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POLICY PAPER

Identifying Rent Pressures in Your Neighbourhood: A New Model of Irish Regional Rent Indicators

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Abstract: Since 2013, researchers in the Economic and Social Research Institute (ESRI) have compiled a hedonic rental index for the Residential Tenancies Board (RTB). The indicator estimates a standardised rental index on a national, Dublin and outside of Dublin basis based on the 950,000 rental properties registered with the RTB. The provision in late 2016 of detailed geographical identifiers has enabled an alternative series of indicators to be estimated. In particular, hedonic rental indicators for 137 local electoral areas (LEAs) are now available on a quarterly basis from Q3 2007 to Q4 2016. By providing a more accurate assessment of regional trends in rental supply and demand, the indicators should enable a more precise implementation of policies in the rental market. They should also serve as a proxy for measuring underlying economic activity in these regions on an ongoing basis.

I INTRODUCTION

Accurately capturing developments in a national rental market is important for a number of reasons; the cost of accommodation is a key indicator of competitiveness, especially in an open economy such as Ireland's, while the

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relationship between property prices and rents can serve as a highly useful indicator of sustainability of housing market developments and more broadly financial stability. Capturing rental trends at a granular regional level not alone offers the possibility of understanding the different housing markets which exist across the country but can ultimately provide an overview of the disparate economic conditions which may prevail at a sub-national basis. Ultimately, movements in the supply and demand of rental properties within a particular market will be closely aligned to the related regional economic circumstances, therefore local rental indicators can help provide a timely assessment of regional development.

Since October 2012, researchers in the ESRI have produced, on a quarterly basis, a measure of rents for the Residential Tenancies Board (RTB). The rental index generated is for every private rental property registered with the RTB which numbers approximately 950,000 properties. The measure, which covers rents on a quarterly basis from Q3 2007 to Q4 2016, has until now been estimated for three regions; nationally, the Dublin area and outside the Dublin area. The index is also broken down for these regions on the basis of rental pressures for houses versus apartments.

In December 2016 the RTB approached the ESRI with a request to explore the possibility of generating rental indicators at a more granular regional level. Following receipt of detailed regional information which enabled the local electoral area (LEA) location of the individual property to be identified, a series of rental indicators for each LEA over the period Q3 2007 to Q4 2016 is now available. In this paper we present the new model used to generate these indicators and we summarise the results for the indicators over the period Q3 2007 to Q4 2016, noting particular trends in the cross-sectional variation of rental movements over the period. We also compare the results for the new model with the approach used to generate the existing RTB index. On an aggregate, national basis, there would appear to be little difference between the two sets of results. Finally, we comment on the potential usefulness of these new indicators in addressing regional issues.

The main policy motivation for developing regional rental indicators is the decision by the Irish Government in late 2016 to introduce "rent pressure zones" (RPZs). In these designated zones, the legislation aims to limit rent increases to 4 per cent per annum for a period of three years from 2016. They will then be reviewed. As of Q1 2017 all of Dublin, Cork and Galway cities along with 23 other towns have been designated RPZs. The empirical criteria used to identify whether an LEA qualifies as an RPZ are the following:

1. The LEA has to have an annualised growth rate in excess of 7 per cent for four of the last six quarters; and,
2. The LEA's average standardised rent must be above the national average.

Therefore, the rental indicators generated are formally used to assess these criteria.

Much of the reason for introducing the RPZ policy can be traced to developments in the Irish rental market since 2013. The period 2007 to 2016 saw significant change in the Irish housing and rental market with prices and rents declining sharply post the international financial crisis of 2007/2008 before stabilising and then increasing strongly from 2013 onwards. The increases post-2013 reflect the swift turnaround in Irish economic activity as the country emerged from a protracted downturn between 2007 and 2012. Irish economic activity declined by 12 per cent[1] during this period with unemployment increasing sharply from 4.7 to 14.7 per cent. However, since 2013, the Irish economy has recovered strongly, resulting in a substantial increase in housing demand. The supply side of the market has been much slower to recover. Consequently, with demand outstripping supply, house prices and rent levels have, since 2013, grown by 46 and 29 per cent respectively.[2]

The rest of this paper is organised as follows; in the next section we outline the existing approaches used to model the Irish rental sector. The new model, incorporating the regional information is then presented, and the results of both the existing and new approaches are then discussed. Results for the Irish rental market revealed by the greater regional distribution of rents are also discussed, while a final section offers some concluding comments.

II MODELS OF IRISH RENTAL LEVELS

2.1 Other Rental Indicators

There is a relative paucity of information on how rent levels are generally determined. McCarthy et al. (2015) do provide a comprehensive description of the current methods used by the Bureau of Labor Statistics (BLS) in the United States to estimate price indices for tenant rents used in the US consumer price index. The index is derived as a weighted-average change in the rents of a single sample of rental housing units with the BLS's goal being to produce a measure of the change in the price of the flow of housing services provided by a constant-quality unit of housing. The underlying data for the price index are obtained from the CPI Housing Survey, which is drawn from the decennial Census of Population and Housing. The CPI Housing Survey is a longitudinal survey; housing units selected into the sample are surveyed on a regular basis until they are no longer rental units or until the households occupying the units no longer respond to the survey.

For the UK market, ONS (2017) details the index of private housing rental prices (IPHRP), which measures the change in price of renting residential property from private landlords. The index is published as a series of price indices covering Great Britain, its constituent countries and the English regions. IPHRP measures

[1] Real GDP fell by 12 per cent between 2007 and 2012.
[2] In nominal terms.

the change in price that tenants face when renting residential property from private landlords. The index does not measure the change in newly advertised rental prices only, but reflects price changes for all private rental properties. The IPHRP is constructed using administrative data. That is, the index makes use of data that are already collected for other purposes in order to estimate rental prices.

Hoffman and Kurz (2002) using data from the German Socio-Economic panel perform a hedonic analysis of housing rents. Using the approach, they find that the estimates suggest official West German rent indicators may have understated true rent levels in the early 1990s.

2.2 Data

The Residential Tenancies Board (RTB) was established in 2004 on foot of the Residential Tenancies Act (RTA). The RTB is an agency of Government with statutory powers. The central role of the RTB is to support the rental housing market and to resolve disputes between landlords and tenants cheaply and speedily without having to resort to the Courts.

Every quarter, the RTB publishes a rent report for the private accommodation sector in Ireland. Compiled by the Economic and Social Research Institute (ESRI), and based on the RTB's own register of tenancies, the Rent Index reveals the actual rents being paid for rented properties. As of Quarter 4, 2016, the RTB's register contains details of over 325,372 tenancies. Every year, the RTB registers approximately 100,000 new tenancies, with annual peaks in activity in September/October.

The database, which is the only one of tenancies in the country, is populated with information on actual/agreed rent, location, six categories of dwelling types, accommodation size and number of occupants and tenancy length. The Rent Index is backdated to Q3 2007. Under the Act, landlords can register a tenancy up to one month after the tenancy commencement date. To reflect this and to provide the most accurate report possible, the data underpinning the Rent Index are extracted five weeks after the end of each quarter.

Since 2012, the RTB and ESRI have estimated rents on a quarterly basis across three categories: nationally, Dublin, and outside of Dublin. Legislation enacted at the end of 2016 requires the RTB and the ESRI to include more localised geographical information, based on Local Electoral Area level, to adjust the Rent Index accordingly.

2.3 Modelling Approaches

The existing RTB index (PRTB, 2013) is constructed following the practice of the Central Statistics Office when constructing the Residential Property Price Index and uses a "rolling" time dummy hedonic regression model. The rent index is constructed using quarterly time dummies. In each regression a dummy variable is

added for the most recent quarter and the "oldest" time dummy is dropped. This is a variant of the time-dummy method and has the advantage of keeping the coefficients relatively up-to-date while still using pooled data. Thus, the implicit price for each characteristic varies over time. In this application however, where a large number of rental estimates are required, the approach requires large amounts of data and so may become unreliable if the volume of transactions becomes very low. In addition, the need to run a regression for each time period is time-consuming, particularly if data are to be revised over a long time series. At present the model is run separately for three regions; the overall national market, the Dublin market and the non-Dublin national market. Accordingly, there are enough observations to run the model on this basis.

For the new index, on the other hand, an alternative approach is required whereby the model is estimated over the entire time period (Q3 2007 to Q4 2016) and time dummy variables are then included in the hedonic regression to capture the change in the index for each LEA. It is necessary to conduct the estimation in this manner as there are not enough observations for each LEA to run the model in the rolling manner as per the existing index.

Another alternative approach would be to run a rolling estimation over a number of quarters with LEA fixed effects, which would allow the parameters on the property characteristics to vary over time. This approach was tested and the estimated coefficients for the property characteristics were found to be quite stable over the time period studied. The variation in sample size and in model fit were therefore judged to be of greater concern than changes in the returns to property characteristics over time and that the reliability of the index would be best served by using the largest amount of data available.

In this pooled approach, a separate dummy for each LEA for each quarter is estimated and this necessitates an additional 5,206 (38 * 137) variables in the model. However, the model can cope with this as using the entire sample results in approximately 950,000 observations. Other than these LEA dummies, the new model has all of the other variables currently in the existing model. Consequently, the new model also includes the following controls for the property characteristics:

- Property size (one, two, three, four or five\+ bedrooms);
- Property type (detached house, semi-detached house, terrace house, apartment, part-house, other);
- Length of tenancy (one to six months, seven to nine months, ten to 12 months, over one year);
- Number of tenants (one, two, three or four\+ tenants);
- Frequency of rent payment (fortnightly, monthly, quarterly or annual);
- Presence of a third-level institution (dummy variable equal to 1 if third-level in local authority area).

In the case of both models the reference property type is a two-bedroom apartment, one tenant, ten- to 12-month lease, rent paid monthly in a region without a third-level institution.

With the new model, the characteristic variables capture the changing mix of properties between time periods while the time dummies capture changes in the price or rent of a constant quality representative dwelling. A mix adjusted index is then calculated based on the time dummy coefficients. An assumption of this approach is that the implicit price of characteristics remains constant over time. In relation to aggregation to the national level, the national index is estimated separately using a model controlling for LEA fixed effects.

Crone and Voith (1992) and Conniffe and Duffy (1999) refer to the difference between the models used for the existing and the new index as the hedonic model and the constrained hedonic model. The model estimated for the new index is constrained in that the implicit prices for the different characteristics are not allowed to change over time. Gatzlaff and Ling (1994) on the other hand refer to the strictly cross-sectional as opposed to the explicit time-variable model.

The methodology generates an index of rent growth. To estimate current standardised rent levels in each LEA (i.e. rent levels that take into account the different composition of rental properties), we apply the growth rate generated by the model to an initial average value of rents in each LEA. These are compared to a national average rent generated on the same basis.

One limitation of the data reported to the RTB is that the index only records rents for new leases and does not capture changes which occur in existing leases. Consequently, if an area sees no new leases, it does not mean that there have been no increases in rents. Rents on existing leases may, for example, have seen significant increases.

III SUMMARY OF RESULTS

Table 1 compares the model output relating to property characteristics from the new model and an example from the published model which is described in detail in PTRB (2013). Apart from the differences in the level of detail on locations and time effects, the variables relating to property level characteristics used to generate the results are the same in both versions of the model.

The sizes of the estimated effects for each characteristic are quite comparable overall. The property characteristics have the expected effect signs, with larger properties and more tenants associated with higher rents. Non-standard lease lengths (i.e. different from one-year agreements) tend to be associated with lower rents. One difference of note between the new and old versions of the model is that the previous model did not find that rents were systematically higher for detached or semi-detached houses compared to apartments once the size of the property was

Table 1: Comparison of Model Estimates

	Original Model		*LEA Model*	
	Coefficient	*T-Value*	*Coefficient*	*T-Value*
Intercept	6.689	1711.6	6.474	409.1
1 Bedroom	–0.219	–79.9	–0.214	–248.4
3 Bedrooms	0.089	33.7	0.113	138.6
4 Bedrooms	0.174	49.5	0.216	199.1
5 Bedrooms	0.191	29.9	0.268	138.7
Detached	–0.047	–16.5	0.023	19.2
Semi-Detached	–0.056	–14.1	0.004	4.5
Terrace	–0.043	–14.2	–0.021	–22.9
Other property	–0.346	–88.1	–0.321	–255.2
Part house	–0.155	–17.1	–0.211	–88.7
2 Tenants	0.052	26.8	0.044	74.2
3 Tenants	0.092	26	0.065	60.2
4+ Tenants	0.084	18.9	0.073	61.4
1-6 months tenancy	–0.036	–13.2	–0.027	–28.4
7-9 months tenancy	–0.064	–12.2	–0.072	–46.4
Over 1 year tenancy	–0.1	–37	–0.054	–73.1
Fortnightly rent	–0.09	–7.1	–0.027	–5.3
Yearly rent	–0.632	–13.2	–0.112	–41.5
Quarterly rent	1.063	114.5	0.344	38.0
Third level	0.432	135	0.039	26.7
Time dummy	Yes			
Region control	Yes			
Time*LEA			Yes	
Adjusted R-squared	0.524		0.679	
Root MSE	0.391		0.358	
Observations	945,749		945,749	

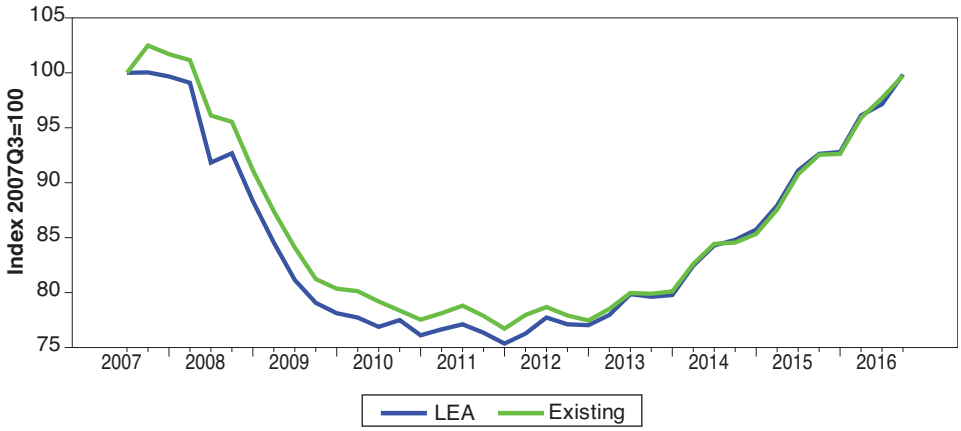
Source: Original model results reproduced from Private Residential Tenancies Board (2013). LEA model results are authors' calculations using PRTB data.

controlled for, whereas the new model finds that there are higher rents for houses compared to apartments over and above property size.

As described above, the new version of the model uses a considerable amount of additional information in relation to location detail by using LEAs rather than broad region and allows for different time trends for each LEA. As a result, we note that the explanatory power of the new model is substantially higher than the previous version, with 68 per cent of the variation in rents being explained according to the R-squared statistic.

Although there are some differences in the estimation approach between the previously published model and the new version incorporating more detailed location information, the overall path of the national rental index for both approaches is very similar. Figure 1 plots the national index of rents with the two different approaches. While the index generated with the new model shows a slightly more rapid decline in rents at the start of 2008, from 2012 onwards the two indices overlap almost completely. Other key statistics between the two different rent indicators are very similar. For example, both indicators had a peak value in Q4 2007, while the trough or lowest point was in Q1 2012. The percentage fall from peak to trough in the case of the new (LEA) and existing models was 33 and 34 per cent respectively. In Figure 2, we plot the year-on-year growth rates for the new and existing models. It is evident from the graph that both approaches yield very similar results.

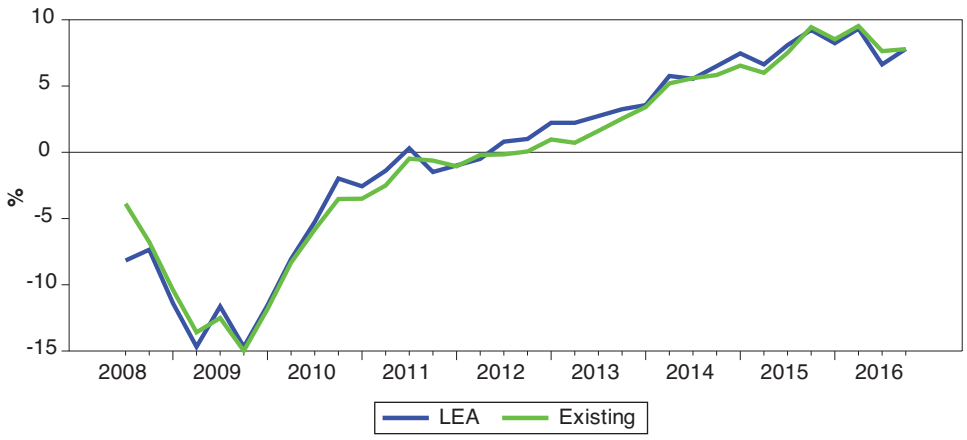
Figure 1: LEA Based and Existing Model Based Estimate of National Rent Levels



Source: Authors' calculations using PRTB data.

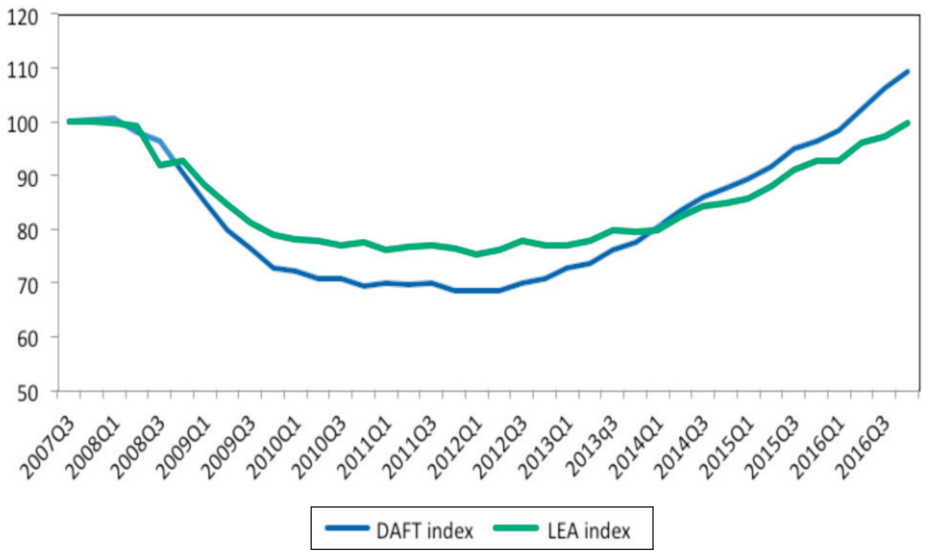
We next compare the new index to the most detailed alternative source of information on Irish rental prices coming from the Daft.ie property advertising website. Figure 3 compares the Daft.ie national index (rebased to be comparable) to the LEA index in the paper, showing that the evolution over time of the two are quite similar. Overall, the correlation coefficient between the two national indices is 97 per cent. The notable difference between the two is that the Daft.ie index shows a larger peak-to-trough swing and stronger recovery whereas the index based on the RTB data shows slightly less volatility. This is likely due to some compositional issues, as a potential shortcoming of the Daft.ie data is that they rely on advertised asking prices for rental properties whereas the LEA index is based

Figure 2: LEA Based and Existing Model Based Estimate of National Rents Annual Growth Rates



Source: Authors' calculations using PRTB data.

Figure 3: Comparison of LEA Based Index and Daft.ie Index



Source: Authors' calculations using PRTB data and Daft.ie index (rebased to same start year as PRTB data).

on the final contracted rent. Although widely used, there will also be some properties which do not appear on Daft.ie, perhaps because they are advertised in local outlets or are let through private contacts.

In Table 2 we summarise the results of the index for both the new (LEA) and existing approaches along with the corresponding year-on-year and quarter-on-quarter growth rates.[3] According to the new index, overall rents increased by 7.8 per cent year-on-year for Q4 2016, which was up marginally on the Q3 2016 year-on-year growth rate. On a quarterly basis, the index was up 2.78 per cent on its Q3 2016 level. In both cases, the index follows almost an identical path covering full U-shape from the starting base of 100 in Q3 2007 to reach a low of 76.12 in Q1 2011 for the LEA model and a low of 76.72 one quarter later for the original model. Both models show rents then recover steadily, returning to a level fractionally below 100 by the final quarter of data available in Q4 2016.

Table 2: Comparison of Model Results

	LEA Model				*Original model*			
Period	*Index*	€	*Y-on-Y*	*Q-on-Q*	*Index*	€	*Y-on-Y*	*Q-on-Q*
Q3 2007	100.00	988.09			100.00	988.09		
Q4 2007	100.04	988.47		0.04	102.48	1012.63		2.48
Q1 2008	99.67	984.82		–0.37	101.70	1004.88		–0.77
Q2 2008	99.09	979.12		–0.58	101.15	999.44		–0.54
Q3 2008	91.83	907.38	–8.17	–7.33	96.12	949.71	–3.88	–4.98
Q4 2008	92.68	915.76	–7.36	0.92	95.54	944.04	–6.77	–0.60
Q1 2009	88.33	872.76	–11.38	–4.70	91.14	900.58	–10.38	–4.60
Q2 2009	84.54	835.35	–14.68	–4.29	87.40	863.61	–13.59	–4.10
Q3 2009	81.15	801.80	–11.64	–4.02	84.10	830.94	–12.51	–3.78
Q4 2009	79.06	781.22	–14.69	–2.57	81.23	802.61	–14.98	–3.41
Q1 2010	78.12	771.90	–11.56	–1.19	80.35	793.97	–11.84	–1.08
Q2 2010	77.73	768.05	–8.06	–0.50	80.13	791.73	–8.32	–0.28
Q3 2010	76.88	759.65	–5.26	–1.09	79.19	782.48	–5.83	–1.17
Q4 2010	77.50	765.75	–1.98	0.80	78.36	774.31	–3.53	–1.04
Q1 2011	76.12	752.09	–2.57	–1.78	77.54	766.15	–3.50	–1.05
Q2 2011	76.65	757.37	–1.39	0.70	78.12	771.91	–2.50	0.75
Q3 2011	77.11	761.93	0.30	0.60	78.81	778.72	–0.48	0.88
Q4 2011	76.34	754.35	–1.49	–1.00	77.87	769.43	–0.63	–1.19
Q1 2012	75.36	744.61	–1.00	–1.29	76.72	758.04	–1.06	–1.48
Q2 2012	76.27	753.60	–0.50	1.21	77.96	770.32	–0.21	1.62
Q3 2012	77.73	768.05	0.80	1.92	78.69	777.50	–0.16	0.93
Q4 2012	77.11	761.93	1.01	–0.80	77.92	769.89	0.06	–0.98
Q1 2013	77.03	761.17	2.22	–0.10	77.46	765.37	0.97	–0.59
Q2 2013	77.96	770.36	2.22	1.21	78.52	775.85	0.72	1.37
Q3 2013	79.86	789.07	2.74	2.43	79.96	790.06	1.62	1.83
Q4 2013	79.62	786.71	3.25	–0.30	79.90	789.44	2.54	–0.08
Q1 2014	79.78	788.28	3.56	0.20	80.10	791.50	3.41	0.26

[3] Rents are normalised to a per month basis where any frequencies used are different.

Table 2: Comparison of Model Results (Contd.)

	LEA Model				Original model			
Period	Index	€	Y-on-Y	Q-on-Q	Index	€	Y-on-Y	Q-on-Q
Q2 2014	82.46	814.73	5.76	3.36	82.60	816.19	5.20	3.12
Q3 2014	84.29	832.85	5.55	2.22	84.43	834.26	5.59	2.21
Q4 2014	84.80	837.86	6.50	0.60	84.55	835.46	5.83	0.14
Q1 2015	85.73	847.13	7.47	1.11	85.34	843.27	6.54	0.93
Q2 2015	87.92	868.75	6.63	2.55	87.56	865.15	6.00	2.60
Q3 2015	91.11	900.24	8.09	3.62	90.77	896.91	7.51	3.67
Q4 2015	92.62	915.21	9.23	1.66	92.54	914.39	9.45	1.95
Q1 2016	92.79	916.86	8.23	0.18	92.62	915.19	8.53	0.09
Q2 2016	96.12	949.78	9.33	3.59	95.90	947.61	9.53	3.54
Q3 2016	97.15	959.93	6.63	1.07	97.70	965.39	7.63	1.88
Q4 2016	99.85	986.59	7.80	2.78	99.75	985.58	7.78	2.09

Source: Original model results reproduced from Private Residential Tenancies Board (2013). LEA model results are authors' calculations using PRTB data.

Table 3 reports the strength of recent rent growth at the LEA level in terms of the number of quarters where annualised rent increases have been greater than 7 per cent. It also shows how rent levels in each LEA compare to the national average. Rents in Dublin and surrounding commuter counties are amongst the highest relative to the national average, with parts of Cork, Galway and Limerick cities also above average.

Given the large amount of regional information now available, an alternative way to present the results is through the use of "heat-maps". Figure 4 breaks down the LEAs by the annual growth rate of the standardised index for Q4 2016, whereas Figure 5 plots the LEAs by the following three criteria:

1. Whether the LEA has an annualised growth rate in excess of 7 per cent for four of the last six quarters;
2. Whether their average standardised rent is above or below the national average; and,
3. Where both conditions prevail.

The purple areas in Figure 5 which are mainly centred around Dublin, Cork and Galway are those LEAS which experience both conditions (1) and (2). Table 4 reports summary statistics for the different LEAs across the period Q4 2007 to Q4 2016. The average value for standardised rents across the period was €760, with Glenties in Donegal registering the lowest rent (€277) and Stillorgan in Dublin experiencing the highest (€2,062). From Figure 1, it is evident that that rents reached a trough in Q1 2012; consequently, we split the overall period into before

Table 3: Summary of LEA Based Rent Levels

LEA Code	*Quarters > 7%*	*Q4 2016 €*	*Ratio to National*	*LEA Code*	*Quarters > 7%*	*Q4 2016 €*	*Ratio to National*
1	5	986	100.00	70	3	580	58.74
2	1	750	76.08	71	3	564	57.16
3	3	685	69.47	72	3	588	59.63
4	5	552	55.93	73	2	604	61.18
5	4	618	62.66	74	4	727	73.72
6	4	568	57.57	75	6	1,165	118.12
7	2	542	54.90	76	5	1,005	101.92
8	5	629	63.76	77	3	1,185	120.12
9	3	710	72.00	78	5	919	93.18
10	6	669	67.78	79	4	868	87.98
11	3	708	71.81	80	2	587	59.50
12	2	656	66.53	81	1	630	63.90
13	4	823	83.47	82	3	487	49.35
14	4	1,041	105.47	83	1	505	51.18
15	5	1,138	115.37	84	2	690	69.92
16	3	907	91.96	85	4	666	67.49
17	2	672	68.09	86	3	451	45.73
18	2	895	90.77	87	1	572	57.97
19	2	338	34.24	88	3	665	67.43
20	5	581	58.86	89	5	492	49.87
21	1	421	42.70	90	2	618	62.60
22	3	478	48.46	91	0	635	64.35
23	0	510	51.70	92	2	561	56.84
24	4	739	74.91	93	1	569	57.67
25	6	634	64.25	94	1	654	66.32
26	1	587	59.47	95	3	596	60.45
27	5	630	63.90	96	4	631	63.99
28	3	841	85.26	97	4	620	62.83
29	4	1,043	105.68	98	5	635	64.34
30	5	1,022	103.55	99	4	656	66.53
31	6	961	97.39	100	4	747	75.71
32	0	536	54.29	101	3	652	66.09
33	5	677	68.67	102	3	674	68.33
34	1	681	69.05	103	5	671	68.02
35	4	601	60.92	104	4	707	71.67
36	4	1,247	126.37	105	3	617	62.58
37	4	1,267	128.41	106	2	645	65.39
38	5	1,154	116.95	107	4	691	70.09
39	5	759	76.93	108	3	865	87.73
40	6	989	100.27	109	4	1,195	121.12
41	2	606	61.44	110	2	1,359	137.77

Table 3: Summary of LEA Based Rent Levels (Contd.)

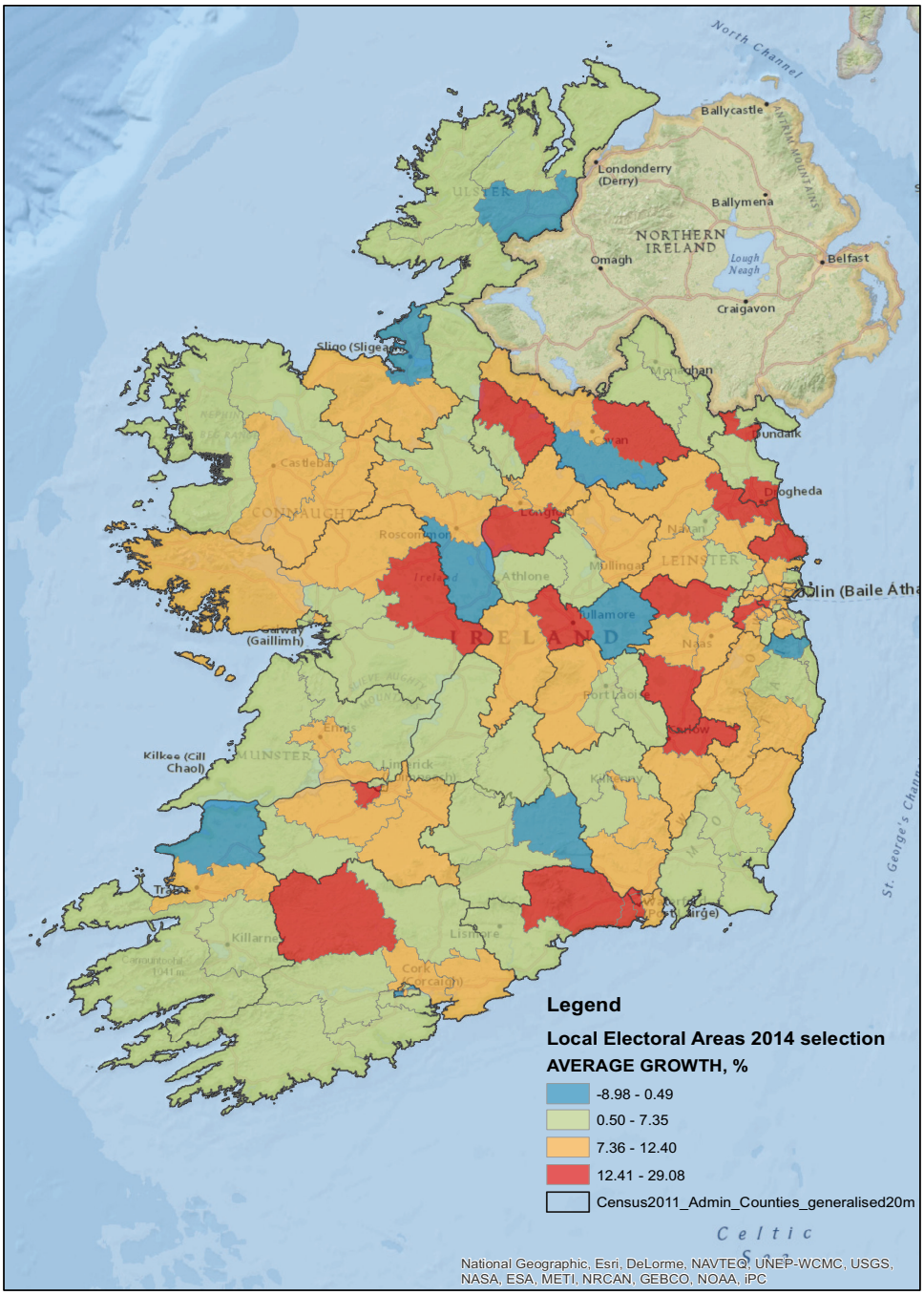
LEA Code	*Quarters > 7%*	*Q4 2016 €*	*Ratio to National*	*LEA Code*	*Quarters > 7%*	*Q4 2016 €*	*Ratio to National*
42	4	813	82.37	111	3	1,071	108.58
43	6	777	78.78	112	5	887	89.87
44	4	833	84.41	113	4	1,171	118.69
45	4	1,047	106.12	114	6	1,412	143.17
46	4	861	87.23	115	3	1,339	135.75
47	5	1,169	118.51	116	5	1,536	155.75
48	6	1,082	109.71	117	3	1,584	160.61
49	4	1,170	118.65	118	3	2,062	209.06
50	1	1,059	107.38	119	3	1,837	186.23
51	5	643	65.21	120	4	1,831	185.56
52	5	752	76.18	121	3	1,611	163.33
53	5	758	76.84	122	5	1,556	157.72
54	1	452	45.82	123	4	1,695	171.84
55	3	419	42.51	124	4	1,503	152.34
56	4	506	51.28	125	5	1,388	140.72
57	3	467	47.37	126	3	1,653	167.57
58	4	774	78.41	127	4	1,703	172.60
59	2	648	65.73	128	4	1,393	141.25
60	5	985	99.83	129	4	1,252	126.90
61	3	805	81.59	130	4	1,285	130.30
62	5	868	88.00	131	4	1,258	127.48
63	2	552	55.94	132	5	1,427	144.67
64	6	554	56.15	133	4	1,419	143.85
65	6	556	56.35	134	4	1,262	127.92
66	5	685	69.39	135	6	1,690	171.27
67	5	899	91.10	136	5	1,353	137.15
68	4	778	78.91	137	2	1,377	139.58
69	6	907	91.96	138	5	1,424	144.33

Source: Authors' calculations using PRTB data.

and after this quarter. Between Q4 2007 and Q1 2012, Waterford City-South experienced the most significant decline in rents (77 per cent fall from its highest rent pre-2012 to the Q1 2012 level), while in the recovery phase, Crumlin-Kimmage experienced the most significant improvement (68 per cent increase between the Q2 2012 level and its highest rent subsequently).

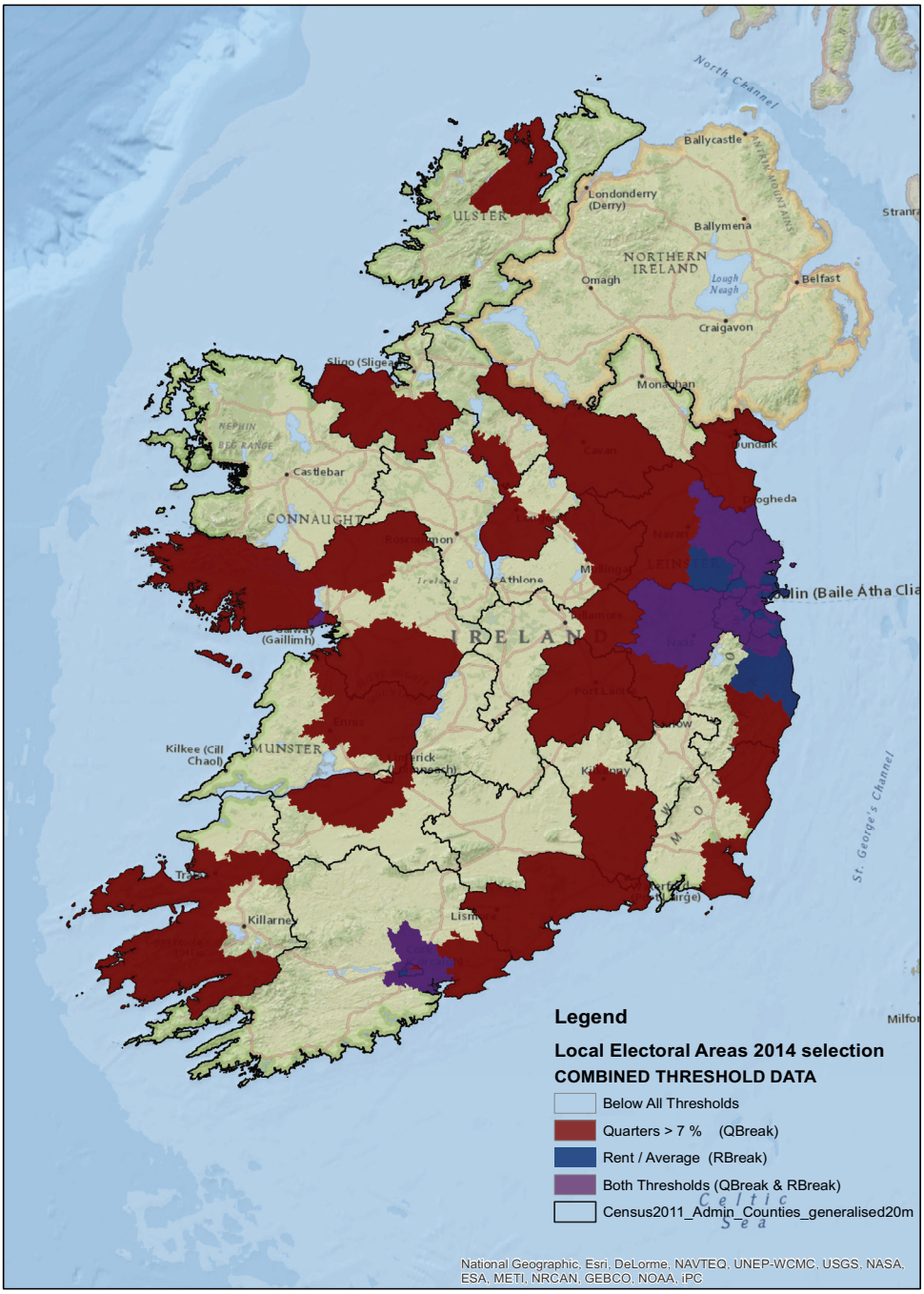
Finally in Figure 6 we plot both the coefficient of variation and the national rent (according to the LEA model) for the period. The coefficient of variation is a standardised measure of dispersion for a given distribution. It is defined as the ratio of the standard deviation to the mean. The measure is calculated across the 137 LEAs for each quarter over the Q3 2007 to Q4 2016 period. Initially, the coefficient

Figure 4: Heat Map of Annual Growth Rates by LEA



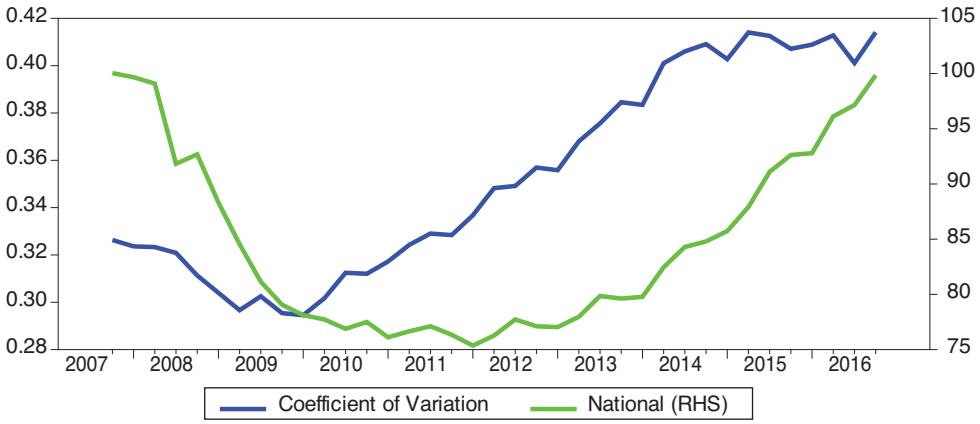
Source: Authors' calculations using PRTB data.

Figure 5: Heat Map of Breakdown of LEA Rents by Different Criteria



Source: Authors' calculations using PRTB data.

Figure 6: Coefficient of Variation and National Rent Level



Source: Authors' calculations using PRTB data.

Table 4: Summary of LEA Results: 2007–2016

Area	*Mean*	*Q4 2007–Q4 2016 Maximum*	*Minimum*
National	€760		
Stillorgan		€2,062	
Glenties			€277
Largest peak to trough change			
		Q4 2007 – Q1 2012	Q2 2012 – Q4 2016
Waterford City South		–77%	
Crumlin-Kimmage			68%

Source: Authors' calculations using PRTB data.

indicates a decline in the dispersion of regional rents, however from 2009 onwards a clear increase in the heterogeneity of regional standardised rents occurs. It is interesting to compare the dispersion with the overall national rent indicator. While the increase in the regional divergence of rents clearly predates the turnaround in national rents, it is evident that post-2011 the two are closely aligned. Similarly, the decline in regional divergence between 2007 and mid-2009 was also accompanied by a decline in national rent levels. Overall, therefore, a decline in national rents seems to correlate with a decline in the regional divergence of rents while an increase in rents, over the longer-term, is accompanied by a growing dispersion across the country.

As noted in RTB (2017), given the small number of observations in many LEAs, issues can arise in terms of the volatility of the Index number over time. This is due to the fact that where there are a small number of observations for an LEA, minor fluctuations in the number of observations can have a large influence on estimates and, over time, changes to the number, structure, and type of agreements can lead to large quarter-on-quarter changes. It could also be the case that the retrospective addition of late registered tenancies can have a large effect on the sample size for some areas. In this regard, large revisions and considerable swings in estimated standardised rents can occur for different LEAs. As a result of this, only estimates are published where there at least 30 observations for that LEA for a given quarter.

IV CONCLUDING COMMENTS

The sharp increases in the cost of accommodation are one characteristic of the recovery observed in the Irish economy post-2013. Irish house prices and rents have increased substantially over the period 2013 to 2016. Much of the reason for this increase lies with the slow response of the Irish construction sector with housing demand substantially outstripping supply.

In this paper we present a new model of the Irish rental sector. Using recently available granular data on the geographical identity of landlords in the private rented sector, we estimate standardised rental indicators for 137 local electoral areas across the Irish State. These indicators cover the period Q4 2007 to Q4 2016 and will be available on a quarterly basis going forward. Furthermore, these indicators will be central to future decisions concerning the designation of areas as rent pressure zones.

Inspection of these indicators over the period reveals the regional asymmetry in rental returns through the cycle. During the significant downturn in the market, all rents appear to fall to the same degree. However, when the market is in a recovery or growth phase, there is an increasing dispersion in rental levels.

The housing and rental literature[4] has long indicated a positive relationship between rent levels and proximity to an economic focal point. Therefore, an examination of rental levels available on a timely, granular, regional basis can also provide a corresponding overview of changes in economic conditions at local levels.

Finally, having such detailed information on rents available at a local level permits future interesting research questions to be addressed. For example, combining the rental indicators with the recently released CSO information on regional house prices enables a series of regional house price-to-rent ratios to be generated. This could enable a series of spatial estimates of sustainability in the Irish housing market. Furthermore, movements in these ratios could be relayed to movements in regional economic indicators such as unemployment rates.

[4] See Sirmans and Benjamin (1991) for an earlier review of the literature.

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APPENDIX

Table A1: Definition of LEA Codes

LEA Code	*Area*	*LEA Code*	*Area*
	National	39	Kildare-Newbridge
1	Carlow	40	Castlecomer
2	Muinebeag	41	Kilkenny City East
3	Cavan - Belturbet	42	Piltown
4	Bailieborough-Cootehill	43	Kilkenny City West
5	Ballyjamesduff	44	Cork City North Central
6	West Clare	45	Cork City North East
7	Killaloe	46	Cork City North West
8	Shannon	47	Cork City South Central
9	Ennis	48	Cork City South East
10	Kanturk - Mallow	49	Cork City South West
11	Fermoy	50	Borris-in-Ossory-Mountmellick
12	Easet Cork	51	Portlaoise
13	Cobh	52	Graiguecullen-Portarlington
14	Ballincollig - Carrigaline	53	Manorhamilton
15	Bandon - Kinsale	54	Ballinamore
16	West Cork	55	Carrick-On-Shannon
17	Blarney - Macroom	56	Newcastle West
18	Glenties	57	Adare-Rathkeale
19	Letterkenny	58	Cappamore-Kilmallock
20	Inishowen	59	Limerick City West
21	Stranorlar	60	Limerick City North
22	Donegal	61	Limerick City East
23	Connemara	62	Granard
24	Tuam	63	Ballymahon
25	Ballinasloe	64	Longford
26	Loughrea	65	Dundalk Carlingford
27	Athenry-Oranmore	66	Dundalk South
28	Galway City West	67	Ardee
29	Galway City Central	68	Drogheda
30	Galway City East	69	Ballina
31	Listowel	70	Claremorris
32	Tralee	71	Castlebar
33	Killarney	72	West Mayo
34	South and West Kerry	73	Kells
35	Maynooth	74	Laytown -Bettystown
36	Celbridge-Leixlip	75	Ashbourne
37	Naas	76	Ratoath
38	Athy	77	Trim

Table A1: Definition of LEA Codes (Contd.)

LEA Code	*Area*	*LEA Code*	*Area*
78	Navan	108	Bray
79	Monaghan	109	Greystones
80	Carrickmacross-Castleblayney	110	Wicklow
81	Ballybay-Clones	111	Arklow
82	Birr	112	Balbriggan
83	Tullamore	113	Swords
84	Edenderry	114	Mulhuddart
85	Boyle	115	Castleknock
86	Roscommon	116	Howth-Malahide
87	Athlone	117	Stillorgan
88	Ballymote-Tobercurry	118	Dundrum
89	Sligo	119	Glencullen-Sandyford
90	Nenagh	120	Killiney-Shankill
91	Templemore-Thurles	121	Dun Laoghaire
92	Carrick-on-Suir	122	Blackrock
93	Clonmel	123	Lucan
94	Cashel-Tipperary	124	Tallaght Central
95	Dungarvan-Lismore	125	Templeogue-Terenure
96	Comeragh	126	Rathfarnham
97	Tramore - Waterford City West	127	Tallaght South
98	Waterford City South	128	Clondalkin
99	Waterford City East	129	Ballymun
100	Athlone	130	Cabra-Finglas
101	Mullingar-Kilbeggan	131	Ballyfermot-Drimnagh
102	Mullingar-Coole	132	Crumlin-Kimmage
103	Gorey	133	Rathgar-Rathmines
104	Enniscorthy	134	Pembroke-South Dock
105	New Ross	135	North Inner City
106	Wexford	136	Clontarf
107	Baltinglass	137	Beaumont-Donaghmede

Source: PRTB data description based on CSO definitions of Local Electoral Areas.