Demand Forecast Update
Jemena Gas Networks (NSW) Ltd
Access Arrangement - 2020 to 2025

January 2020

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1. Glossary

AER	Australian Energy Regulator
CORE	Core Energy & Resources Pty Ltd
GJ	Gigajoule
HIA	Housing Industry Association
JGN	Jemena Gas Networks (NSW)
NGL	National Gas Law
NGO	National Gas Objective
NGR	National Gas Rules
NSW	New South Wales
Original CORE Submission	The submission in May 2019 based on data to end 2018 (report and model)
Revised CORE submission	This report and related model, updated for 2018-19 data.

2. Introduction

This document has been prepared in response to the AER's Draft Decision (Attachment 12), in relation to the demand forecasts incorporated in the JGN (NSW) 2020-2025 Access Arrangement.

CORE has been engaged by JGN to review the AER's draft decision, to provide an independent response to each issue raised, based on information provided by JGN and sourced from third parties and prepare a revised forecast.

The structure of this document is as follows:

2. Summary and Revised Forecasts

3. Tariff V

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   3.2 HIA Data Update

   3.3 Billing Data Clarification

   3.4 HIA One Year Lag

   3.5 Suspended Connections (formerly Zero Consuming Meters)

   3.6 Volume Boundary Meter Strategy

Attachment 1: Updated Model

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3. Summary and Revised Forecasts

3.1. Methodology

CORE notes the following statement included in 12.1 of the Draft Decision:

"We are satisfied that the overall demand forecasting methodology applied by JGN's consultant, CORE Energy & Resources (CORE), is consistent with rule 74(2) of the National Gas Rules (NGR)".

CORE confirms that is has adopted the same methodology in developing the revised forecasts which are included with this submission as it used in its Original Submission. More specifically the changes CORE has made to the model are:

- updated weather normalisation model based on new 2019-year weather data
- updated the demand forecasting model for:
  - latest connections and demand data sourced from JGN
  - latest HIA data

3.2. Tariff V

CORE has noted the following comments by the AER in its Draft Decision:

12.1.1 Additional information sought

"We would like JGN in its revised proposal to:

- *incorporate updated demand and customer forecast based on 2018–19 actual data, and the latest HIA data*
- *provide clarifications on the basis in which the billing data is derived including the source data and associated workings in a separate worksheet*
- *provide further clarifications on the accuracy of using a one-year lag between HIA data and JGN connection, including the likely error margins to the penetration rates*
- *describe the concept of zero consuming meters, its application to the demand and customer forecast, how it differs from disconnections, its relationship with other areas in JGN's proposal, and the reasons it complies with the National Gas Objective (NGO)*
- *confirm the impact to the demand and customer forecast with and without JGN's volume boundary meter strategy in which individual hot water meters remain on offer for buildings with centralised hot water systems.*

We recommend that JGN seek independent assurance on any updates to the demand and customer forecast as well as validating that the key inputs used in the demand and customer forecast are fit for purpose".

CORE confirms that each of the above issues has been addressed and provides independent assurance regarding updates to demand and customer forecast, as well as validating that the key inputs in the demand and customer forecast are fit for purpose.

Each of the matters set out above are addressed individually below.

3.3. Revised Demand Forecast

The following is a summary of the revised forecasts for Tariff V – Residential and Commercial - connections and demand.

The most significant movements between the Revised Submission forecasts and those which formed part of the Original Submission are set out below. CORE notes that the major factor contributing to increased demand for both residential and small business customers is a forecast increase in consumption per connection.

Residential

- Increase in total annual demand by 2025 from 27.55 PJs to 27.87 PJs
- Negligible movement in new connections
- Increase in demand per connection by 2025 from 18.3 to 18.5 GJ per customer
- Changes to address the timing of suspended connection in 2019 vs 2018 and changes to reflect change in new connection customer mix as summarised in the tables below.

Small Business

- Increase in total annual demand by 2025 from 13.29 PJs to 13.59 PJs
- Minor movement in new connections from 39,630 to 39,689
- Increase in demand per connection by 2025 from 335.3 to 342.4 GJ per customer

The following figures and tables provide a summary of forecast aggregate demand, connections and demand per connection for both residential and small business customers.

Figure 3.1 Residential Connections (1,000's)

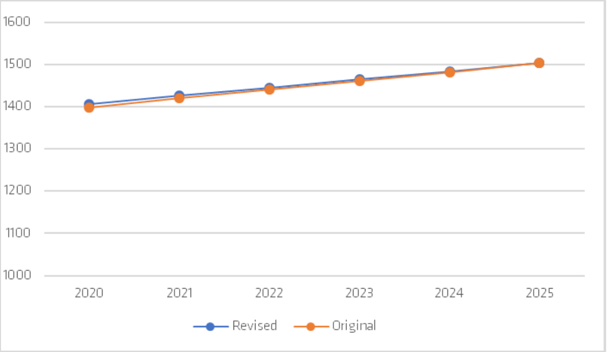


Figure 3.2 Residential Consumption per Connection (GJ

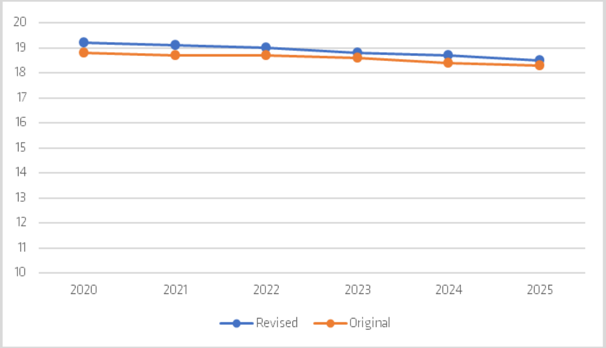


Figure 3.3 Small Business Connections

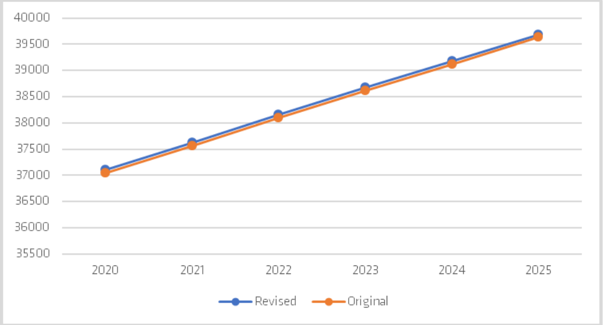
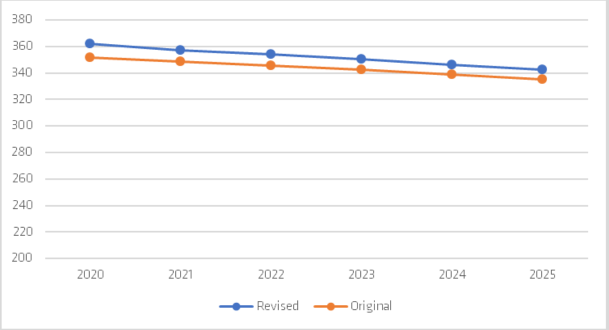


Figure 3.4 Small Business Consumption per Connection (GJ)



3.4. Revised Submission Forecasts

3.4.1. Residential

Figure 3.5 Residential Demand

Residential	2020	2021	2022	2023	2024	2025
Existing 2018 Connections	26,822,203	26,520,419	26,212,467	25,873,436	25,541,345	25,203,377
New Dwelling Connections | Residential Estate	116,542	450,020	768,563	1,062,769	1,349,942	1,635,449
New Dwelling Connections | Residential E2G	20,647	82,634	149,150	213,180	274,956	334,417
New Dwelling Connections | Residential HRVB	22,450	90,292	162,977	233,581	303,543	374,741
New Dwelling Connections | Residential MD	12,166	47,536	82,833	116,539	149,681	182,972
New Dwelling Connections | Residential HRVI	16,958	58,390	83,497	104,576	125,471	146,172
Total Demand	**27,010,966**	**27,249,292**	**27,459,486**	**27,604,083**	**27,744,939**	**27,877,128**

Figure 3.6 Residential Connections

Residential	2020	2021	2022	2023	2024	2025
Opening Connections	1,398,848	1,405,425	1,426,103	1,445,411	1,464,509	1,483,589
Disconnections	2,959	3,030	3,084	3,136	3,188	3,240
Disconnections | Zero Consuming Connections	27,023	5,162	5,255	5,343	5,431	5,520
Existing 2018 Connections	1,368,867	1,360,675	1,352,336	1,343,856	1,335,237	1,326,477
Net Dwelling Connections | Estate	21,154	16,879	15,705	15,632	15,620	16,369
Net Dwelling Connections | E2G	3,704	3,697	3,692	3,686	3,681	3,676
Net Dwelling Connections | HRVB	160	154	151	150	153	160
Net Dwelling Connections | MD	3,787	3,272	3,216	3,192	3,241	3,377
Net Dwelling Connections | HRVI	4,795	1,837	1,799	1,782	1,816	1,750
Total New Dwelling Connections	36,559	28,869	27,647	27,578	27,699	28,573
Cumulative New Connections | Residential Estate	23,817	43,423	61,904	80,358	98,847	118,132
Cumulative New Connections | Residential E2G	4,000	8,000	12,000	16,000	20,000	24,000
Cumulative New Connections | Residential HRVB	160	314	466	615	768	928
Cumulative New Connections | Residential MD	3,787	7,058	10,275	13,467	16,708	20,085
Cumulative New Connections | Residential HRVI	4,795	6,632	8,431	10,213	12,029	13,779
Total Connections	**1,405,425**	**1,426,103**	**1,445,411**	**1,464,509**	**1,483,589**	**1,503,402**
% Growth	0.47%	1.47%	1.35%	1.32%	1.30%	1.34%
Net Connections	**6,577**	**20,678**	**19,307**	**19,098**	**19,080**	**19,813**
Total Disconnections (Includes ZCM's)	**29,981**	**8,191**	**8,339**	**8,480**	**8,619**	**8,760**

Figure 3.7 Residential Consumption per Connection

Residential	2020	2021	2022	2023	2024	2025
Existing 2018	19.6	19.5	19.4	19.3	19.1	19.0
New Dwelling Connections | Residential Estate	4.9	10.4	12.4	13.2	13.7	13.8
New Dwelling Connections | Residential E2G	5.2	10.3	12.4	13.3	13.7	13.9
New Dwelling Connections | Residential HRVB	140.2	287.1	350.1	379.7	395.4	403.8
New Dwelling Connections | Residential MD	3.2	6.7	8.1	8.7	9.0	9.1
New Dwelling Connections | Residential HRVI	3.5	8.8	9.9	10.2	10.4	10.6
Weighted Average Demand per Connection	**19.2**	**19.1**	**19.0**	**18.8**	**18.7**	**18.5**
% Growth	1.97%	-0.58%	-0.57%	-0.78%	-0.78%	-0.85%

3.4.2. Small Business

Figure 3.8 Small Business Demand

Small Business	2020	2021	2022	2023	2024	2025
Existing 2018	13,379,748	13,177,837	13,005,214	12,804,611	12,566,545	12,338,121
New Small Business	56,868	254,273	500,373	749,547	999,393	1,252,190
Total Demand	**13,436,616**	**13,432,111**	**13,505,587**	**13,554,159**	**13,565,938**	**13,590,312**
% Growth	-4.08%	-0.03%	0.55%	0.36%	0.09%	0.18%

Figure 3.9 Small Business Connections

Small Business	2020	2021	2022	2023	2024	2025
Opening Connections	36,596	37,104	37,629	38,151	38,668	39,180
Disconnections	320	302	306	311	315	319
Disconnections | Zero Consuming Connections						
Existing 2018 Connections	36,276	35,974	35,668	35,357	35,042	34,723
New Small Business Connections	828	828	828	828	828	828
Cumulative New Commercial Connections	828	1,655	2,483	3,310	4,138	4,966
Total Connections	**37,104**	**37,629**	**38,151**	**38,668**	**39,180**	**39,689**
% Growth	1.39%	1.42%	1.39%	1.36%	1.33%	1.30%
Net Connections	**508**	**526**	**521**	**517**	**513**	**509**
% Growth	-11.55%	3.52%	-0.81%	-0.81%	-0.81%	-0.81%

Figure 3.10 Small Business Consumption per Connection

Small Business	2020	2021	2022	2023	2024	2025
Existing 2018	368.8	366.3	364.6	362.2	358.6	355.3
New Small Business	68.7	153.6	201.5	226.4	241.5	252.2
Weighted Average Demand per Connection	**362.1**	**357.0**	**354.0**	**350.5**	**346.2**	**342.4**
% Growth	-5.40%	-1.43%	-0.83%	-0.98%	-1.22%	-1.10%

4. Tariff V

4.1. Data Update

4.1.1. Connection and Demand Data Update

CORE confirms that JGN has provided updated data for the 2019 year, for Tariff V - residential and commercial customers, including both connection and demand data, in order to develop this Revised Submission. Further CORE confirms that the data is consistent in nature with that used to develop forecasts for the Original CORE submission and has been applied in a consistent manner by CORE to derive the Revised Submission.

This update resulted in an increase in residential and small business demand as referred to above.

CORE refers to the Revised Model which is included as Attachment 1.

4.1.2. HIA Data Update

CORE confirms that it has accessed and applied latest available HIA data to derive Revised Forecasts of Tariff V, Residential connections, including allocation between dwelling types (due to variable levels of gas consumption of each dwelling type). Further CORE confirms that it has applied this data in a manner consistent with the approach used to derive forecasts in the Original Submission.

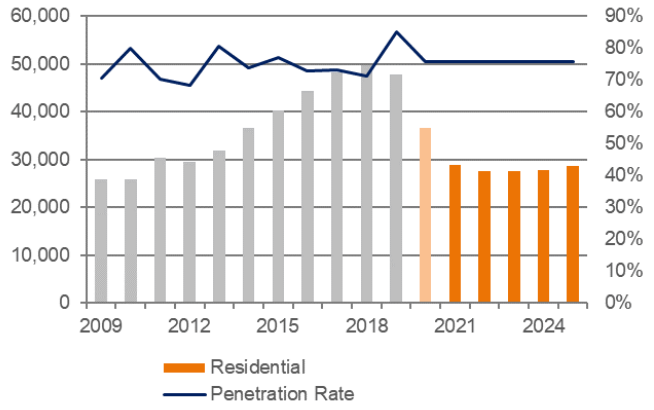
CORE refers to the Revised Model which is included as Attachment 1

4.2. Billing Data and Penetration Rate Explanation

4.2.1. Overview of Approach

- CORE's penetration rate (the proportion of new NSW dwellings which will connect to the JGN network) is based on two sets of data: actual connection data (for new homes, medium density, and individually metered high-rise connections) and estimates of the number of dwellings connected via JGN's volume boundary metering product.
- CORE takes the data and formats it to meet the requirements of CORE's analytical models.
- The final data by customer category is compared against the latest HIA data (by dwelling category) to arrive at the best estimate of Penetration rates for each customer type, across the JGN network
- CORE reiterates that there is a difference between the dwelling connection rate and the connection penetration rate due to the impact of VB connection type which serve multiple dwellings from one connection. The variance between the values, following the 2019 data update, is summarised below:

Figure 4.1 Residential Dwelling Connection Rate vs Connection Penetration Rate



4.2.1.1 High Rise Dwellings

JGN requested that Core provide assurance over the estimates of the number of dwellings and sites connected for each high-rise sub-segment. CORE was not asked to review annual connections as this data has been reported to the AER and audited by KMPG as part of JGN's RIN responses.

The high-rise subsegments are as follows:

- Volume boundary – sites with a single volume boundary meter.
- Instantaneous hot water – sites with individual gas meters for each dwelling.
- Centralised hot water – sites with individual metering for each dwelling (hot water meters or hot water and gas meters).
- Hybrid (volume boundary and centralised hot water) – sites which have both a volume boundary meter and individual hot water meters.

JGN's approach to estimating the number of dwellings and sites is to:

- Use billing data where there was a 1-1 relationship between the number of connections and dwellings or sites. For instance:
  - Each high-rise VI connection is for a single dwelling.
  - Each VB connection is for a single site.
- Supplement this data set JGN compiled data from connections applications to identify:
  - How many dwellings where supplied by each VB connection. JGN calculated this number by adding up the number of dwellings listed in each VB connection application.
  - How many sites were configured with individual gas or hot water and gas metering. JGN calculated this number by adding up the number of connection applications for these VI connections on the assumption that there is a single connection application for each site.
- Use billing information to identify:
  - Whether a VI connection was an instantaneous hot water site or a centralised hot water site. This was done by allocating connections based on whether there was a hot water read or not.
  - Whether a VB connection is a volume boundary or hybrid site based on connection application data. Where a VB connection was requested together with a VI connection which has a hot water read this VB connection was allocated to hybrid.

Table 4.1 Estimation methodology for the high-rise sub-segment

	Dwelling numbers	Number of sites
Volume boundary	Number of dwellings listed in each VB connection application	Number of VB connections where there was no associated VI connection with a hot water read
Instantaneous hot water	Number of high-rise VI connections without a hot water read	Number of connection applications for the associated VI connections
Centralised hot water	Number of high-rise VI connections with a hot water read	Number of connection applications for the associated VI connections
Hybrid (volume boundary and centralised hot water)	Number of high-rise VI connections	Number of VB connections where there was associated VI connection with a hot water read

4.2.2. CORE Conclusion

CORE has undertaken an interview with JGN team members responsible for the relevant data and undertaken a 'walk through' the process and has received relevant data to illustrate the process at a highly granular level.

CORE confirms that it has reviewed the approach to developing the assumed penetration rate, based on billing data and notes that dwelling numbers and connection numbers are consistent and has assessed the approach to be reasonable and consistent with rule 74(2) of the NGR.

The final penetration rates relied upon to develop the Revised Forecasts are included within the Revised Model in Attachment 1.

4.3. Reliance on One Year Lag on HIA Data for Residential Connection Forecasts

4.3.1. Introduction

CORE has considered all reasonable approaches in developing a forecast of dwelling completions, connections and thus penetration rates.

CORE has consistently adopted a one-year lag of HIA data (commencements) to derive an estimate of housing completions (the potential timing of connection) on the following basis:

- The HIA is one of few reputable data providers available in the Australian market. CORE has used other data from a specialist provider in the past and found results less accurate;
- 12 months is a prudent estimate of the time from commencement to completion of an 'average' dwelling (see below);
- This approach has been used and accepted in prior regulatory submissions;

- Reference to ABS data on average dwelling completion times in NSW[1]:
    - 7 quarters for new flats, units and apartments
    - 3 quarters for townhouses
    - 2-3 quarters for houses
- There is a statistically significant relationship between JGN connection data and HIA data with a one-year lag - see Attachment 2; and
- CORE is not aware of a suitable alternative which is consistent with rule 74(2) of the NGR.

4.3.2. Use of One Year Lag

Building starts are published by the Housing Industry Association (HIA) on a quarterly basis. Each release details the number of residential dwellings commenced during any given quarter, further detailing the housing type each dwelling commencement falls under. Core has established a lag period of 1 year between the listing of a dwelling commencement and the date at which a dwelling is first billed. This lag period has been determined based on the amount of time taken for a contractor to register a connection request, the installation of the inlet service by a sub-contractor followed by the request and subsequent installation of a gas meter.

Core has determined that the construction time of a new build is the most limiting factor when considering the time at which a gas meter may be installed.

Core recognises that each new dwelling commencement will vary in how long it takes to connect. With multistorey houses and apartment blocks taking considerably longer than a single-story build. Core has therefore investigated the complete range of timeframes quoted for new dwellings to be complete, occupiers moved in and consumption to be first billed. Without considering the pre-construction and planning stages of a new build, approximately 8 months of construction is estimated for single story houses in Australia[2] [3] [4] whilst estimates closer to 17months have been quoted for multistorey projects[5]. Research has suggested this 8-month low estimate has been rising in Australia from around 7 months during 2016[6]. Furthermore, the Australian government whilst not giving an estimated timeline quotes that, 'very few new builds fit within their timeliness' because of increasing council legislation, contractor and weather-related delays[7].

Considering the HIA data is annual, and the significant length of time taken for a housing start to reach a stage of development ready for a occupier to move in Core considers the aforementioned 1 year time lag to be the best estimate of the average time it takes to be installed following commencement and is considered a prudent assumption.

1https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/8752.0Feature%20Article3Jun%202019?opendocument&tabname=Summary&prodno=8752.0&issue=Jun%202019&num=&view=

2 https://www.homeloanexperts.com.au/home-loan-articles/stages-of-construction/

3 https://www.newhomesguide.com.au/articles/2016/12/20/average-build-time-for-a-house

4 https://www.novushomes.com.au/blog/how-long-does-it-take-build-new-home-perth

5 https://www.realestate.com.au/advice/long-take-build-house/

6 https://www.ruralcoproperty.com.au/2016/04/15/a-typical-timeline-for-how-long-it-takes-to-build-a-new-home/

7 https://www.yourhome.gov.au/you-begin/construction-process

4.3.3. Conclusion

CORE considers the use of HIA data and a one-year lag to be a prudent basis for deriving estimates of future residential connections and the estimates included with the Revised Model to be reasonable and consistent with Rule 74(2) of the NGR.

4.4. Suspended Connections (formerly Zero Consuming Meters)

The general description – suspended connections, relates to customers who have been suspended and therefore had their service suspended (physical suspension via a wad being inserted to prevent gas flow to the connection).

4.4.1. JGN Approach

During 2019, JGN and retailers agreed that network charges would cease 20 business days after suspension of a MIRN. This change was implemented in October 2019 and applies to MIRNS which had previously been suspended, and to MIRNS disconnected after that date. When a MIRN is reconnected, network charges resume from the date of reconnection. In preparing the demand forecast for JGN's Draft Proposal the label "zero-consuming MIRNS" or "ZCM" was used to refer to these MIRNs as gas cannot be consumed at the premises because the meter is locked or wadded. This label has been revised to suspended connections to avoid confusion.

In the context of the demand forecast, the following terminology is used:

1. "Suspended Disconnections" are MIRNS which have been suspended (typically through wadding or locking of the meter). Typically, the MIRN is disconnected at the request of the retailer due to non-payment, customer move-out or failure of the customer to set up a retail agreement.

2. "Disconnected MIRNS" are MIRNS which have been permanently disconnected (otherwise referred to as "abolished"). With these MIRNS, the service to the property is permanently removed (e.g. by isolation of the main in the street) and the MIRN is removed from the market.

The proposed 2020-2025 RSA submitted by JGN in June 2019 specifies that the MIRN would be removed from the Customer List and charges will cease 20 Business Days after suspension. Following consultation with retailers, JGN has agreed that the charges for the MIRN will cease from the date of suspension – this change will be reflected in the updated RSA which will be lodged as part of the response to the Draft Decision.

JGN considers that treatment of suspended connections not incurring network charge in this manner is consistent with the NGO because it improves the accuracy of the forecast on which reference tariffs are based.

4.4.2. Modelling approach

It should be noted that the estimation was undertaken by CORE based on information provided by JGN, relating to historical billing records, including analysis of MIRNS which were suspended (temporarily disconnected)..

The removal of MIRNS from network charges is different from the historical situation that applied prior to October 2019, where network charges continued to apply to sites which had been suspended.

CORE notes that the adjustment to 21,982 customers in 2019 related to customers that had already been suspended but the billing of fixed charges stopped in October. Therefore, adjustments were required for connections only and not total consumption.

Core has assessed the historical suspended connection data and identified that approximately 0.36% or 5,000+ customers (who previously used gas) become suspended each year and cease consuming gas. When this occurs in the future JGN will lose the load from the customer and stop billing fixed charges.

By way of illustration, CORE has identified 7,216 connections would have been suspended (for at least 20 days) at a point in time during 2018 financial year and 10,667 during the 2017 financial year. Further analysis indicates that approximately 0.36% of opening connections are expected to be suspended on average during a year.

4.4.3. Conclusion

CORE has undertaken a review of data provided by JGN, calculated the estimates to be included with the Revised Model and determines them to be reasonable and consistent with Rule 74(2) of the NGR.

4.5. Volume Boundary Meter Strategy

4.5.1. Background

The high-rise market can be dissected into the following segments:

- Volume boundary – sites with a single volume boundary meter.
- Instantaneous hot water – sites with individual gas meters for each dwelling.
- Centralised hot water – sites with individual metering for each dwelling (hot water meters or hot water and gas meters).
- Hybrid (volume boundary and centralised hot water) – sites which have both a volume boundary meter and individual hot water meters.

The proportion of high-rise sub-segments can be forecast by analysing the trends observed over the last three years (since JGN's volume boundary metering product was introduced) and by taking into account the factors influencing developer decision making.

Over the last three years there has been a steady rise in the number of dwellings taking up the volume boundary product. The proportion of high-rise dwellings utilising volume boundary has risen by 14% in 2017 to 51% in 2019. There has also been a reduction in the proportion of dwellings being supplied with individual hot water meters (centralised hot water and hybrid sites combined) – from 59% to 41% over the same time period.

The number of high-rise sites with instantaneous hot water systems has also fallen from 26% in 2017 to 9% in 2019. It is thought this may be due to embedders increasingly marketing their product to smaller sites as well as changes to the Australian Standards around the ventilation requirements of gas hot water heaters on balconies.

The gradual increase in the take-up of the volume boundary product is consistent with high-rise construction timelines where projects can take anywhere from 2-5 years to construct[8]. Although the volume boundary product was available from 2016 many

[8] https://rba.gov.au/publications/bulletin/2017/jun/pdf/bu-0617-1-houses-and-apartments-in-australia.pdf

of the developments completed in 2017 and 2018 had already made their design decisions by 2016 and could not take advantage of the volume boundary product.

JGN expects the proportion of dwellings supplied via volume boundary metering to continue to increase as developers communicate and demonstrate that they are motivated by associated reduction in construction costs and space savings, relative to individual hot water metering.

Based on the observed historical trends and the latest market developments Core forecasts that:

- the proportion of Instantaneous hot water dwellings will continue to fall (following a demonstrated historical trend), from 9% to 5% by 2021, after which time the percentage is expected to remain relatively constant;
- the proportion of centralised hot water dwellings will fall to 5% as only a minority of developers will opt to install individual hot water metering;
- the number of hybrid sites will fall to 1%, reflecting the historic ratio of hybrid to centralised hot water sites; and
- the residual number of sites (89% by 2022) will be supplied by volume boundary metering.

4.6. Independent assurance on updates as well as validating key inputs are fit for purpose

CORE has completed an independent assessment of the JGN data used to develop updates of the forecasts of both Tariff V (Residential and Commercial) connection and demand and other input data (including third party).

CORE has undertaken a review of the adjustment to the model by the AER referred to in its Draft Decision and observed that the change in demand is as expected. In this regard CORE notes a number of interrelations between elements of the model.

CORE confirms that the JGN data used is reasonable and the other input data is fit for purpose.

Attachment 1 - Revised Model

Attachment 2 | Statistical Analysis – HIA One Year Lag Relationship with JGN Connections

Statistics/Data Analysis

```
      name:  <unnamed>
       log:  S:\Cameron Kirkpatrick\HIA lag\HIA_lags.smcl
  log type:  smcl
 opened on:  10 Dec 2019, 09:32:20

1 . insheet using "S:\Cameron Kirkpatrick\HIA lag\HIA_lags.csv"
  (12 vars, 11 obs)

2 . tabulate year

       year |      Freq.     Percent        Cum.
------------+-----------------------------------
       2009 |          1        9.09        9.09
       2010 |          1        9.09       18.18
       2011 |          1        9.09       27.27
       2012 |          1        9.09       36.36
       2013 |          1        9.09       45.45
       2014 |          1        9.09       54.55
       2015 |          1        9.09       63.64
       2016 |          1        9.09       72.73
       2017 |          1        9.09       81.82
       2018 |          1        9.09       90.91
       2019 |          1        9.09      100.00
------------+-----------------------------------
      Total |         11      100.00

3 . gen time = _n

4 . tsset year
        time variable:  year, 2009 to 2019
                delta:  1 unit

5 .
6 . *all categories of HIA forecast regressed against JGN recorded connections
7 . reg jgn a

      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =     50.46
       Model |  1.4726e+09         1  1.4726e+09   Prob > F        =    0.0001
    Residual |   262666895         9  29185210.6   R-squared       =    0.8486
-------------+----------------------------------   Adj R-squared   =    0.8318
       Total |  1.7353e+09        10   173525941   Root MSE        =    5402.3

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           a |   1.924004   .2708607     7.10   0.000     1.311274    2.536733
       _cons |  -2842.548   6268.832    -0.45   0.661    -17023.63    11338.53
------------------------------------------------------------------------------

8 . estat ic

  Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         11 -119.4292  -109.0451       2    222.0902    222.886
-----------------------------------------------------------------------------
               Note:  N=Obs used in calculating BIC; see [R] BIC note
```

```
9 . reg jgn b

      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =      3.23
       Model |  457820739         1  457820739   Prob > F        =    0.1061
    Residual |  1.2774e+09         9  141937630   R-squared       =    0.2638
-------------+----------------------------------   Adj R-squared   =    0.1820
       Total |  1.7353e+09        10  173525941   Root MSE        =     11914

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           b |   10.56486    5.88254     1.80   0.106    -2.742368    23.87209
       _cons |   13300.52   15379.34     0.86   0.410    -21489.96    48091.01
------------------------------------------------------------------------------

10. estat ic

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         11 -119.4292  -117.7446       2    239.4892   240.2849
-----------------------------------------------------------------------------
               Note: N=Obs used in calculating BIC; see [R] BIC note

11. reg jgn c

      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =    194.00
       Model |  1.6583e+09         1  1.6583e+09   Prob > F        =    0.0000
    Residual |  76933899.2         9  8548211.02   R-squared       =    0.9557
-------------+----------------------------------   Adj R-squared   =    0.9507
       Total |  1.7353e+09        10  173525941   Root MSE        =    2923.7

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           c |   7.776538   .5583275    13.93   0.000     6.513513    9.039562
       _cons |   9797.053    2351.27     4.17   0.002     4478.111    15115.99
------------------------------------------------------------------------------

12. estat ic

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         11 -119.4292  -102.2914       2    208.5828   209.3786
-----------------------------------------------------------------------------
               Note: N=Obs used in calculating BIC; see [R] BIC note

13. reg jgn d

      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =      2.54
       Model |  381490843         1  381490843   Prob > F        =    0.1457
    Residual |  1.3538e+09         9  150418730   R-squared       =    0.2198
-------------+----------------------------------   Adj R-squared   =    0.1332
       Total |  1.7353e+09        10  173525941   Root MSE        =     12265

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           d |  -7.262075    4.56005    -1.59   0.146    -17.57762    3.053475
       _cons |   50153.94    7285.37     6.88   0.000     33673.29    66634.59
------------------------------------------------------------------------------
```

14. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-118.0638**	**2**	**240.1275**	**240.9233**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

15. reg jgn e

Source	SS	df	MS
Model	**305460712**	**1**	**305460712**
Residual	**1.4298e+09**	**9**	**158866522**
Total	**1.7353e+09**	**10**	**173525941**

Number of obs	=	**11**
F(1, 9)	=	**1.92**
Prob > F	=	**0.1989**
R-squared	=	**0.1760**
Adj R-squared	=	**0.0845**
Root MSE	=	**12604**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
e	**19.74597**	**14.24023**	**1.39**	**0.199**	**-12.46767**	**51.95961**
_cons	**19434.86**	**15420.11**	**1.26**	**0.239**	**-15447.84**	**54317.57**

16. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-118.3643**	**2**	**240.7286**	**241.5244**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

17. reg jgn f

Source	SS	df	MS
Model	**1.2373e+09**	**1**	**1.2373e+09**
Residual	**497921736**	**9**	**55324637.4**
Total	**1.7353e+09**	**10**	**173525941**

Number of obs	=	**11**
F(1, 9)	=	**22.37**
Prob > F	=	**0.0011**
R-squared	=	**0.7131**
Adj R-squared	=	**0.6812**
Root MSE	=	**7438.1**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
f	**1.08289**	**.2289809**	**4.73**	**0.001**	**.5648987**	**1.60088**
_cons	**20821.98**	**4663.224**	**4.47**	**0.002**	**10273.03**	**31370.92**

18. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-112.5626**	**2**	**229.1253**	**229.9211**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

19. reg jgn g

```
      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =     49.53
       Model |  1.4684e+09         1  1.4684e+09   Prob > F        =    0.0001
    Residual |   266820727         9  29646747.4   R-squared       =    0.8462
-------------+----------------------------------   Adj R-squared   =    0.8292
       Total |  1.7353e+09        10   173525941   Root MSE        =    5444.9

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           g |   1.923994   .2733785     7.04   0.000     1.305569    2.542419
       _cons |   -2907.05   6335.384    -0.46   0.657    -17238.68    11424.59
------------------------------------------------------------------------------
```

20. estat ic

Akaike's information criterion and Bayesian information criterion

```
-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         11 -119.4292  -109.1314       2    222.2628   223.0586
-----------------------------------------------------------------------------
               Note: N=Obs used in calculating BIC; see [R] BIC note
```

21. reg jgn h

```
      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =     22.38
       Model |  1.2376e+09         1  1.2376e+09   Prob > F        =    0.0011
    Residual |   497631674         9  55292408.3   R-squared       =    0.7132
-------------+----------------------------------   Adj R-squared   =    0.6814
       Total |  1.7353e+09        10   173525941   Root MSE        =    7435.9

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           h |   .9056124   .1914168     4.73   0.001     .4725975    1.338627
       _cons |   15141.06   5743.309     2.64   0.027     2148.787    28133.32
------------------------------------------------------------------------------
```

22. estat ic

Akaike's information criterion and Bayesian information criterion

```
-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         11 -119.4292  -112.5594       2    229.1189   229.9147
-----------------------------------------------------------------------------
               Note: N=Obs used in calculating BIC; see [R] BIC note
```

23. reg jgn total

```
      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =     29.98
       Model |  1.3346e+09         1  1.3346e+09   Prob > F        =    0.0004
    Residual |   400698283         9  44522031.5   R-squared       =    0.7691
-------------+----------------------------------   Adj R-squared   =    0.7434
       Total |  1.7353e+09        10   173525941   Root MSE        =    6672.5

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       total |   .6266005   .1144482     5.47   0.000     .3677007    .8855003
       _cons |   8823.294   6066.456     1.45   0.180    -4899.983    22546.57
------------------------------------------------------------------------------
```

24. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-111.3679**	**2**	**226.7357**	**227.5315**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

25.
26. *all except bde providing a signficant relationship
27. *note AIC indicators significantly higher than in later model structures
28.
29. reg jgn a

Source	SS	df	MS
Model	**1.4726e+09**	**1**	**1.4726e+09**
Residual	**262666895**	**9**	**29185210.6**
Total	**1.7353e+09**	**10**	**173525941**

Number of obs	=	**11**
F(1, 9)	=	**50.46**
Prob > F	=	**0.0001**
R-squared	=	**0.8486**
Adj R-squared	=	**0.8318**
Root MSE	=	**5402.3**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
a	**1.924004**	**.2708607**	**7.10**	**0.000**	**1.311274**	**2.536733**
_cons	**-2842.548**	**6268.832**	**-0.45**	**0.661**	**-17023.63**	**11338.53**

30. estat hettest

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of jgn

         chi2(1)      =     0.94
         Prob > chi2  =   0.3329
```

31. estat imtest, white

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(2)      =     0.80
         Prob > chi2  =   0.6711
```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	**0.80**	**2**	**0.6711**
Skewness	**4.52**	**1**	**0.0336**
Kurtosis	**0.29**	**1**	**0.5921**
Total	**5.60**	**4**	**0.2310**

32. dwstat

Durbin-Watson d-statistic(**2**,   **11**) = **1.357518**

33. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	**0.020**	**1**	**0.8878**

H0: no serial correlation

34. estat bgodfrey, lags(2)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
2	**0.091**	**2**	**0.9557**

H0: no serial correlation

35. estat ovtest

```
Ramsey RESET test using powers of the fitted values of jgn
       Ho:  model has no omitted variables
                  F(3, 6) =      1.39
                 Prob > F =      0.3329
```

36. estat vif

Variable	VIF	1/VIF
a	**1.00**	**1.000000**
Mean VIF	**1.00**	

37. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-109.0451**	**2**	**222.0902**	**222.886**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

38.
39. reg jgn c

Source	SS	df	MS
Model	**1.6583e+09**	**1**	**1.6583e+09**
Residual	**76933899.2**	**9**	**8548211.02**
Total	**1.7353e+09**	**10**	**173525941**

```
Number of obs =       11
F(  1,      9) =  194.00
Prob > F       =  0.0000
R-squared      =  0.9557
Adj R-squared =  0.9507
Root MSE       =  2923.7
```

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
c	**7.776538**	**.5583275**	**13.93**	**0.000**	**6.513513**	**9.039562**
_cons	**9797.053**	**2351.27**	**4.17**	**0.002**	**4478.111**	**15115.99**

```
40. estat hettest

  Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
           Ho: Constant variance
           Variables: fitted values of jgn

           chi2(1)      =     0.40
           Prob > chi2  =   0.5267

41. estat imtest, white

  White's test for Ho: homoskedasticity
           against Ha: unrestricted heteroskedasticity

           chi2(2)      =      1.53
           Prob > chi2  =    0.4642

  Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	1.53	2	0.4642
Skewness	0.38	1	0.5402
Kurtosis	1.74	1	0.1876
Total	3.65	4	0.4560

```
42. dwstat

  Durbin-Watson d-statistic(  2,    11) =  2.427626

43. estat bgodfrey, lags(1)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	1.121	1	0.2897

```
                         H0: no serial correlation

44. estat bgodfrey, lags(2)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
2	1.123	2	0.5702

```
                         H0: no serial correlation

45. estat ovtest

  Ramsey RESET test using powers of the fitted values of jgn
         Ho:  model has no omitted variables
                   F(3, 6) =      0.61
                  Prob > F =      0.6342
```

```
46. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
           c |      1.00    1.000000
-------------+----------------------
    Mean VIF |      1.00

47. estat ic

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         11 -119.4292  -102.2914       2    208.5828   209.3786
-----------------------------------------------------------------------------
               Note:  N=Obs used in calculating BIC; see [R] BIC note

48.
49. reg jgn f

      Source |       SS           df       MS      Number of obs   =        11
-------------+----------------------------------   F(1, 9)         =     22.37
       Model |  1.2373e+09         1  1.2373e+09   Prob > F        =    0.0011
    Residual |   497921736         9  55324637.4   R-squared       =    0.7131
-------------+----------------------------------   Adj R-squared   =    0.6812
       Total |  1.7353e+09        10   173525941   Root MSE        =    7438.1

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           f |    1.08289   .2289809     4.73   0.001     .5648987     1.60088
       _cons |   20821.98   4663.224     4.47   0.002     10273.03    31370.92
------------------------------------------------------------------------------

50. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of jgn

         chi2(1)      =     1.74
         Prob > chi2  =   0.1869

51. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(2)      =     2.03
         Prob > chi2  =    0.3618

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df      p
---------------------+-----------------------------
  Heteroskedasticity |       2.03      2    0.3618
            Skewness |       2.51      1    0.1133
            Kurtosis |       2.68      1    0.1015
---------------------+-----------------------------
               Total |       7.22      4    0.1245
---------------------------------------------------
```

52. dwstat

Durbin-Watson d-statistic(**2**,   **11**) = **.6638264**

53. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	**7.003**	**1**	**0.0081**

H0: no serial correlation

54. estat bgodfrey, lags(2)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
2	**7.123**	**2**	**0.0284**

H0: no serial correlation

55. estat ovtest

```
Ramsey RESET test using powers of the fitted values of jgn
       Ho:  model has no omitted variables
                 F(3, 6) =      0.43
                 Prob > F =      0.7390
```

56. estat vif

Variable	VIF	1/VIF
f	**1.00**	**1.000000**
Mean VIF	**1.00**	

57. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-112.5626**	**2**	**229.1253**	**229.9211**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

58.
59. reg jgn g

Source	SS	df	MS
Model	**1.4684e+09**	**1**	**1.4684e+09**
Residual	**266820727**	**9**	**29646747.4**
Total	**1.7353e+09**	**10**	**173525941**

```
Number of obs =        11
F(  1,      9) =     49.53
Prob > F      =    0.0001
R-squared     =    0.8462
Adj R-squared =    0.8292
Root MSE      =    5444.9
```

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
g	**1.923994**	**.2733785**	**7.04**	**0.000**	**1.305569**	**2.542419**
_cons	**-2907.05**	**6335.384**	**-0.46**	**0.657**	**-17238.68**	**11424.59**

```
60. estat hettest

  Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
           Ho: Constant variance
           Variables: fitted values of jgn

           chi2(1)      =     0.92
           Prob > chi2  =   0.3381

61. estat imtest, white

  White's test for Ho: homoskedasticity
           against Ha: unrestricted heteroskedasticity

           chi2(2)      =      0.80
           Prob > chi2  =    0.6694

  Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	**0.80**	**2**	**0.6694**
Skewness	**4.44**	**1**	**0.0351**
Kurtosis	**0.20**	**1**	**0.6512**
Total	**5.45**	**4**	**0.2446**

```
62. dwstat

  Durbin-Watson d-statistic(  2,    11) =  1.381133

63. estat bgodfrey, lags(1)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	**0.008**	**1**	**0.9275**

H0: no serial correlation

```
64. estat bgodfrey, lags(2)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
2	**0.113**	**2**	**0.9449**

H0: no serial correlation

```
65. estat ovtest

  Ramsey RESET test using powers of the fitted values of jgn
         Ho:  model has no omitted variables
                    F(3, 6) =      1.52
                   Prob > F =      0.3018
```

66. estat vif

Variable	VIF	1/VIF
g	**1.00**	**1.000000**
Mean VIF	**1.00**	

67. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-109.1314**	**2**	**222.2628**	**223.0586**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

68.
69. reg jgn h

Source	SS	df	MS
Model	**1.2376e+09**	**1**	**1.2376e+09**
Residual	**497631674**	**9**	**55292408.3**
Total	**1.7353e+09**	**10**	**173525941**

```
Number of obs =      11
F(  1,     9) =   22.38
Prob > F      =  0.0011
R-squared     =  0.7132
Adj R-squared =  0.6814
Root MSE      =  7435.9
```

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
h	**.9056124**	**.1914168**	**4.73**	**0.001**	**.4725975**	**1.338627**
_cons	**15141.06**	**5743.309**	**2.64**	**0.027**	**2148.787**	**28133.32**

70. estat hettest

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of jgn

         chi2(1)      =     1.43
         Prob > chi2  =   0.2319
```

71. estat imtest, white

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(2)      =     1.79
         Prob > chi2  =    0.4091
```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	**1.79**	**2**	**0.4091**
Skewness	**2.44**	**1**	**0.1180**
Kurtosis	**2.70**	**1**	**0.1003**
Total	**6.93**	**4**	**0.1395**

72. dwstat

Durbin-Watson d-statistic(**2**, **11**) = **.8948624**

73. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	**2.202**	**1**	**0.1378**

H0: no serial correlation

74. estat bgodfrey, lags(2)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
2	**2.206**	**2**	**0.3318**

H0: no serial correlation

75. estat ovtest

```
Ramsey RESET test using powers of the fitted values of jgn
       Ho:  model has no omitted variables
                 F(3, 6) =      0.67
                Prob > F =      0.6014
```

76. estat vif

Variable	VIF	1/VIF
h	**1.00**	**1.000000**
Mean VIF	**1.00**	

77. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**11**	**-119.4292**	**-112.5594**	**2**	**229.1189**	**229.9147**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

78.
79. reg jgn total

Source	SS	df	MS
Model	**1.3346e+09**	**1**	**1.3346e+09**
Residual	**400698283**	**9**	**44522031.5**
Total	**1.7353e+09**	**10**	**173525941**

```
Number of obs =       11
F(  1,      9) =   29.98
Prob > F       =  0.0004
R-squared      =  0.7691
Adj R-squared =  0.7434
Root MSE       =  6672.5
```

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
total	**.6266005**	**.1144482**	**5.47**	**0.000**	**.3677007**	**.8855003**
_cons	**8823.294**	**6066.456**	**1.45**	**0.180**	**-4899.983**	**22546.57**

```
80. estat hettest

  Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
           Ho: Constant variance
           Variables: fitted values of jgn

           chi2(1)      =     1.57
           Prob > chi2  =   0.2097

81. estat imtest, white

  White's test for Ho: homoskedasticity
           against Ha: unrestricted heteroskedasticity

           chi2(2)      =      1.43
           Prob > chi2  =    0.4885

  Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	**1.43**	**2**	**0.4885**
Skewness	**2.97**	**1**	**0.0849**
Kurtosis	**2.61**	**1**	**0.1064**
Total	**7.01**	**4**	**0.1355**

```
82. dwstat

  Durbin-Watson d-statistic(  2,    11) =  1.007931

83. estat bgodfrey, lags(1)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	**1.138**	**1**	**0.2860**

H0: no serial correlation

```
84. estat bgodfrey, lags(2)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
2	**1.171**	**2**	**0.5568**

H0: no serial correlation

```
85. estat ovtest

  Ramsey RESET test using powers of the fitted values of jgn
         Ho:  model has no omitted variables
                    F(3, 6) =      0.59
                   Prob > F =      0.6443
```

86. estat vif

Variable	VIF	1/VIF
total	1.00	1.000000
Mean VIF	1.00	

87. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	11	-119.4292	-111.3679	2	226.7357	227.5315

Note: N=Obs used in calculating BIC; see **[R] BIC note**

88.
89. *no autocoreelation or heterskedasticity detected causing false possitive relationsh
> ips in those HIA categories providing signifcant predictions of JGN dwellings
90.
91. reg jgn L1.a

Source	SS	df	MS
Model	1.5113e+09	1	1.5113e+09
Residual	51619469	8	6452433.63
Total	1.5630e+09	9	173662406

Number of obs	=	10
F(1, 8)	=	234.23
Prob > F	=	0.0000
R-squared	=	0.9670
Adj R-squared	=	0.9628
Root MSE	=	2540.2

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
a						
L1.	2.078286	.1357956	15.30	0.000	1.765141	2.391431
_cons	-3667.671	3052.884	-1.20	0.264	-10707.64	3372.293

92. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	10	-108.5257	-91.47351	2	186.947	187.5522

Note: N=Obs used in calculating BIC; see **[R] BIC note**

93. reg jgn L1.b

Source	SS	df	MS
Model	695765079	1	695765079
Residual	867196574	8	108399572
Total	1.5630e+09	9	173662406

Number of obs	=	10
F(1, 8)	=	6.42
Prob > F	=	0.0351
R-squared	=	0.4452
Adj R-squared	=	0.3758
Root MSE	=	10412

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
b						
L1.	13.03288	5.14426	2.53	0.035	1.170196	24.89556
_cons	8370.548	13449.9	0.62	0.551	-22644.97	39386.07

94. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-105.5803**	**2**	**215.1607**	**215.7659**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

95. reg jgn L1.c

Source	SS	df	MS
Model	**1.4953e+09**	**1**	**1.4953e+09**
Residual	**67663087.5**	**8**	**8457885.93**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs =	**10**
F(1, 8) =	**176.79**
Prob > F =	**0.0000**
R-squared =	**0.9567**
Adj R-squared =	**0.9513**
Root MSE =	**2908.2**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
c						
L1.	**8.762547**	**.6590181**	**13.30**	**0.000**	**7.242849**	**10.28225**
_cons	**9554.412**	**2566.185**	**3.72**	**0.006**	**3636.78**	**15472.04**

96. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-92.82672**	**2**	**189.6534**	**190.2586**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

97. reg jgn L1.d

Source	SS	df	MS
Model	**102034323**	**1**	**102034323**
Residual	**1.4609e+09**	**8**	**182615916**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs =	**10**
F(1, 8) =	**0.56**
Prob > F =	**0.4762**
R-squared =	**0.0653**
Adj R-squared =	**-0.0516**
Root MSE =	**13514**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d						
L1.	**-3.863883**	**5.169161**	**-0.75**	**0.476**	**-15.78399**	**8.056225**
_cons	**46960.53**	**8568.703**	**5.48**	**0.001**	**27201.06**	**66719.99**

98. estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-108.1881**	**2**	**220.3763**	**220.9815**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

99. reg jgn L1.e

Source	SS	df	MS
Model	879747393	1	879747393
Residual	683214259	8	85401782.4
Total	1.5630e+09	9	173662406

Number of obs =	10
F(1, 8) =	10.30
Prob > F =	0.0124
R-squared =	0.5629
Adj R-squared =	0.5082
Root MSE =	9241.3

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
e						
L1.	34.58198	10.77468	3.21	0.012	9.735526	59.42843
_cons	4395.808	11896.65	0.37	0.721	-23037.93	31829.54

100 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	10	-108.5257	-104.3881	2	212.7761	213.3813

Note: N=Obs used in calculating BIC; see **[R] BIC note**

101 reg jgn L1.f

Source	SS	df	MS
Model	1.4201e+09	1	1.4201e+09
Residual	142829485	8	17853685.6
Total	1.5630e+09	9	173662406

Number of obs =	10
F(1, 8) =	79.54
Prob > F =	0.0000
R-squared =	0.9086
Adj R-squared =	0.8972
Root MSE =	4225.4

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
f						
L1.	1.175877	.1318443	8.92	0.000	.8718434	1.479911
_cons	21007.32	2649.166	7.93	0.000	14898.33	27116.31

102 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	10	-108.5257	-96.56227	2	197.1245	197.7297

Note: N=Obs used in calculating BIC; see **[R] BIC note**

103 reg jgn L1.g

Source	SS	df	MS
Model	1.5125e+09	1	1.5125e+09
Residual	50466139.5	8	6308267.44
Total	1.5630e+09	9	173662406

Number of obs =	10
F(1, 8) =	239.76
Prob > F =	0.0000
R-squared =	0.9677
Adj R-squared =	0.9637
Root MSE =	2511.6

```
------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           g |
         L1. |   2.081689   .1344386    15.48   0.000     1.771673    2.391705
             |
       _cons |  -3814.964   3026.693    -1.26   0.243    -10794.53    3164.603
------------------------------------------------------------------------------
```

104 estat ic

```
Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         10 -108.5257  -91.36053       2    186.7211   187.3262
-----------------------------------------------------------------------------
               Note:  N=Obs used in calculating BIC; see [R] BIC note
```

105 reg jgn L1.h

```
      Source |       SS           df       MS      Number of obs   =        10
-------------+----------------------------------   F(1, 8)         =    113.52
       Model |  1.4601e+09         1  1.4601e+09   Prob > F        =    0.0000
    Residual |   102895128         8  12861890.9   R-squared       =    0.9342
-------------+----------------------------------   Adj R-squared   =    0.9259
       Total |  1.5630e+09         9   173662406   Root MSE        =    3586.3

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           h |
         L1. |   .9990346   .0937663    10.65   0.000     .7828092     1.21526
             |
       _cons |   14459.14   2772.031     5.22   0.001     8066.827    20851.46
------------------------------------------------------------------------------
```

106 estat ic

```
Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |         10 -108.5257  -94.92256       2    193.8451   194.4503
-----------------------------------------------------------------------------
               Note:  N=Obs used in calculating BIC; see [R] BIC note
```

107 reg jgn L1.total

```
      Source |       SS           df       MS      Number of obs   =        10
-------------+----------------------------------   F(1, 8)         =    165.26
       Model |  1.4908e+09         1  1.4908e+09   Prob > F        =    0.0000
    Residual |  72165738.6         8  9020717.32   R-squared       =    0.9538
-------------+----------------------------------   Adj R-squared   =    0.9481
       Total |  1.5630e+09         9   173662406   Root MSE        =    3003.5

------------------------------------------------------------------------------
         jgn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       total |
         L1. |   .6813358   .0529996    12.86   0.000     .5591185    .8035531
             |
       _cons |   8227.573   2750.302     2.99   0.017     1885.366    14569.78
------------------------------------------------------------------------------
```

```
108 estat hettest

  Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
           Ho: Constant variance
           Variables: fitted values of jgn

           chi2(1)      =     4.74
           Prob > chi2  =   0.0295

109 estat imtest, white

  White's test for Ho: homoskedasticity
           against Ha: unrestricted heteroskedasticity

           chi2(2)      =      3.65
           Prob > chi2  =    0.1611

  Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	3.65	2	0.1611
Skewness	6.06	1	0.0138
Kurtosis	2.65	1	0.1036
Total	12.36	4	0.0149

```
110 dwstat

  Durbin-Watson d-statistic(  2,    10) =  1.685001

111 estat bgodfrey, lags(1)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	1.401	1	0.2366

H0: no serial correlation

```
112 estat bgodfrey, lags(2)

  Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
2	2.471	2	0.2906

H0: no serial correlation

```
113 estat ovtest

  Ramsey RESET test using powers of the fitted values of jgn
         Ho:  model has no omitted variables
                   F(3, 5) =      0.18
                  Prob > F =      0.9089
```

114 estat vif

Variable	VIF	1/VIF
total L1.	**1.00**	**1.000000**
Mean VIF	**1.00**	

115 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-93.14884**	**2**	**190.2977**	**190.9028**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

116 *All 1 year lags provide signficant forecasts of JGN commencements (other than D)
117 *note that range of AIC value is small, but A,G,H providing the best comparitive pow
  > er
118 *AIC is lower than in all unlagged regressions
119
120 reg jgn a L1.a

Source	SS	df	MS
Model	**1.5114e+09**	**2**	**755678965**
Residual	**51603723.5**	**7**	**7371960.5**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs	=	**10**
F(2, 7)	=	**102.51**
Prob > F	=	**0.0000**
R-squared	=	**0.9670**
Adj R-squared	=	**0.9576**
Root MSE	=	**2715.1**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
a						
--.	**-.0206535**	**.4468967**	**-0.05**	**0.964**	**-1.077396**	**1.036089**
L1.	**2.096582**	**.4216519**	**4.97**	**0.002**	**1.099534**	**3.09363**
_cons	**-3584.61**	**3725.377**	**-0.96**	**0.368**	**-12393.73**	**5224.507**

121 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-91.47198**	**3**	**188.944**	**189.8517**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

122 reg jgn b L1.b

Source	SS	df	MS
Model	**924625611**	**2**	**462312805**
Residual	**638336042**	**7**	**91190863.1**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs	=	**10**
F(2, 7)	=	**5.07**
Prob > F	=	**0.0435**
R-squared	=	**0.5916**
Adj R-squared	=	**0.4749**
Root MSE	=	**9549.4**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
b						
--.	8.524357	5.380862	1.58	0.157	-4.19936	21.24807
L1.	12.42297	4.733972	2.62	0.034	1.228909	23.61704
_cons	-12537.35	18065.51	-0.69	0.510	-55255.49	30180.79

123 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	10	-108.5257	-104.0483	3	214.0967	215.0044

Note: N=Obs used in calculating BIC; see **[R] BIC note**

124 reg jgn c L1.c

Source	SS	df	MS
Model	1.5259e+09	2	762943343
Residual	37074966.2	7	5296423.75
Total	1.5630e+09	9	173662406

Number of obs	=	10
F(2, 7)	=	144.05
Prob > F	=	0.0000
R-squared	=	0.9763
Adj R-squared	=	0.9695
Root MSE	=	2301.4

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
c						
--.	3.749656	1.560294	2.40	0.047	.0601474	7.439165
L1.	4.763389	1.743917	2.73	0.029	.6396804	8.887099
_cons	8824.7	2053.288	4.30	0.004	3969.445	13679.95

125 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	10	-108.5257	-89.81872	3	185.6374	186.5452

Note: N=Obs used in calculating BIC; see **[R] BIC note**

126 reg jgn d L1.d

Source	SS	df	MS
Model	809119140	2	404559570
Residual	753842513	7	107691788
Total	1.5630e+09	9	173662406

Number of obs	=	10
F(2, 7)	=	3.76
Prob > F	=	0.0779
R-squared	=	0.5177
Adj R-squared	=	0.3799
Root MSE	=	10377

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d						
--.	-10.49065	4.094097	-2.56	0.037	-20.17166	-.8096536
L1.	-5.89042	4.047576	-1.46	0.189	-15.46142	3.680577
_cons	65057.48	9652.881	6.74	0.000	42232.04	87882.91

127 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-104.8799**	**3**	**215.7599**	**216.6676**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

128 reg jgn e L1.e

Source	SS	df	MS
Model	**922461923**	**2**	**461230962**
Residual	**640499730**	**7**	**91499961.4**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs = **10**
F(2, 7) = **5.04**
Prob > F = **0.0441**
R-squared = **0.5902**
Adj R-squared = **0.4731**
Root MSE = **9565.6**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
e						
--.	**8.340249**	**12.2068**	**0.68**	**0.516**	**-20.52424**	**37.20473**
L1.	**30.72207**	**12.50195**	**2.46**	**0.044**	**1.159642**	**60.28449**
_cons	**-139.2802**	**13989.06**	**-0.01**	**0.992**	**-33218.14**	**32939.58**

129 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-104.0653**	**3**	**214.1305**	**215.0383**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

130 reg jgn f L1.f

Source	SS	df	MS
Model	**1.4357e+09**	**2**	**717871485**
Residual	**127218684**	**7**	**18174097.7**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs = **10**
F(2, 7) = **39.50**
Prob > F = **0.0002**
R-squared = **0.9186**
Adj R-squared = **0.8953**
Root MSE = **4263.1**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
f						
--.	**-.3268195**	**.352632**	**-0.93**	**0.385**	**-1.160662**	**.5070228**
L1.	**1.448472**	**.322807**	**4.49**	**0.003**	**.6851548**	**2.211789**
_cons	**22547.8**	**3147.502**	**7.16**	**0.000**	**15105.14**	**29990.46**

131 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-95.98355**	**3**	**197.9671**	**198.8749**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

132 reg jgn g L1.g

Source	SS	df	MS
Model	**1.5125e+09**	**2**	**756253335**
Residual	**50454983**	**7**	**7207854.71**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs	=	**10**
F(2, 7)	=	**104.92**
Prob > F	=	**0.0000**
R-squared	=	**0.9677**
Adj R-squared	=	**0.9585**
Root MSE	=	**2684.7**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
g						
--.	**-.0171794**	**.4366634**	**-0.04**	**0.970**	**-1.049724**	**1.015365**
L1.	**2.096862**	**.4115575**	**5.09**	**0.001**	**1.123683**	**3.070041**
_cons	**-3744.812**	**3694.156**	**-1.01**	**0.344**	**-12480.1**	**4990.478**

133 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-91.35942**	**3**	**188.7188**	**189.6266**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

134 reg jgn h L1.h

Source	SS	df	MS
Model	**1.4707e+09**	**2**	**735368116**
Residual	**92225419.9**	**7**	**13175060**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs	=	**10**
F(2, 7)	=	**55.82**
Prob > F	=	**0.0000**
R-squared	=	**0.9410**
Adj R-squared	=	**0.9241**
Root MSE	=	**3629.7**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
h						
--.	**-.214174**	**.2379944**	**-0.90**	**0.398**	**-.7769413**	**.3485933**
L1.	**1.172176**	**.2145307**	**5.46**	**0.001**	**.6648919**	**1.679461**
_cons	**16070.29**	**3328.148**	**4.83**	**0.002**	**8200.47**	**23940.11**

135 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-94.37519**	**3**	**194.7504**	**195.6581**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

136 reg jgn total L1.total

Source	SS	df	MS
Model	**1.4991e+09**	**2**	**749573725**
Residual	**63814203.9**	**7**	**9116314.84**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs	=	**10**
F(2, 7)	=	**82.22**
Prob > F	=	**0.0000**
R-squared	=	**0.9592**
Adj R-squared	=	**0.9475**
Root MSE	=	**3019.3**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
total						
--.	**-.1428118**	**.1492075**	**-0.96**	**0.370**	**-.4956314**	**.2100078**
L1.	**.8008558**	**.135764**	**5.90**	**0.001**	**.4798248**	**1.121887**
_cons	**9918.89**	**3281.284**	**3.02**	**0.019**	**2159.886**	**17677.89**

137 estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of jgn

chi2(**1**) = **1.76**
Prob > chi2 = **0.1842**

138 estat imtest, white

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

chi2(**5**) = **9.39**
Prob > chi2 = **0.0944**

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	**9.39**	**5**	**0.0944**
Skewness	**8.93**	**2**	**0.0115**
Kurtosis	**0.09**	**1**	**0.7643**
Total	**18.42**	**8**	**0.0183**

139 dwstat

Durbin-Watson d-statistic(**3**, **10**) = **2.083126**

140 estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	**1.899**	**1**	**0.1682**

H0: no serial correlation

141 estat bgodfrey, lags(2)

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
2	**3.526**	**2**	**0.1715**

H0: no serial correlation

142 estat ovtest

```
Ramsey RESET test using powers of the fitted values of jgn
       Ho:  model has no omitted variables
                  F(3, 4) =      0.21
                 Prob > F =      0.8836
```

143 estat vif

Variable	VIF	1/VIF
total		
L1.	**6.49**	**0.154012**
--.	**6.49**	**0.154012**
Mean VIF	**6.49**	

144 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-92.53389**	**3**	**191.0678**	**191.9755**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

145
146 *All 1 year lags provide signficant forecasts
147 *Unlagged HIA categories fail to provide significant relationships when combined wit
> h lags, P Value exceeds acceptable threshold
148 *Unlagged categeroies should therefore be dropped from the model.
149
150 *final two candidates for models providing the highest comparitive power
151 reg jgn L1.a

Source	SS	df	MS
Model	**1.5113e+09**	**1**	**1.5113e+09**
Residual	**51619469**	**8**	**6452433.63**
Total	**1.5630e+09**	**9**	**173662406**

```
Number of obs =        10
F(  1,      8) =    234.23
Prob > F       =    0.0000
R-squared      =    0.9670
Adj R-squared =    0.9628
Root MSE       =    2540.2
```

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
a						
L1.	**2.078286**	**.1357956**	**15.30**	**0.000**	**1.765141**	**2.391431**
_cons	**-3667.671**	**3052.884**	**-1.20**	**0.264**	**-10707.64**	**3372.293**

152 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-91.47351**	**2**	**186.947**	**187.5522**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

153
154 reg jgn L1.total

Source	SS	df	MS
Model	**1.4908e+09**	**1**	**1.4908e+09**
Residual	**72165738.6**	**8**	**9020717.32**
Total	**1.5630e+09**	**9**	**173662406**

Number of obs =	**10**
F(1, 8) =	**165.26**
Prob > F =	**0.0000**
R-squared =	**0.9538**
Adj R-squared =	**0.9481**
Root MSE =	**3003.5**

jgn	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
total						
L1.	**.6813358**	**.0529996**	**12.86**	**0.000**	**.5591185**	**.8035531**
_cons	**8227.573**	**2750.302**	**2.99**	**0.017**	**1885.366**	**14569.78**

155 estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**10**	**-108.5257**	**-93.14884**	**2**	**190.2977**	**190.9028**

Note: N=Obs used in calculating BIC; see **[R] BIC note**

156
157 log close
name: **<unnamed>**
log: **S:\Cameron Kirkpatrick\HIA lag\HIA_lags.smcl**
log type: **smcl**
closed on: **10 Dec 2019, 09:32:21**