



# ESRI Research Note

## *The PRTB Rent Index*

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David Duffy, Kevin Timoney and John R. Walsh



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## Introduction

Data from Census 2011 show that 28.8 per cent of households rent their accommodation. The Census also shows that, between 2006 and 2011, there was a dramatic increase in the share of households in private rented accommodation. Between 2006 and 2011 the number of households in Ireland increased by 187,000 or almost 13 per cent, to 1,649,000, while the number of households renting increased by 160,000. As a result of this change in tenure pattern, according to the 2011 Census, 18.5 per cent of households were in private rented accommodation, compared with 9.9 per cent in 2006.

In October 2012, the ESRI commenced working on the construction of a mix-adjusted rent measure for the Private Residential Tenancies Board (PRTB)<sup>1</sup>. Owners of private residential accommodation in Ireland are required to register with the PRTB, in accordance with the Residential Tenancies Act 2004. The registration requires an application to be filed for all tenancies with the PRTB's Register of Tenancies, from which aggregate data on the private rented sector is compiled. Registration is the responsibility of the landlord and involves filing various details, either online or by hard copy, about the dwelling and the leasing arrangements, along with information about the tenant(s), the landlord(s) and the management company where applicable. The PRTB provided the ESRI with an anonymised dataset of registrations – tenants or landlords are not identifiable.

## Constructing the Index

### *The Data*

If a measure of rents constructed using the PRTB data are to reflect movements in rents in the overall market, it is necessary that the PRTB data is representative of the rental market as a whole. In order to assess this we compare the PRTB data for quarter 2, 2011 to data published as part of Census 2011. Figure 1 shows that the Dublin region is somewhat over-represented, while the Border region and the South West region are under-represented. Differences may reflect misinterpretation of or households declining to answer

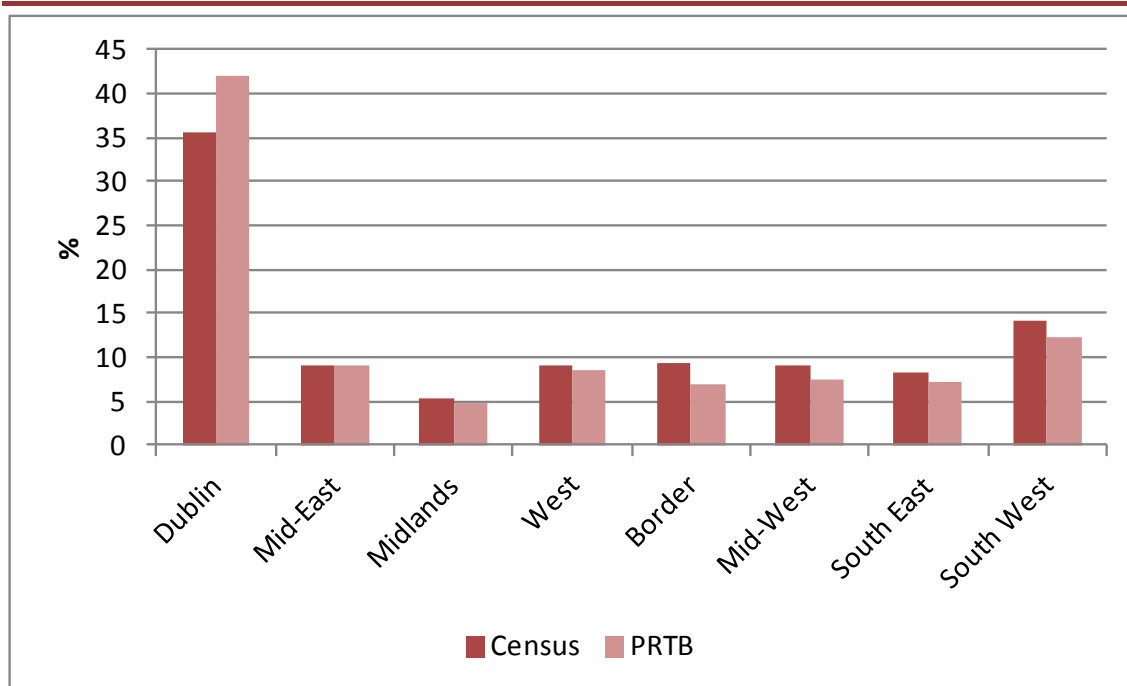
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<sup>1</sup> The ESRI were awarded the project following a tender process.

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the Census questions on homeownership, landlords not registering or being unaware of the need to register with the PRTB.

**FIGURE 1.1** Distribution of sample by planning region



Note: PRTB data is for quarter 2, 2011 to compare to Census 2011.

Table 1 shows the distribution of rented properties by property type and the average rent. As can be seen the PRTB sample is more heavily concentrated in apartments, flats and bedsits, while showing a similar proportion of semi-detached dwellings, and a lower proportion of detached properties. Despite this the average weekly rent for semi-detached houses and apartments is very similar. However, the average weekly rent for detached and terraced houses is higher in the PRTB sample.

**TABLE 1** Distribution of dwellings and average weekly rent, by property type

	Census 2011	PRTB		Census 2011	PRTB
	Distribution by property type			Average Weekly Rent	
	%	%		€	€
Detached	18.3	10.1		160	185
Semi-Detached	27.7	26.1		171	171
Terraced	17.1	14.9		176	191
Apartment, Flat, etc.	36.8	48.6		147	135
	<b>100.0</b>	<b>100.0</b>			

Note: Census data for properties rented from a private landlord. Census 2011 data are April 2011, PRTB data are for quarter 2, 2011.

Source: Central Statistics Office Census 2011 and PRTB Data.

The distribution of average rents may well provide some explanation as to the difference. The data show that the PRTB sample does not contain as many properties with low rents as the Census data. A similar pattern is evident for detached and terraced houses, the PRTB sample has a higher proportion of properties with higher rents than in the Census.

In spite of the variations the PRTB sample appears to be sufficiently comprehensive to provide a suitable base for constructing hedonic rent indices that reflect the rental market as a whole.

### *Data Editing*

The primary focus of the study is to create a mix-adjusted measure of rents; that is, a measure of rents that takes account of the changing mix of properties rented in different time periods. Thus, the data are examined prior to any mix-adjustment to identify outliers and/or data entry errors. This is not a comprehensive check of all the variables but is focused on those that will form a part of the mix-adjustment process.

To arrive at the dataset for our analysis we restrict the data to the period specified in the tender documents for the “trend” report, 2007:Q3 to 2012:Q4. Extreme observations where the rent is below €100 or above €10,000 per month are also excluded. We exclude cases where there are not enough data present to allow the application to be registered. The impact of these different steps results in a dataset under consideration of just over 460,000 cases.

### *Identifying and Excluding Outliers*

Outliers and cases that contain data errors must be excluded so that they do not bias the results. While some visual checking of the data is possible, the size of the dataset means that outlier detection must be automated. To do this we employ a measure known as “Cook’s Distance” where a regression measures the distance between each observation and the means of the dependent and independent variables. In other words it provides a measure of the influence an observation is having on the results. Our examination of the data showed that data errors were independent of each other – an error in number of bedrooms did not mean that there was an error in the rent amount for the same observation. Given our concern is with the rent paid we focussed our outlier analysis on the monthly rent amount.

In addition we also examined the number of bedrooms by property type. Previous studies of Irish house prices have found that property size is a key explanatory variable (Conniffe and Duffy, 1999). Similar to O’Hanlon’s (2011) analysis of data for the Residential Property Price Index, the data entered for floor area contain a mix of metric and imperial measures.

As the majority of the data is inputted online as part of the registration process this means that the data have been input by a large number of individual landlords when registering their property. Thus, there is a wide distribution in the number of bedrooms, reflecting data input errors. The distribution of number of bedrooms by type of property was examined and if the number of bedrooms for a given property type was less than 1% of records for that property type then it was identified as outside the threshold. For these observations, following the practise of O’Hanlon, 2011, the number of bedrooms was set to the average number of bedrooms for that property type.

## **The Index**

### *The Hedonic Methodology*

One of the challenges faced when measuring changes in prices is to take account of the impact that a change in the composition of goods sold in a period can have on the price level. Even if all rents remained unchanged over a time period, the average rent would change if the mix of properties rented changed.

The need to mix-adjust so that a measure of “pure” price change is constructed has lead to extensive use of the hedonic regression methodology. This methodology has been extensively used to measure house price change both internationally and in Ireland. However, it has also been applied to the rental market (see Lyons 2012, Hoffmann and Kurz, 2002). Hedonic regression decomposes the item being researched into its constituent characteristics, and obtains estimates of the value of each characteristic. In other words, it is based on the hypothesis that products can be treated as bundles of characteristics and that prices can be attached to each characteristic. For example, a house may be valued according to such components as the number of bedrooms, floor area, the age of the house and its location. It is usually estimated using ordinary least squares (OLS) regression analysis. The characteristics may be non-numeric attributes that are represented by dummy variables. The regression coefficients are treated as estimates of the contributions of the characteristics to the overall prices.

## **The Variables**

The rent paid for a dwelling can be influenced by a wide range of variables. While not all variables are captured in the sample, the PRTB dataset does contain sufficient variables that can be used as explanatory variables to explain variation in rents. The variables can be grouped into the following: size, dwelling type, location and other characteristics.

### *Dwelling size*

The PRTB registration form contains a number of variables that could be used as a measure of size: the floor area of the dwelling, the number of bedrooms, number of occupants and number of bedspaces. However, an analysis of the data indicated that for a number of these variables there may be issues with how they are interpreted. For example, does a double bed represent one or two bedspaces, or does the number of occupants include, for example, young children? In addition it is evident that the floor area is reported as either square metres or square feet, but no indication of which is reported is available. Based on the analysis it has been decided to use number of bedrooms as a measure of dwelling size.

### *Dwelling type*

The data include dwelling identifiers for semi-detached, detached, terraced, maisonette, apartment, flat and bedsit. Using these data, dummy variables are constructed for the different types of dwellings, with maisonette, flat and bedsits grouped into a single variable “other property”. The PRTB registration form also requires the landlord to indicate, when the property being rented is a house, if the property is the whole house or part of the house. A dummy variable is constructed to control for this.

### *Location*

Properties are registered with full address, including local authority. In the case of Dublin city, location includes city postcode. Rents are calculated for the country as a whole, Dublin, and outside Dublin. For the Dublin regressions, where feasible, location is identified by postcode and by a dummy variable identifying Dublin locations outside Dublin City, based on local authority, e.g., South County Dublin. In the National regressions location is captured by a dummy variable identifying the planning region in which the property is located, if outside Dublin, and by the local authority if located in Dublin. We separately identify urban areas outside Dublin based on local authority (Galway, Waterford, Limerick and Cork). Similarly, for the regressions that measure rents outside Dublin, location is captured by planning region dummy variables.

### Other Characteristics

The PRTB registration form aims to capture additional details about the tenancy. For example, landlords registering their property are asked to indicate changes incurred by the tenant (Electricity, Oil, TV licence, Waste, Gas, Other) subletting (Y/N), BER Certificate (Y/N), BER Rating (Y/N), length of lease, deposit amount, frequency of rent (weekly, monthly, annually) and if the rent applies to whole of house or part of house. In reality most of this information is not provided by landlords when registering and has only been completed in a small proportion of cases. This limits the number of other characteristics that can be used as explanatory variables. However, as an additional location explanatory variable we construct a dummy variable taking the value of 1 if there is a third level institution located in the local authority.

**TABLE 1** Summary of Variables Used

	Description
Rent	Monthly rent. Log of monthly rent used in regressions
Number of bedrooms	Dummy variable: 1 Bed, 2 Bed, 3 Bed, 4 Bed, 5 bed plus
Dwelling type	Dummy variable: Detached, Semi-detached, Terraced, Apartment, Other property (flat, maisonette, bedsit)
Number of tenants	Dummy variable: 1, 2, 3, 4 plus
Part	Identifies if rented house is whole or part of house
Tenancy Length	Dummy variable: 1-6 months, 7-9 months, 10-12 months, Over 12 months
Rent Frequency	Dummy Variable: Weekly, Fortnightly, Monthly, Quarterly, Annual
Location	Dummy Variable: Dun Laoghaire-Rathdown, Fingal, Dublin city, South Dublin, Midlands, Mid-East, Mid-West, Midlands, Border, South-East, South West
Third level	Dummy variable indicating the presence of a third level institution in the local authority.

### Constructing the Indices

Having identified and excluded outliers, imposed the threshold for the number of bedrooms, the next stage is to run hedonic regressions. Following international practice the dependent variable is the log of the monthly rent for the dwelling. The explanatory variables are entered as a series of dummy variables. For each characteristic group one dummy variable is omitted to avoid multicollinearity. As is the norm internationally the most frequently occurring observation within each characteristic group is omitted. Thus, the equations calculate the difference in the price of each transaction for that of a reference dwelling.



A number of alternative hedonic methodologies exist. One approach is to run a separate hedonic regression for each time period. This has the advantage of allowing the implicit price for each characteristic to vary over time but 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 revised over a long time series.

An alternative is to include time dummy variables in the hedonic regression. In this case the characteristics 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 constructing the rent index we follow the practice of the Central Statistics Office when constructing its Residential Property Price Index and use the rolling time dummy hedonic regression model. The PRTB 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.

In general the equations are found to explain approximately 50 per cent of the rent paid. However, for some of the sub-indices the proportion explained declines to between 30 and 40 per cent. This is particularly the case for sub indices by location. In view of the limited number of explanatory variables we are able to use and the cross-sectional nature of the data this can be regarded as satisfactory. The coefficients for individual variables are fairly consistent over time, have the expected signs and in most cases are significant at a 95 per cent confidence level in all equations. When a sufficiently long data series exists, the seasonality of the data can be assessed and a seasonally adjusted index introduced if necessary.

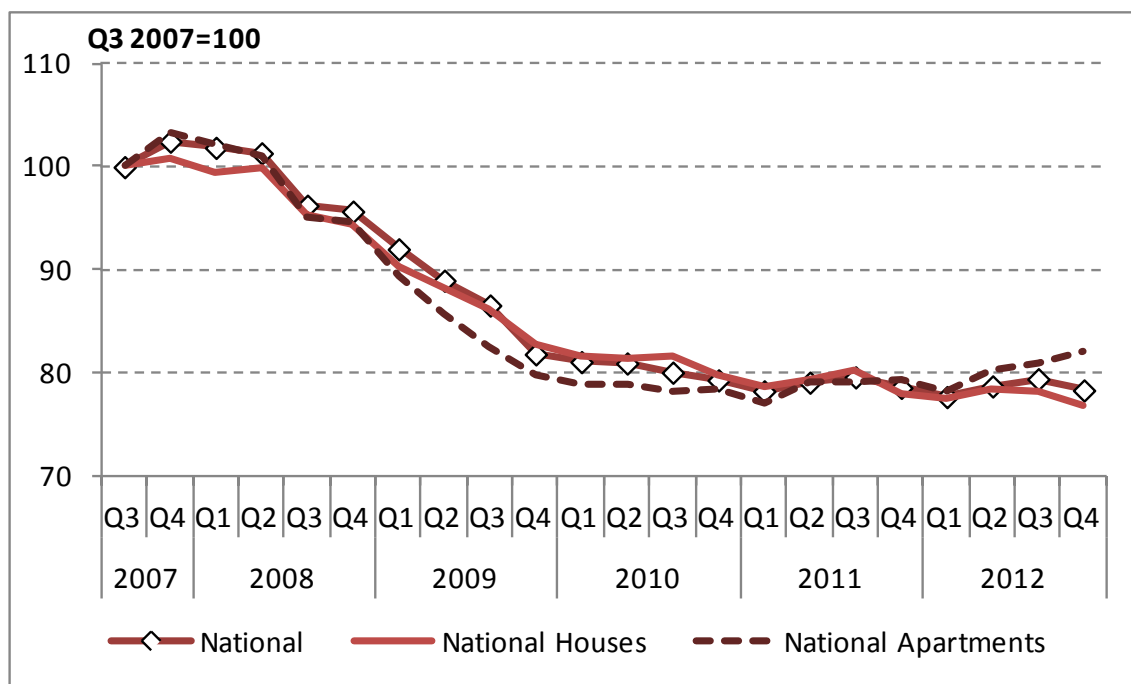
### **The PRTB Rent Index**

Separate indices are calculated for the national market, the national house market, and the national apartment market. Similar indices are calculated for Dublin and Outside Dublin. These indices are shown in Table 2. Table 3 shows standardised rents based on these indices. The standardised rent is based on the average rent in the base period which is then updated using the mix-adjusted index.

Figure 1.2 shows the index values for the national market, national houses and national apartments. The indices show that, nationally, rents rose in the latter half of 2007 before starting to decline in 2008. Declines were strongest in 2008 and 2009 and although there have been further, more moderate, monthly declines since then, on a mix-adjusted basis rents appear to have stabilised at around 80 per cent of their level in quarter 3, 2007. Figure 1.3 shows the index values for the Dublin market, Dublin houses and Dublin apartments. As in the case of the national market the indices show a decline in rents from mid-2008 and a broad stabilisation after the first quarter 2010. Having reached a trough in the first quarter of 2011 the indices show by the end of 2012 rents in Dublin had increased by close to 4 per cent.

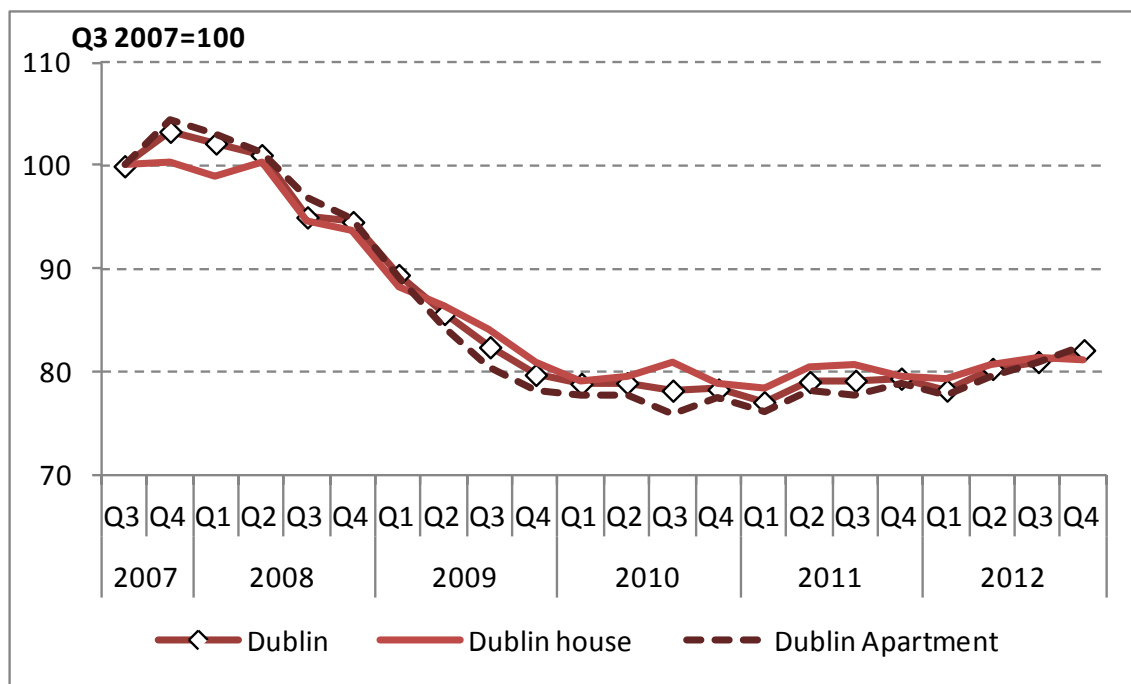
Figure 1.4 shows the index values for the non-Dublin market, non-Dublin houses and non-Dublin apartments, which shows that a similar trend in rents, although the graph suggests that the stabilisation in rents occurred after the Dublin market.

**FIGURE 1.2** Mix-adjusted Rent Index, National Market



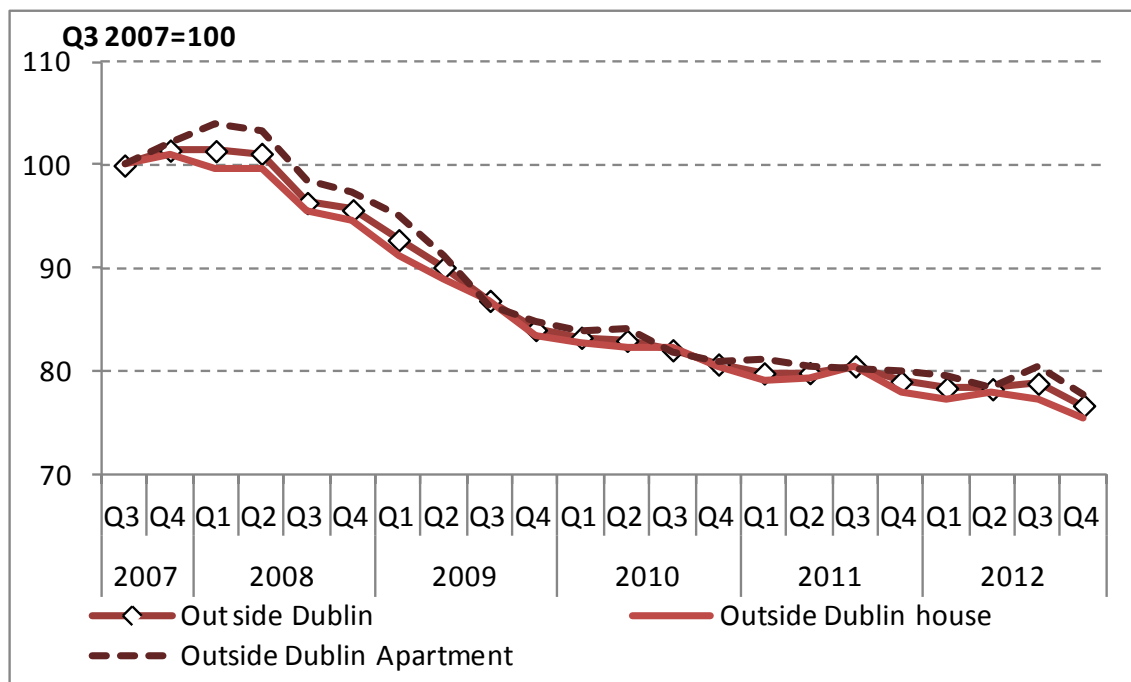
Source: PRTB data.

**FIGURE 1.3** Mix-adjusted Rent Index, Dublin Market



Source: PRTB data.

**FIGURE 1.4** Mix-adjusted Rent Index, Outside Dublin Market

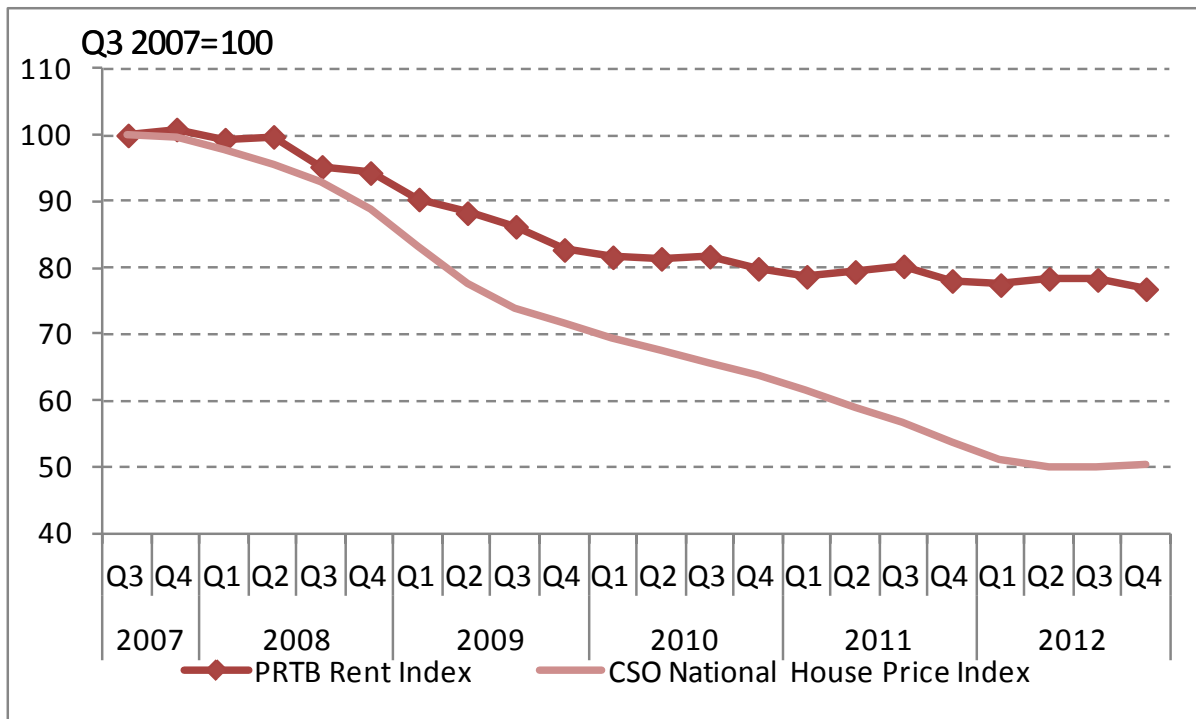


Source: PRTB data.

Using the PRTB index we compare the mix-adjusted measure of rents with a mix-adjusted measure of house prices from the CSO Residential Property Price Index, Figure 1.5. The graph shows that house prices started to decline before rents. In

addition the declines in house prices are more severe than the decline experienced in rent. From quarter 3, 2007 to quarter 4, 2012 house prices have fallen by close to 50 per cent, while market rents have fallen by just under 22 per cent. The smaller decline in rents may reflect the increase in the number of households opting to rent, as shown in Census 2011.

**FIGURE 1.5** National House Prices and National Rents, Q3 2007=100



Source: Based on CSO and PRTB data.

### Conclusions

The new PRTB Rent Index allows us to examine what has happened to market rents since the second half of 2007. The index shows that rents rose between the third and fourth quarter of 2007. Rents fell sharply throughout 2008 and 2009. Since then the declines have been much more moderate and there have been some increases on a basis, although these have been infrequent. In nominal value terms, the index shows that monthly rents declined from a value of €975 in quarter 3, 2007 to €764 in the fourth quarter of 2012.

The PRTB Rent Index provides us with a reliable measure of trends in the private rental market. The intention is that the results will be published quarterly, approximately one month after the end of the quarter.

## References

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**TABLE 2** Quarterly Rental Indices by Property Type and Location, Q3 2007=100

		National	National House	National Apt	Dublin All	Dublin House	Dublin Apt	Outside Dublin All	Outside Dublin House	Outside Dublin Apt
2007	Q3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Q4	102.5	100.9	103.3	103.3	100.4	104.3	101.4	101.1	102.2
2008	Q1	101.9	99.4	102.2	102.2	99.0	103.2	101.4	99.6	104.0
	Q2	101.3	99.8	101.1	101.1	100.3	101.4	101.1	99.6	103.3
	Q3	96.3	95.3	95.1	95.1	94.6	96.9	96.4	95.5	98.5
	Q4	95.7	94.3	94.6	94.6	93.8	94.8	95.7	94.6	97.4
2009	Q1	92.1	90.4	89.5	89.5	88.3	89.3	92.8	91.2	95.0
	Q2	89.0	88.3	85.7	85.7	86.5	84.3	90.2	89.0	91.1
	Q3	86.6	86.2	82.5	82.5	84.2	80.6	86.9	87.0	86.5
	Q4	81.9	82.8	79.8	79.8	81.1	78.2	84.1	83.6	84.9
2010	Q1	81.1	81.6	79.0	79.0	79.1	77.8	83.3	82.8	83.9
	Q2	81.0	81.4	79.0	79.0	79.6	77.8	83.1	82.2	84.2
	Q3	80.1	81.7	78.3	78.3	81.0	76.0	82.1	82.3	82.0
	Q4	79.4	79.9	78.4	78.4	79.0	77.6	80.8	80.5	81.0
2011	Q1	78.3	78.7	77.2	77.2	78.4	76.2	79.9	79.2	81.3
	Q2	79.2	79.4	79.1	79.1	80.5	78.2	79.9	79.5	80.6
	Q3	79.7	80.3	79.2	79.2	80.7	77.9	80.6	80.6	80.4
	Q4	78.7	78.1	79.5	79.5	79.5	79.0	79.1	78.1	80.2
2012	Q1	77.8	77.5	78.3	78.3	79.3	77.9	78.5	77.2	79.7
	Q2	78.8	78.4	80.4	80.4	80.6	79.7	78.4	78.0	78.6
	Q3	79.5	78.2	81.1	81.1	81.5	81.0	78.9	77.4	80.6
	Q4	78.4	76.8	82.2	82.2	81.2	82.5	76.8	75.6	77.8

*Note:* The data in this table may be revised due to retrospective registrations.

*Source:* Based on PRTB Data.

**TABLE 3** Quarterly Standardised Rents by Property Type and Location, Euro

		National	National House	National Apt	Dublin All	Dublin House	Dublin Apt	Outside Dublin All	Outside Dublin House	Outside Dublin Apt
2007	Q3	975	968	1,019	1,212	1,356	1,216	809	817	818
	Q4	999	976	1,053	1,253	1,362	1,269	821	826	836
2008	Q1	993	962	1,041	1,239	1,343	1,255	821	814	850
	Q2	988	966	1,030	1,225	1,361	1,233	818	814	845
	Q3	938	922	969	1,152	1,283	1,178	780	780	806
	Q4	933	913	964	1,147	1,272	1,153	774	773	797
2009	Q1	897	874	912	1,085	1,198	1,086	751	744	777
	Q2	868	854	873	1,039	1,173	1,026	730	727	746
	Q3	844	835	841	1,000	1,142	980	703	710	707
	Q4	798	801	813	967	1,099	951	681	683	694
2010	Q1	791	790	805	957	1,073	946	675	676	687
	Q2	790	788	805	958	1,080	946	672	672	689
	Q3	781	791	798	949	1,099	925	665	672	671
	Q4	774	773	799	950	1,072	944	654	658	663
2011	Q1	763	762	786	935	1,064	927	647	647	665
	Q2	771	769	806	959	1,092	951	647	649	660
	Q3	776	777	808	961	1,095	947	652	658	658
	Q4	767	756	810	963	1,079	961	640	638	656
2012	Q1	758	750	798	949	1,075	947	635	631	652
	Q2	768	759	819	974	1,094	970	634	637	643
	Q3	775	757	826	983	1,105	985	638	632	659
	Q4	764	744	838	996	1,102	1004	621	618	637

*Note:* The standardised rent is based on the average rent in the base period which is then updated using the mix -adjusted index. The data in this table may be revised due to retrospective registrations.

*Source:* Based on PRTB Data.