unbiased
Loans secured on dwellings (new advances to households)	no	no	Unbiased
Other loans (new advances to households)	no	no	Unbiased
New time deposits (PNFCs)	no	no	Unbiased
Other new loans to PNFCs	no	no	Unbiased

Definitions: see Annex

(a) Tests are assessed using a 95% confidence interval. Revisions calculated after two years to first estimates for the period January 2014 to December 2016.
(b) From January 2016, CFMHSDG has been discontinued and replaced with CFMZ6IR. See article 'Developments in Effective Rates statistics' in the December 2015 issue of this publication.
(c) Evidence of bias is judged by the t-test when there is no significant evidence of first order autocorrelation of revisions according to a chi-squared test. Where autocorrelation is significant, this is indicated as (*), and the reported outcome represents the adjusted t-test.

Table 5: Measures of root mean square revision (RMSR) and mean square revision for money and credit data [a]

Series	Non-seasonally adjusted data			Seasonally adjusted data		
	RMSR (pp)	RMSR, ratio to mean of revised data	MSR, ratio to variance of revised data	RMSR (pp)	RMSR, ratio to mean of revised data	MSR, ratio to variance of revised data
Notes and coin	0.00	0.00	0.00	0.18	0.33	0.21
Household Divisia money [b]	n.a.	n.a.	n.a.	0.17	0.26	0.22
M4	0.07	0.41	0.01	0.14	0.95	0.03
M4, excluding intermediate OFCs	0.09	0.20	0.03	0.16	0.40	0.20
M4, retail	0.13	0.28	0.07	0.13	0.29	0.53
M4, wholesale	0.23	-0.41	0.01	0.58	-1.01	0.10
M4, households	0.05	0.12	0.01	0.07	0.18	0.16
M4, PNFCs	0.13	0.18	0.00	0.24	0.33	0.12
M4, OFCs	0.17	-0.28	0.00	0.46	-0.74	0.03
M4, NIOFCs	0.49	1.64	0.05	1.01	4.07	0.21
M4 lending (M4L)	0.12	6.08	0.04	0.12	4.17	0.04
M4. lending excluding intermediate OFCs	0.15	0.48	0.15	0.15	0.49	0.19
M4, lending to households	0.02	0.06	0.01	0.05	0.18	0.25
M4. lending to PNFCs	0.54	7.47	0.74	0.50	6.67	1.58
M4, lending to OFCs	0.14	-0.29	0.01	0.14	-0.29	0.01
M4, lending to NIOFCs	0.86	0.77	0.09	0.86	0.77	0.09
Lending to individuals (secured)	0.04	0.17	0.11	0.05	0.24	0.38
Lending to individuals (consumer credit)	0.19	0.28	0.08	0.19	0.27	0.49
Total value of all mortgage approvals, £mn [c]	262	0.01	0.01	321	0.02	0.02
Number of mortgage approvals for house purchase, 000's [d]	0.56	0.01	0.00	0.99	0.01	0.00
Net finance raised by PNFCs, £mn [e]	268	0.13	0.01	1,245	0.61	0.19

Definitions: see Annex

(a) Revisions calculated two years after publication of first estimates for data published 2014 to 2016.
(b) Estimates for Household Divisia money were published as seasonally adjusted data only for the period covered.
(c) Total value of all mortgage approvals is reported as monthly flows, in £mn.
(d) Number of mortgage approvals for house purchase is reported in 000's.
(e) Net finance raised by PNFCs is reported as monthly flows, in £mn.

Table 6: Measures of root mean square revision and mean square revision, effective interest rates, NSA [a]

Series	RMSR (pp)	RMSR, ratio to mean of revised data	MSR, ratio to variance of revised data
Rates on outstanding businesses			
Interest-bearing sight deposits (households)	0.02	0.03	0.06
Time deposits (households)	0.02	0.01	0.00
Loans secured on dwellings to households	0.00	0.00	0.00
Credit card loans to households[b]	0.38	0.02	1.89
Other loans to households	0.02	0.00	0.00
Overdrafts to households	0.19	0.02	0.39
Interest-bearing sight deposits (PNFCs)	0.01	0.04	0.04
Time deposits (PNFCs)	0.05	0.07	0.60
Overdrafts to PNFCs	0.05	0.01	0.18
Other loans to PNFCs	0.01	0.00	0.02
Interest-bearing sight deposits (OFCs)	0.02	0.04	0.02
Time deposits (OFCs)	0.02	0.02	0.01
Other loans to OFCs	0.05	0.03	0.16
Rates on new businesses			
New time deposits (households)*	0.01	0.01	0.00
Loans secured on dwellings (new advances to households)*	0.00	0.00	0.00
Other loans (new advances to households)*	0.02	0.00	0.01
New time deposits (PNFCs)*	0.01	0.02	0.02
Other new loans to PNFCs*	0.05	0.02	0.17

Definitions: see Annex

(a) Revisions calculated two years after publication of first estimates for data published 2014 to 2016.
(b) From January 2016, CFMHSDG has been discontinued and replaced with CFMZ6IR. See article 'Developments in Effective Rates statistics' in the December 2015 issue of this publication.

Annex: Definitions

Money and credit series

Notes and coin – LPMVQVT (NSA), LPMVQUT (SA): Monthly 1 month growth rate of total sterling notes and coin in circulation outside the Bank of England (in percent).

Household Divisia money – LPMB6F7 (SA only): Monthly 1 month growth rate of monetary financial institutions' sterling divisia for household sector (in percent).

M4 – LPMVQKY (NSA), LPMVQJS (SA): Monthly 1 month growth rate of M4 (monetary financial institutions' sterling M4 liabilities to private sector) (in percent).

M4, excluding IOFCs – RPMB3D4 (NSA), RPMB68P (SA): Monthly 1 month growth rate of monetary financial institutions' sterling M4 liabilities to Private sector excluding intermediate OFCs (in percent).

M4, retail – LPMVQXX (NSA), LPMVQWW (SA): Monthly 1 month growth rate of monetary financial institutions' sterling retail M4 liabilities to private sector (in percent).

M4, wholesale – LPMVRKC (NSA), LPMVRGU (SA): Monthly 1 month growth rate of monetary financial institutions' sterling wholesale M4 liabilities to private sector (in percent).

M4, households – LPMVVIL (NSA), LPMVVHT (SA): Monthly 1 month growth rate of monetary financial institutions' sterling M4 liabilities to household sector (in percent).

M4, PNFCs – LPMVVIF (NSA), LPMVVHN (SA): Monthly 1 month growth rate of monetary financial institutions' sterling M4 liabilities to private non-financial corporations (in percent).

M4, OFCs – LPMVVHZ (NSA), LPMVVHH (SA): Monthly 1 month growth rate of monetary financial institutions' sterling M4 liabilities to other financial corporations (in percent).

M4 lending (M4L) – LPMBF38 (NSA), LPMVWVM (SA): Monthly 1 month growth rate of monetary financial institutions' sterling net lending to private sector (in percent).

M4, lending excluding IOFCs – RPMB3D5 (NSA), RPMB66P (SA): Monthly 1 month growth rate of monetary financial institutions' sterling net lending to Private sector excluding intermediate OFCs (in percent).

M4L to households – LPMB3Z7 (NSA), LPMVWNM (SA): Monthly 1 month growth rate of monetary financial institutions' sterling net lending to household sector (in percent).

M4L to PNFCs – LPMB3Z6 (NSA), LPMVWNR (SA): Monthly 1 month growth rate of monetary financial institutions' sterling net lending (historical measure) to private non-financial corporations (in percent).

M4L to OFCs – LPMB3Z5 (NSA), LPMVWNM (SA): Monthly 1 month growth rate of monetary financial institutions' sterling net lending (historical measure) to other financial corporations (in percent).

Lending to individuals (secured) – LPMVTYD (NSA), LPMVTYF (SA): Monthly 1 month growth rate of total sterling net secured lending to individuals (in percent).

Lending to individuals (consumer credit) – LPMB3UJ (NSA), LPMVWAU (SA): Monthly 1 month growth rate of monetary financial institutions' sterling net consumer credit (excluding credit card) excluding securitisations to individuals (in percent).

Total value of all mortgage approvals, £mn – LPMVTVN (NSA), LPMVTVQ (SA): Monthly value of total sterling approvals for secured lending to individuals (in sterling millions).

Number of mortgage approvals for house purchase, 000's – LPMVTVU (NSA), LPMVTVX (SA): Monthly number of total sterling approvals for house purchase to individuals.

Net finance raised by PNFCs, £mn – LPMVYVV (SA only): Monthly amount of private non-financial corporations' sterling and all foreign currency funds raised from UK MFIs and capital markets (in sterling millions).

Effective interest rates series (outstanding business)

Please note that series codes changed from January 2016 data as part of changes from the ER Rolling Review. For further details, please see the article "Developments in Effective Rates statistics" in the *Bankstats* December 2015 edition.

Interest bearing sight deposits, households – CFMHSCV: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, interest bearing sight deposits from households (in percent).

Time deposits, households – CFMHSCW: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, time deposits from households (in percent).

Loans secured on dwellings to households – CFMHSDE: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, loans secured on dwellings to households (in percent).

Credit card loans to households – CFMHSDG (discontinued from January 2016 and replaced with CFMZ6IR): Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, credit card loans to households (in percent).

Credit card loans to households – CFMZ6IR: Monthly average of UK resident banks' sterling weighted average interest rate, credit card loans to Individuals and individual trusts (in percent).

Other loans to households – CFMHSDI: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, other loans to households (in percent).

Overdrafts to households – CFMHSDH: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, overdrafts to households (in percent).

Interest bearing sight deposits, PNFCs – CFMHSCT: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, interest bearing sight deposits from private non-financial corporations (in percent).

Time deposits, PNFCs – CFMHSCU: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, time deposits from private non-financial corporations (in percent).

Overdrafts to PNFCs – CFMHSDB: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, overdrafts to private non-financial corporations (in percent).

Other loans to PNFCs – CFMHSDC: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, other loans to private non-financial corporations (in percent).

Interest bearing sight deposits, OFCs – CFMHSCR: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, interest bearing sight deposits from other financial corporations (in percent).

Time deposits, OFCs – CFMHSCS: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, time deposits from other financial corporations (in percent).

Other loans to OFCs – CFMHSDA: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, other loans to other financial corporations (in percent).

Effective interest rates series (new business)

Time deposits, households – CFMBJ74: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate - new time deposits from households (in percent).

Loans secured on dwellings to households – CFMBJ95: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate, loans secured on dwellings, new advances to households (in percent).

Other loans to households – CFMBJ93: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate - other loans, new advances to households (in percent).

Time deposits, PNFCs – CFMBJ72: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate - new time deposits from private non-financial corporations (in percent).

Other loans to PNFCs – CFMBJ82: Monthly average of UK resident monetary financial institutions' (excl. Central Bank) sterling weighted average interest rate - other loans, new advances to private non-financial corporations (in percent).

Sectors

Definitions of the sectors used in this article can be found in the Classification of Accounts Guide.