ESRI
www.esri.ie

Working Paper No. 218
November 2007

# The Public/Private Mix in Irish Acute Public Hospitals: Trends and Implications

**Jacqueline O'Reilly* and Miriam M. Wiley**

**Research Programme on "Health Services, Health Inequalities and Health and Social Gain"**

Subsequently published as "Who's That Sleeping In My Bed? Potential and Actual Utilization of Public and Private In-patient Beds in Irish Acute Public Hospitals" Journal of Health Services Research & Policy, Vol. 15, No 4, October 2010, pp. 210-214.

*Abstract*: The public/private mix in Irish health care is nowhere more evident than in the acute hospital system where both public and private patients can be treated in public hospitals by the same consultant. By undertaking new analyses of data from the Hospital In-Patient Enquiry Scheme, this study investigates this public/private mix and its impact on utilisation of hospital services. Demand- and supply-side factors were both found to be statistically significant in explaining the ratio of private to public discharges across hospitals and over time. Private discharges are found to have higher levels of utilisation of surgical procedures, even though the level of comorbidity did not appear to be any greater for this group. The analysis also found that 'excess utilisation' of public hospital facilities by private discharges in particular hospitals increased over the time period of the study. Despite limitations of available data and methods, this study provides useful insights into the factors driving private and public utilisation in the acute public hospital system in Ireland.

**Corresponding Author*: jacqueline.oreilly@esri.ie

# The Public/Private Mix in Irish Acute Public Hospitals: Trends and Implications

## 1. Introduction

The co-existence of public and private sector involvement in health care is not unique to Ireland. Of particular interest in the Irish health care system, though, is the 'extraordinary symbiosis of public and private medicine' (Barrington, 1987, p. 285). This unusual association is nowhere more evident than in the acute hospital system where both public and private patients can be accommodated in public hospitals and be treated by the same consultant.

The latest government health strategy clearly states that 'the two-tier element of hospital treatment' means that 'public patients frequently do not have fair access to elective treatment' (Department of Health and Children, 2001, p. 48). Such inequities have become particularly acute in recent years because the current structure of private health insurance provision in Ireland has substantially altered from that initially introduced under the 1957 Voluntary Health Insurance Act. Originally, the scheme was instigated with the intention of providing coverage for hospital costs and consultants' charges to those in the top 15 per cent of the earnings distribution whose health care costs were not covered by the State. By 2005, there had been considerable growth in coverage with over half of the population subscribing to private health insurance (Health Insurance Authority, 2006), even though there is universal, but not necessarily free, entitlement to public hospital services.

This study attempts to contribute to the literature on the impact of the public/private patient mix on health care in Ireland by undertaking new analysis of data on the utilisation of acute hospital services over the period 2000 to 2004. Concomitant with the rise in private health insurance subscribers in recent years, there has been a significant increase in the number of private discharges from acute public hospitals. Moreover, the first part of this study (Section 3) identifies considerable variability in the public/private mix, not only over time, but also between hospitals. Regression analysis is used to attempt to determine the factors contributing to this variability. Section 4 considers the implications of the fall in the public/private ratio on the allocation of resources within acute public hospitals. Claims that

public patients are being crowded out of the public hospital system by private patients are investigated. The following analysis, then, complements existing studies which have examined the relationship between private health insurance and the use of secondary care services in Ireland (Nolan and Wiley, 2000; Harmon and Nolan, 2001). However, unlike these previous studies which used survey data, self-reported measures of health or proxies for private status, the present study analyses discharge-level data from the Hospital In-Patient Enquiry (HIPE) Scheme focusing for the first time on a variable relating to the public/private status of hospital discharges. These data are described in more detail in the following section.

## 2. Hospital Discharge Data

The main data source on which this analysis relies is the Hospital In-Patient Enquiry (HIPE) system. HIPE is the only source of national morbidity data available for acute public hospital services, collecting data on discharges from, and deaths in, acute hospitals throughout the Republic of Ireland (HIPE & NPRS Unit, 2002, 2006, 2007). Sixty-one public hospitals participate in HIPE and coverage of discharges from these hospitals has consistently been at 95 per cent or above since the mid-1990s.[1] While day patient and in-patient activity are captured through HIPE, visits to Emergency Departments and outpatient clinics are not.

The data collected by HIPE falls into three groups – administrative, clinical and demographic. Of particular interest for the purpose of this paper is the public/private status of the patient on discharge. This variable, which has been collected since 1999, relates to whether the patient saw the consultant publicly or privately at the time of discharge, and does not relate to the type of bed occupied by the patient.[2] This measure is not without its flaws. First, categorising patients as public or private at only one point in time means that the measure does not capture any changes in public/private status which may have occurred during a patient's hospitalisation. However, given the often cited argument that private care

[1] A small number of private and long stay hospitals also report to HIPE. In the absence of comprehensive data on these two hospital groups, they have been excluded from this analysis, which focuses on acute public hospitals. Underreporting of discharges tends to be more prevalent among large hospitals with high volumes of activity.

[2] As 1999 was the first year in which public/private status was captured by HIPE, this year has been excluded from the period under consideration in this paper.

offers better access, the extent of switching between private and public status may not be significant, although it may be more prevalent for those admitted through the emergency department. Second, the system does not provide information on how patients identified as private funded their care, which may be through private health insurance or directly from the patient's pocket. While it is reasonable to postulate that private patients treated in public hospitals are more likely to pay for their care through private health insurance, the conclusions of this study nevertheless pertain to those receiving private care, irrespective of the means by which this care is funded. Third, there may be a potential misclassification in the public/private status variable as patients with private health insurance could opt to go public, and hence be classified as such in HIPE. In the absence of additional information, it is not possible to quantify the magnitude of this misclassification.

Unfortunately, current legislation prohibits the collection of a unique patient identifier in HIPE. This means that analysis cannot be undertaken at the individual patient level; instead the unit of measurement is the discharge. A further problem for data analysis is that observations on discharges may not be independent as at least some will certainly involve the same patient. Estimating a regression at discharge level would therefore violate the fundamental assumption of independent observations in the classical linear regression model (Greene, 2003). Thus, for the purposes of this analysis, discharge-level data have been aggregated to the hospital level. While this transformation eliminates the problem of correlated observations, unfortunately it means a loss of information.[3]

On the other hand, an advantage of performing the analysis at the hospital level is that the influence of both patients and providers on the public/private mix can be examined (Feldstein, 1977). This study therefore contrasts with previous work on Ireland that used individual-level data and which only allowed the determination of the influence of the characteristics of the individual to influence the demand for health care. Here, the impact of providers and other supply-side factors is also examined. Finally, the HIPE dataset contains a number of objective measures of utilisation as well as objective proxies for health status, which contrast with self-reported measures obtained from surveys typically used in the existing literature (although, as is acknowledged below, the aggregation to hospital level creates some further complications here).

[3] Unique identifiers for each patient exist in each hospital. Work is currently in progress to assess the possibility of undertaking analysis at this level.

A variety of other sources were drawn upon for additional information on variables such as hospital beds, as outlined in the pages below. Hospitals were excluded from the analysis if data on public and private discharges were not available for all years during the period under consideration, 2000 to 2004. On the basis of this and the exclusion of private and long stay hospitals, a total of seven hospitals (11.5 per cent of hospitals) were omitted from the analysis. Invariably, the omission of any hospitals raises concerns about the introduction of sample selection bias. However, the potential for bias is likely to be low for two reasons. First, most of the excluded hospitals were long stay, and consequently, should not adversely impact on the focus of this analysis which is acute hospitals. Second, these hospitals accounted for a small proportion of total discharges (1.6 per cent of total discharges over the entire period).

## 3. Trends in the Public/Private Mix in Acute Public Hospitals

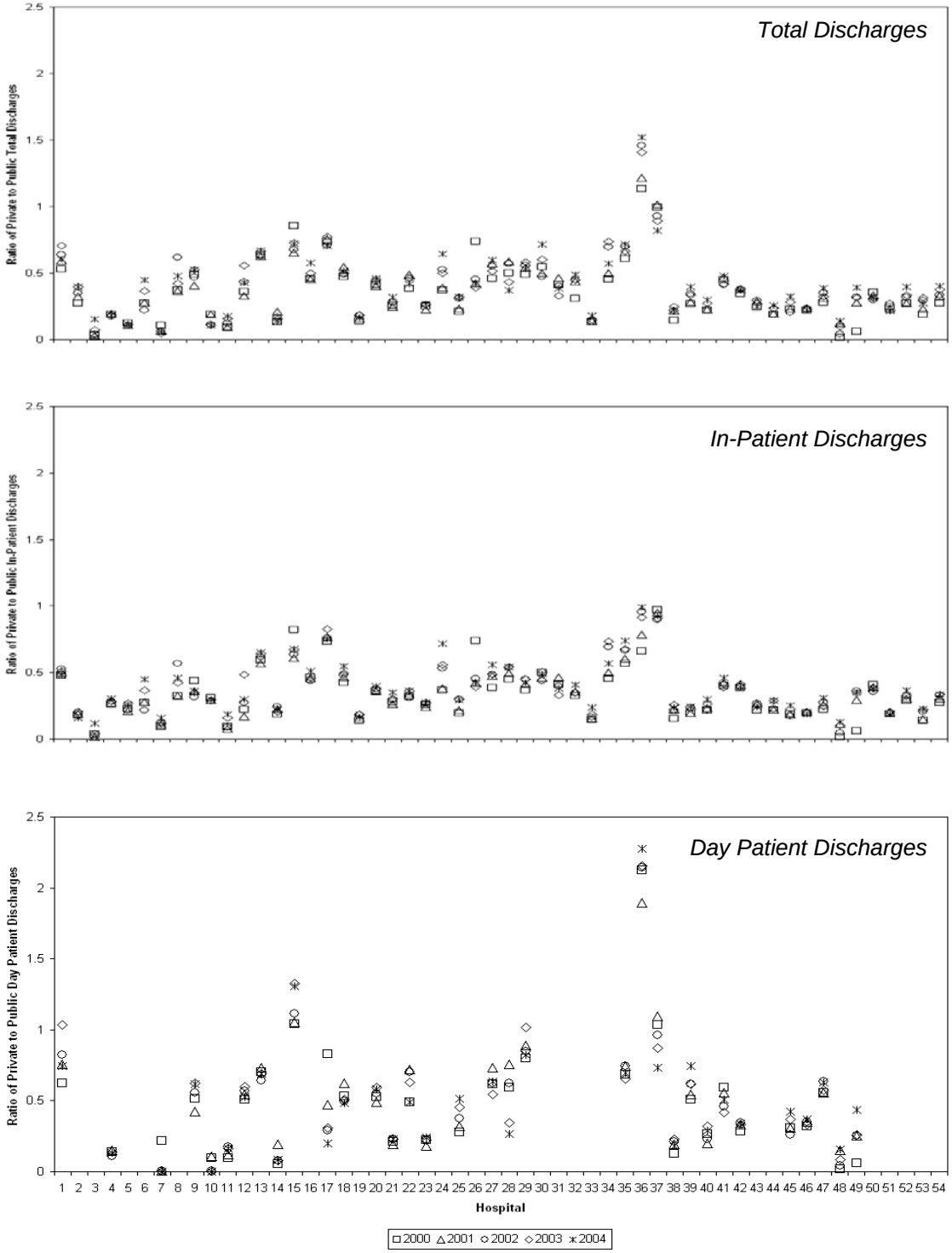
### *3.1 Stylised Facts and Existing Evidence*

Figure 1 shows the ratio of private to public discharges between 2000 and 2004 for the 54 acute public hospitals included in this analysis. The graph demonstrates the two sources of variability in the private to public ratio. First, there was variability across hospitals. In 2000, for example, the ratio of private to public total discharges ranged from 0.02 to 1.13. Such between-hospital deviation may reflect a number of underlying differences, such as the balance between public and private beds and consultants' contracts, the prevalence of private health insurance cover among the discharges treated and the local population, or the types of treatment provided within each hospital. Second, the ratio also changed within hospitals during the time period under consideration, with most hospitals experiencing an increase in their private to public ratio at the same time as the proportion of the national population with private health insurance increased from approximately 42 per cent in 1999 to over 50 per cent in 2004.[4] Variability in the ratio within hospitals was greater for day

[4] Data for 1999 were obtained from the Department of Health and Children (1999). Data for 2004 were obtained from the Health Insurance Authority (2005a) and relate to 31 December in that year. Surveys have suggested that the main drivers of demand for health insurance in Ireland appear to be related to gaining better access to hospital services, choice of consultant and perceptions regarding quality of care (Nolan and Wiley, 2000; Harmon and Nolan, 2001; Nolan, 2004). Moreover, tax relief on premiums would be expected to have also contributed to increased uptake. While tax relief is now at the standard rate, it was originally provided at the marginal rate, which was identified by Wagstaff et al. (1999) as "generous" and "pro-rich".

patient discharges than in-patient discharges, which may reflect the relatively recent move towards day patient treatment which has been accommodated by the substantial increases in facilities for day patients.

**Figure 1: Ratio of Private to Public Discharges for Acute Public Hospitals, 2000-2004**




*Note*: Hospitals are numbered to preserve anonymity.
*Source*: HIPE.

There are supply- and demand-side reasons why patients with private health insurance would have high utilisation of health services. On the demand-side, it is well known that by distorting the price of health services faced by subscribers at the point of use, the financial barriers to accessing health care are at least diminished by insurance. Such distortions are likely to increase the propensity to consume care, as well as the quantity of care demanded, thus leading to inefficient utilisation of scarce health care services. This hypothesis was confirmed by, *inter alia*, the seminal Rand Health Insurance Experiment (Manning et al., 1987; Keeler, 1992). Of course, this problem of excess utilisation is also predicted to be found amongst Ireland's medical card holders, who are entitled to access public health services free at the point of use, and therefore, face similar distortions to those described above. Empirical work by Harmon and Nolan (2001) found that compared to those with no cover, both medical card holders and those with private health insurance were more likely to record an in-patient stay; however, the effect of medical cards was greater than that for insurance (see also Nolan and Nolan, 2003).

In addition to patient-led demand, the differing reimbursement regimes for public and private patients in Ireland have been criticised for creating perverse incentives for providers on the supply-side (Nolan and Nolan, 2004). Consultants are paid on a salary basis for public patients, and on a fee-for-service basis for private patients.[5] By rewarding the volume of care provided, fee-for-service remuneration would be expected to be associated with increased service delivery to private patients (Simoens and Hurst, 2006; Gosden et al., 2001; Hurst, 1991; Donaldson and Gerard, 1989).[6]

Public hospitals also face divergent reimbursement schemes for public and private patients. Hospitals receive a fixed daily payment for private patients, which 'provides a mechanism to improve revenue collection' (Colombo and Tapay, 2004b, p. 22). Even though this amounts to only approximately half of the actual cost of treatment (Nolan and Wiley

[5] There are currently two principal categories of consultant contract. Category 1 contracts allow for private practice to be undertaken only on the public hospital site. In contrast, Category 2 contracts do not restrict private practice, so that consultants may undertake such work both within public hospitals and off-site in private hospitals. As at January 2005, 60 per cent of consultants held Category 1 contracts and just 31 per cent had Category 2 contracts. The remainder comprises consultants who may work on a geographical wholetime basis, are full-time academics, or top grade biochemists (National Hospitals Office, 2005).

[6] Madden et al. (2005) found evidence to the contrary whereby a move from a fee-for-service to a capitation-based system did not eliminate the difference in utilisation between medical card holders and non-medical card holders.

(2000); Commission on Financial Management and Control Systems in the Health Service (2003); Wiley (2005)), it still provides public hospitals with 'an additional income stream' (Colombo and Tapay, 2004a, p. 17), while subsidising private health insurance. The failure to charge the full economic cost of treating private patients in public hospitals could potentially place private hospitals at a competitive disadvantage from the perspective of insurers and represents a 'windfall' gain for health insurers. However, the incentives for public hospitals to treat private patients is dampened somewhat because these hospitals only receive payment on a per diem basis for such patients if they are treated in private beds, and the government sets a quota on these (Nolan and Wiley, 2000).

Empirical evidence of the positive relationship between private insurance and patients' utilisation of health care has been found for a number of countries (Zuvekas and Taliaferro (2003); Buchmueller et al. (2004); Brameld et al. (2006)), including Ireland (Harmon and Nolan (2001); van Doorslaer et al. (2002); and Jones et al. (2004)). Furthermore, the theoretical arguments discussed in this section indicated that the reimbursement mechanism for private care in Ireland may incentivise providers to increase utilisation among private patients. Such demand- and supply-side considerations are incorporated into the model derived in the following section, which attempts to examine the factors driving the variability in the private/public ratio in Irish acute public hospitals.

### *3.2 Econometric Issues*

The process of selecting an econometric model to explain the variation in the ratio of private to public discharges both across hospitals and over time has had to be pragmatic given the constraints relating to the use of HIPE data; specifically, that the data do not permit analysis at the individual patient level while analysis at the discharge level was not pursued due to methodological constraints. *A priori*, a model of hospital discharges would take account of the interdependence of private and public discharges. Ideally, a system of simultaneous equations would be estimated, requiring instrumental variables for both private and public discharges in the respective equations. In the absence of data on obvious instrumental variables, the method adopted here involves estimating a single equation where the dependent variable is the ratio of private to public discharges in hospital *i* in year *t*.

The dependent variable is expressed as a function of a range of explanatory variables affecting the demand for, and supply of, hospital services. On the demand side, the characteristics of the mean discharge for each hospital *i* in year *t* are included, such as age, marital status, medical card status, together with morbidity measures to capture health status.[7] A further parameter proxying for health status was obtained from the National Casemix Programme: mean relative value in hospital *i* in year *t*, indicating the relative cost and complexity of in-patient discharges treated. While this measure may be a more accurate proxy for complexity than morbidity measures, it was only available for that subset of 32 hospitals that were also part of the Casemix Programme (Department of Health and Children, Casemix Unit, 2004).[8] One obvious parameter for which data are unfortunately not available is the proportion of the population with private health insurance at the county level.[9] An index of county disposable income per person (based on the county in which the hospitalisation takes place) has been included as a proxy, albeit imperfect, for private health insurance subscription (Central Statistics Office, 2007). This index captures county personal disposable income relative to that of the State in a given year, indicating a relationship between private care and relative, rather than absolute, income. Intuitively, demand for private care may increase as an individual becomes richer relative to the national average, particularly in a buoyant economy as Ireland was over these years. (However, an increase in relative personal income in a depressed economy may not have the same effect on private health care.) On the supply side, private bed capacity and the type of hospital and its governance structure have been included, as were dummy variables

[7] Observations were excluded from the analysis if sex, marital status or GMS status were recorded as unknown; if they were usually resident outside Ireland; or where there were inconsistencies. These exclusions accounted for 7.3 per cent of discharges reported to HIPE over the five-year period.

[8] Maternity and paediatric hospitals were only included in the National Casemix Programme in 2002 and 2003 respectively. Therefore, as data on these groups of hospitals are not available for the full period in this study, these hospitals were excluded from the casemix analysis. From 2003, the Casemix model was revised to calculate a number of different relative values to take account of differing types of patients (for example, same day in-patient discharges and those with an outlying length of stay). While these different relative values were applied to discharges for 2003 and 2004 in this model, only one value was available to apply to discharges prior to this.

[9] Figures on private health insurance subscriptions are only readily available at a national level from the Health Insurance Authority and prior to this from the Department of Health and Children. Although the Health Insurance Authority has undertaken surveys of consumers in the health insurance market, these data do not focus on county level information (see, for example, Health Insurance Authority, 2005b). Insurers do not have easily accessible data on subscriptions at county level. Even if these data were available from insurers, there are likely to be some issues concerning commercial sensitivity in releasing them to an external organisation. The now discontinued Living in Ireland Survey used to collect information on private health insurance subscriptions, although this was only at a regional level and is only available for two (2000 and 2001) of the five years of interest in this study.

for year and health board/regional authority.[10] It is possible that there may be a relationship between some of this set of explanatory variables (particularly among those used to capture demand-side influences). In the presence of serious multicollinearity, it would not be possible to distinguish the individual effects of the related independent variables on the dependent variable, with the estimated coefficients being insignificant. But as the results presented in the following section do indicate many statistically significant coefficients, multicollinearity does not appear to be a substantial concern for the models presented in this paper.

Ideally, the model would identify how the characteristics of the population at risk (mean age, marital status, etc.) explain the ratio of private to public discharges in hospital *i* in year *t*. However, in this case it is very difficult to identify and measure the population at risk. Hospital catchment areas are typically not well defined in Ireland, apart from those hospitals which provide emergency services. Consequently, the population of hospital discharges was chosen as a proxy for the population at risk (that is, as noted above, the characteristics of the mean discharges were used). This may not be unreasonable if hospitals do not discriminate between those who present for treatment. However, if there is active selection of patients, then the characteristics of those discharged from hospital may be endogenous with the private/public discharge ratio. To test the robustness of the results, sensitivity analyses were performed which alternatively defined the population at risk as first, that of the county, and second, as that of the health board of hospitalisation.[11] While this may eliminate the problem of endogeneity, there is a trade-off in that limited information is available on populations at county and health board levels, particularly in relation to their health status. In addition, this approach reduces the variation in the data as where there are a number of hospitals in the same county or health board/regional authority, these hospitals will have common populations at risk.

[10] Data on hospital beds, and their public/private designation, were obtained from the Department of Health and Children (personal communication). The classification of hospitals according to type and governance structure is set out in HIPE & NPRS Unit (2002, 2006, 2007).

[11] Data on the sex and age breakdown of county and health board/regional authority populations were obtained from the Population Health Intelligence System for intercensal years (that is, all years under consideration apart from 2002) and from the 2002 Census of population. Data on the proportion of county and health board/regional authority populations with medical cards were obtained from the Department of Health and Children (2006).

As one of the perceived advantages of private health insurance is providing the patient with improved access and choice, the relationship between the dependent and independent variables may be expected, *ex ante*, to differ between day patients and planned and emergency in-patients. The results of Chow tests confirmed that it was not appropriate to pool day and in-patient discharges, or planned and emergency in-patients.[12] Consequently, separate models were estimated for these three different categories of discharges.[13]

Formally, these data on a cross section of hospitals at a number of time periods may be considered a panel dataset. However, panel data techniques have not been explicitly preferred to estimate the model. The main reason for adopting alternative estimation techniques is that a model with dummy variables for individual hospitals and time periods (equivalent to a fixed effects or least squares dummy variable model) alone would capture almost all of the variation in the data, and adding the other explanatory variables of interest would have little marginal effect on the fit of the model (see also Hagen et al., 2006). Regressions with only dummy variables for years and individual hospitals as the independent variables explained between 91 and 96 per cent of the variation in the dependent variables. When other independent variables are included, the explanatory power increased only very marginally to between 92 and 97 per cent (see Appendix A, Table A1). Moreover, the high $R^2$ of these latter regressions, together with the high number of statistically insignificant coefficients, is a classic symptom of multicollinearity, which is confirmed by the high mean variance inflation factors. Adding the fixed effect dummy variables substantially reduces the degrees of freedom in the sample, and a longer time series for each individual hospital is required to overcome these problems and permit more precise estimation of the parameters of interest. Consequently, as noted above, the model has instead been estimated as a simple ordinary least squares regression with dummy variables for years, health board/regional authorities and the type and governance structure of groups of hospitals. While ignoring the panel properties of these data, particularly unobserved heterogeneity of individual hospitals, risks introducing omitted variable bias, the inclusion of variables to control for time and characteristics of groups of hospitals will negate this bias to some extent and is thought to be the least inappropriate approach.

[12] The Chow test for poolability found the coefficients on interaction variables to be statistically significant in the combined day and in-patient model (P-value = 0.0000) and the combined planned and emergency in-patient model (P-value = 0.0000).

[13] The number of hospitals included in the models varies because some do not offer day patient or emergency in-patient care.

### *3.3 Results*

Descriptive statistics for key variables included in the regression analysis are reported in Table 1. In 2000, 76.3 per cent of total discharges were classified as public. In 2004, this proportion had fallen to 74.1 per cent, reflecting the fact that the growth in private discharges outstripped that of public discharges (average annual growth rate of 9.09 per cent versus 5.88 per cent). Public discharges were older than their private counterparts in all five years, with the age gap increasing over time. The gender breakdown was very similar for both categories of discharges. The proportion of private discharges who were married was considerably higher than that for public discharges. While understandably a much higher proportion of public discharges held a medical card, there was a rapid increase in the proportion of private discharges with a medical card. This may reflect the change in the eligibility criteria for medical cards, which occurred in July 2001.[14] A higher number of diagnoses were consistently reported for public discharges but, interestingly, proportionately more private discharges underwent at least one procedure, and they also had a greater mean number of procedures. The result that private discharges had more procedures but no more diagnoses than public discharges is suggestive that the treatment received by the two groups was different.

[14] Prior to July 2001, entitlement to medical card was based on a means test. Since 1 July 2001, all those aged 70 years and over were eligible for a medical card, irrespective of income (Comptroller and Auditor General, 2002).

**Table 1: Descriptive Statistics, 2000-2004[a]**

| Mean (SD) | 2000 | | 2001 | | 2002 | | 2003 | | 2004 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Public** | **Private** | **Public** | **Private** | **Public** | **Private** | **Public** | **Private** | **Public** | **Private** |
| Total Discharges | 543,684 | 169,280 | 598,062 | 199,637 | 621,224 | 204,171 | 651,221 | 219,185 | 682,522 | 238,472 |
| Age (years) | 45.06 | 44.24 | 45.41 | 44.31 | 46.18 | 44.64 | 46.72 | 45.00 | 46.91 | 45.30 |
| | (12.39) | (12.23) | (12.25) | (11.69) | (12.39) | (11.83) | (12.51) | (11.81) | (12.65) | (12.07) |
| Male (proportion) | 0.43 | 0.42 | 0.43 | 0.42 | 0.43 | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 |
| | (0.14) | (0.15) | (0.14) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| Married (proportion) | 0.40 | 0.58 | 0.41 | 0.60 | 0.43 | 0.60 | 0.43 | 0.60 | 0.43 | 0.60 |
| | (0.10) | (0.16) | (0.10) | (0.15) | (0.10) | (0.15) | (0.10) | (0.15) | (0.10) | (0.15) |
| Medical card holders (proportion)[b] | 0.57 | 0.11 | 0.57 | 0.12 | 0.57 | 0.15 | 0.58 | 0.16 | 0.58 | 0.17 |
| | (0.17) | (0.18) | (0.16) | (0.16) | (0.18) | (0.13) | (0.19) | (0.15) | (0.19) | (0.17) |
| Diagnosis (number)[c] | 2.50 | 2.30 | 2.54 | 2.34 | 2.85 | 2.58 | 2.92 | 2.64 | 2.87 | 2.63 |
| | (0.61) | (0.62) | (0.59) | (0.63) | (0.80) | (0.77) | (0.80) | (0.78) | (0.80) | (0.78) |
| Procedures (number)[d] | 1.26 | 1.37 | 1.50 | 1.58 | 1.86 | 1.95 | 2.04 | 2.16 | 2.08 | 2.22 |
| | (0.59) | (0.60) | (0.57) | (0.57) | (0.83) | (0.85) | (0.98) | (1.08) | (0.99) | (1.13) |
| Proportion with at least one procedure | 0.74 | 0.80 | 0.83 | 0.87 | 0.86 | 0.89 | 0.87 | 0.90 | 0.88 | 0.91 |
| | (0.23) | (0.21) | (0.18) | (0.17) | (0.18) | (0.17) | (0.18) | (0.17) | (0.17) | (0.16) |

*Notes*: SD, standard deviation.

[a] Relate to discharges from 54 hospitals. Statistics were calculated across all public and private discharges within these hospitals.

[b] Prior to July 2001, eligibility for a medical card was dependent on income. However, following a change in entitlements in July 2001, all those aged 70 years and over became eligible for a medical card, while means tests continued to apply for the rest of the population.

[c] In 2002, the HIPE reporting scheme changed to allow up to nine secondary diagnoses codes, in addition to a principal diagnosis code, to be recorded. Prior to this, a maximum of five secondary diagnoses codes could be reported.

[d] In 2002, the potential number of secondary procedure codes reported to HIPE increased to nine. Previously, the reporting system permitted a maximum of three secondary procedure codes to be recorded. The mean number of procedures is calculated across all discharges, including those who did not undergo a procedure.

Table 2 reports the results for the regression models for day patients and planned and emergency in-patients. The results for both types of elective discharge (that is, day and planned in-patient) were consistent. The overall effect of age was negative and statistically significant, indicating that hospitals with a lower mean age of discharges had a higher number of private discharges relative to public discharges. Hospitals also had a higher private/public discharge ratio if a higher proportion of their discharges were male, married and not medical card holders.[15] These effects were almost always observed for the emergency in-patients. Particularly interesting results are the coefficients on the diagnosis and procedure variables. In all three models, the mean number of diagnoses per discharge

[15] To test for the impact of the 2001 change in eligibility criteria for medical cards, interaction variables between the medical card and year dummies were included in the first estimation of the models. The coefficients on these interaction variables were not jointly statistically significant in any of the three models (P-values of 0.8716, 0.6439 and 0.7276 in the day patient, planned in-patient and emergency in-patient models, respectively), and were omitted from the final model reported in Table 2.

did not significantly affect the hospital's ratio of private to public discharges. However, in the two elective models the mean number of procedures had a positive and statistically significant effect, whereas, in contrast, the variable had a statistically significant negative effect in the emergency in-patient model. Recall that, from the univariate statistics reported in Table 1, private discharges were found to have higher levels of utilisation of surgical procedures than their public counterparts; the results of the regression model therefore provide indirect evidence to support this finding in relation to elective day and in-patient discharges, in that hospitals apparently have a high ratio of private to public discharges where a high mean number of procedures were undertaken *ceteris paribus*. In contrast, the unplanned nature of emergency in-patient discharges may help to explain why this result did not hold in the third emergency in-patient model.

The proportion of hospital beds designated for private patients unsurprisingly had a positive impact on the number of private relative to public discharges, statistically significantly so in the planned and emergency in-patient models. Hospitals located in counties with higher income had a statistically significantly higher ratio of private to public discharges in all three models, although the magnitude of the income effect varied, being smallest in the emergency in-patient model. Interestingly, the year dummy variables had negative coefficients in all three models, and were almost always statistically insignificant in the day patient and planned in-patient models, but mostly statistically significant in the emergency in-patient model.

Relative to hospitals in the Eastern Regional Health Authority, hospitals in all other health boards were more likely to report higher ratios of private to public discharges. The type and governance structure of the hospital had differing effects in the three models. Special hospitals, irrespective of whether they were managed by health boards or on a voluntary basis, were statistically significantly more likely to have higher ratios of private to public day patient discharges compared to general voluntary hospitals. In contrast, in the planned in-patient model the private/public ratio was lower in both general and special health board hospitals, statistically significantly so in the latter group. In the emergency in-patient model, all three hospital type/governance dummies were negative, two of them being statistically significant.

All three models failed the test for omitted variables. This is not surprising given that, as previously mentioned, data are not available on a number of potentially important explanatory variables, such as the proportion of the population with private health insurance. Thus, the results should be interpreted with caution.

**Table 2: Regression Results**

| | Day Patients | | Planned In-Patients | | Emergency In-Patients | |
|---|---|---|---|---|---|---|
| | **Coefficient** | **T-statistic** | **Coefficient** | **T-statistic** | **Coefficient** | **T-statistic** |
| Age | -0.0254 | -2.28** | -0.0154 | -3.17*** | -0.0076 | -1.71* |
| Age Squared | 0.0002 | 1.47 | 0.0002 | 3.25*** | 0.0000 | 1.05 |
| Male | 0.3989 | 1.75* | 0.3396 | 3.30*** | 0.2343 | 2.04** |
| Married | 0.9103 | 2.33** | 0.3931 | 2.53** | 0.1737 | 1.01 |
| Medical card | -0.3742 | -2.08** | -0.3442 | -3.69*** | -0.1387 | -1.92* |
| Diagnosis | -0.0262 | -0.60 | -0.0236 | -1.51 | 0.0029 | 0.42 |
| Procedure | 0.4116 | 5.25*** | 0.0472 | 3.26*** | -0.0426 | -4.60*** |
| Private bed ratio | 0.2952 | 1.65 | 1.5619 | 7.57*** | 1.0134 | 7.72*** |
| County income index | 0.0141 | 2.39** | 0.0102 | 3.75*** | 0.0064 | 4.63*** |
| 2001 | 0.0060 | 0.13 | 0.0126 | 0.43 | 0.0305 | 1.30 |
| 2002 | -0.0153 | -0.32 | 0.0373 | 1.27 | 0.0554 | 2.46** |
| 2003 | -0.0023 | -0.05 | 0.0484 | 1.65 | 0.0955 | 4.11*** |
| 2004 | -0.0086 | -0.17 | 0.0598 | 2.08** | 0.1091 | 4.40*** |
| South-Eastern HB | 0.4292 | 2.85*** | 0.2885 | 3.96*** | 0.2029 | 5.29*** |
| Mid-Western HB | 0.3929 | 3.44*** | 0.3890 | 5.24*** | 0.2052 | 4.71*** |
| Southern HB | 0.5367 | 4.91*** | 0.3006 | 4.41*** | 0.1553 | 3.79*** |
| Western HB | 0.3117 | 2.39** | 0.2837 | 3.75*** | 0.1004 | 2.59** |
| Midland HB | 0.4839 | 3.16*** | 0.3310 | 4.03*** | 0.0688 | 1.78* |
| North-Western HB | 0.4039 | 2.50** | 0.2204 | 2.41** | -0.0086 | -0.16 |
| North-Eastern HB | –[a] | –[a] | 0.2412 | 3.23*** | 0.0575 | 1.51 |
| General, health board | 0.0151 | 0.25 | -0.0452 | -1.21 | -0.0845 | -3.33*** |
| Special, voluntary | 0.2243 | 3.25*** | 0.0332 | 0.62 | -0.0621 | -1.45 |
| Special, health board | 1.2126 | 10.43*** | -0.2039 | -3.78*** | -0.1241 | -1.70* |
| Constant | -1.6776 | -2.17** | -1.0261 | -3.09*** | -0.4065 | -2.49** |
| | | | | | | |
| N[b] | 165 | | 270 | | 250 | |
| $R^2$ | 0.8133 | | 0.6872 | | 0.6536 | |
| Adjusted $R^2$ | 0.7844 | | –[e] | | –[e] | |
| RESET Test (P-value)[c] | 3.02 (0.0319) | | 16.44 (0.0000) | | 2.88 (0.0369) | |
| Test for heteroscedasticity (P-value)[d] | 1.28 (0.2587) | | –[e] | | –[e] | |
| Joint significance of year dummy variables (P-value) | 0.06 (0.9934) | | 1.37 (0.2435) | | 6.54 (0.0001) | |

*Notes*: Dependent variable is the ratio of private to public discharges in hospital *i* in year *t*. Reference group: females, non-married, not medical card holders, year 2000, Eastern Regional Health Authority, general special hospitals.

*** significant at 1 per cent level. ** significant at 5 per cent level. * significant at 10 per cent level.

HB, health board.

[a] No day patient discharges occurred in the North-Eastern Health Board.

[b] Number of hospital/year observations (1 observation = 1 hospital in 1 year). Not all hospitals provide day care treatment or emergency treatment, hence the variation in the number of observations included in the three regression models.

[c] Null hypothesis is that there are no omitted variables in the model.

[d] Null hypothesis is that the errors have constant variance.

[e] Regressions were estimated with robust standard errors to correct for heteroscedasticity.

Table 3 reports results using relative value (from the National Casemix Programme) as an additional, more precise, proxy of health status, but at the cost of observations. Furthermore, the day patient regression model was not run with casemix parameters because the casemix model used for day patients is different to that used for in-patients, and doing so may create various complications. The inclusion of relative value improves the explanatory power of the planned and emergency in-patient models in Table 3, compared to the results reported in Table 2. Generally, the signs and statistical significance of the regressors are similar, but there are a number of differences. Most notably, in both casemix models, the mean number of procedures was no longer statistically significant in explaining the hospital's ratio of private to public discharges. In the planned in-patient casemix model, the coefficients on both the mean number of diagnoses and relative value were statistically significant, although their signs differed. The hospital's ratio of private to public discharges was greater if the number of diagnoses was lower, but higher if the relative value was higher. This indicates that the ratio of private to public discharges will be higher where there is a lower level of comorbidity among a hospital's discharges, but these discharges have a higher level of complexity. This finding is consistent with the result from the original planned in-patient model where a higher number of procedures was associated with a higher private/public discharge ratio. Conversely, in the emergency in-patient casemix model, the coefficient on the diagnoses variable was statistically significant, while the coefficient on the relative value variable was only significant at the 10 per cent level. Overall, the inclusion of the relative value variable yielded regression results which were broadly consistent with those reported in Table 2. For both planned and emergency in-patients, the procedure variable was no longer statistically significant in explaining the private/public discharge ratio when the relative value, controlling for casemix complexity, was included in the models.

**Table 3: Regression Results from Models with Additional Casemix Parameter**

| | Planned In-Patients | | Emergency In-Patients | |
|---|---|---|---|---|
| | **Coefficient** | **T-statistic** | **Coefficient** | **T-statistic** |
| Age | -0.0048 | -0.18 | -0.0323 | -3.11*** |
| Age Squared | 0.0000 | 0.05 | 0.0004 | 3.15*** |
| Male | 0.6750 | 3.36*** | 0.1400 | 1.22 |
| Married | 0.1353 | 0.51 | -0.2418 | -2.43** |
| Medical card | -0.3621 | -4.09*** | -0.1417 | -2.96*** |
| Diagnosis | -0.0569 | -3.16*** | 0.0106 | 1.45 |
| Procedure | 0.0162 | 1.06 | 0.0062 | 0.84 |
| Private bed ratio | 1.0159 | 4.22*** | 0.2272 | 1.56 |
| County income index | 0.0119 | 4.30*** | 0.0075 | 4.94*** |
| 2001 | 0.0412 | 1.63 | 0.0269 | 1.99** |
| 2002 | 0.0856 | 3.04*** | 0.0228 | 1.52 |
| 2003 | 0.1331 | 3.96*** | 0.0158 | 0.81 |
| 2004 | 0.1462 | 4.16*** | 0.0304 | 1.49 |
| South-Eastern HB | 0.4516 | 6.11*** | 0.2665 | 6.51*** |
| Mid-Western HB | 0.6156 | 7.82*** | 0.4695 | 9.13*** |
| Southern HB | 0.4320 | 6.82*** | 0.1832 | 5.16*** |
| Western HB | 0.4291 | 6.11*** | 0.2226 | 5.44*** |
| Midland HB | 0.3871 | 4.88*** | 0.1702 | 3.94*** |
| North-Western HB | 0.3246 | 3.36*** | 0.1888 | 3.22*** |
| North-Eastern HB | 0.3618 | 4.74*** | 0.2137 | 4.80*** |
| General, health board | 0.0218 | 0.66 | -0.1151 | -5.96*** |
| Special, voluntary | _[a] | _[a] | _[a] | _[a] |
| Special, health board | -0.2446 | -3.82*** | 0.1788 | 5.20*** |
| Relative value | 0.2266 | 3.29*** | -0.0946 | -1.83* |
| Constant | -1.4395 | -1.90* | 0.2394 | 0.82 |
| | | | | |
| N[b] | 160 | | 155 | |
| $R^2$ | 0.7898 | | 0.8521 | |
| Adjusted $R^2$ | 0.7542 | | 0.8261 | |
| RESET Test (P-value) | 2.33 (0.0773) | | 0.72 (0.5422) | |
| Test for heteroscedasticity (P-value) | 0.22 (0.6380) | | 0.01 (0.9183) | |
| Joint significance of year dummy variables (P-value) | 4.87 (0.0011) | | 1.35 (0.2560) | |
| Joint significance of age variables (P-value) | 0.57 (0.5692) | | 4.97 (0.0083) | |

*Notes*: Notes and tests as per Table 2.

[a] No special voluntary hospitals included in the econometric models.

[b] Relates to number of hospital/year observations for hospitals participating in the National Casemix Programme. Not all hospitals provide emergency treatment.

The five models estimated the hospital's ratio of private to public discharges using, among other variables, the characteristics of discharges, which themselves may be dependent on a

number of variables, including supply-side factors. Given this potential endogeneity, as outlined in Section 3.2 above, imperfect sensitivity analyses were performed to examine the robustness of results to the selection of discharges as the population at risk. Two alternative populations, namely that of the county and of the health board/regional authority in which each hospital was located, were used as the basis for calculating the demographic parameters (mean age, etc.). Due to the absence of data at such levels of aggregation, these models of hospital private/public discharge ratio do not contain explicit proxies for health status. The results were broadly consistent with those of the three non-casemix models, although, as expected, there was a lack of variability in the independent variables across hospitals located in the same county and health board, as well as evidence of significant multicollinearity.

In conclusion, the results of these regression models were generally consistent with the findings of previous studies which estimated the influences on the demand for private health insurance. As reported by Harmon and Nolan (2001), age, sex and income were found to be significant in explaining the private/public discharge ratio. As suggested by Jones et al. (2005) and Harmon and Nolan (2001), the apparent positive association between the proxies for health status (captured by age, medical card status, and relative value) and the private/public discharge ratio may challenge the concept of adverse selection whereby those with poor health purchase insurance cover under conditions of asymmetric information. Given the statistically significant positive effect of the mean number of procedures on the private/public discharge ratio, the question arises as to whether this finding is consistent with the view that private health insurance afforded patients better access to surgical procedures (Brameld et al., 2006). The data available for this analysis, unfortunately, does enable us to give a definitive answer to this important question.

## 4. Implications of an Increasing Private/Public Ratio

### *4.1 Context and Existing Evidence*

Private health care, it is argued, releases scarce public resources to provide care to those unable to access insurance or self-finance (Mossialos et al., 2002). In the absence of a clear demarcation between resources for public and private provision, however, an increase in demand for private care, which may be associated with growing private health insurance coverage as identified in Section 3.1, may actually place pressures on health systems and result in the re-allocation of resources from public to private (Colombo and Tapay, 2004b). Similarly, a change in supply-side factors, such as the reimbursement mechanism received by providers for the treatment of private patients relative to public patients, may provide an incentive to increase the volume of private activity. Thus, private sector involvement in the Irish health care system may raise concerns that private patients are crowding out public patients.

Measures have been adopted in the Irish health care system to attempt to control for such shifts in resources. The ability of public hospitals to treat private patients is restricted to some extent by a quota on the number of beds designated for the treatment of private patients in public hospitals (Department of Health and Children, 2002). Historically, 20 per cent of beds nationally in acute public hospitals have been designated for private patients. However, in practice, recent findings indicate that the proportion of private elective in-patient discharge activity exceeds this quota, with private treatment accounting for as much as 46 per cent of all activity in some hospitals (Wiley, 2005; Seanad Éireann, 2006). Nolan and Wiley (2000) have extensively discussed the 'crossover' of private patients to designated public beds, in addition to the relatively smaller number of public patients using private beds.

A conflict also exists between public and private consultant practice. The differential pay arrangements noted earlier may encourage consultants to increase throughput of fee-paying private patients, while waiting lists form among public patients (Siciliani and Hurst, 2003). Indeed, by maintaining long waiting lists and times for public patients, consultants may increase demand and capacity for their private practice (Bloor and Maynard, 1992).

Although as Morga and Xavier (2001) argue, consultants' ability to purposively control their waiting list in this fashion is likely to be greater for elective activity.

Thus, despite some expectation of observing an alleviation of pressures in the public sector with an increase in private health insurance coverage, the international empirical evidence for such a relationship is lacking (Propper and Green, 2001). For the possible reasons outlined above, perversely an increase in insurance coverage did not reduce waiting times in Australia and Ireland (Colombo and Tapay, 2003 and 2004a). Tuohy et al. (2000) also found a positive correlation between waiting lists and a "parallel private sector".

The following analysis examines one of the key implications of the increase in private utilisation of acute services from public hospitals in Ireland. In particular, by comparing the estimated actual level of utilisation with the estimated potential level available, the analysis attempts to investigate whether the increase in private utilisation has resulted in a re-allocation of resources between the two types of patients and tests the hypothesis that public patients are being crowded out by private patients in acute public hospitals.

### *4.2 Methods*

This analysis focuses on the ratio of actual to potential utilisation by public and private patients in acute public hospitals. Although similar comparisons of actual and potential bed utilisation have been done before in Ireland (Department of Health and Children, 2002), this study is the first time such a comparison has been undertaken between public and private discharges.

The following ratio for hospital *i* in year *t* has been separately constructed for public (*pu*) discharges:

$$Utilisation\ Ratio_{i,t,pu} = \frac{Estimated\ Actual\ Utilisation_{i,t,pu}}{Estimated\ Potential\ Utilisation_{i,t,pu}}$$

where:

$$Estimated\ Actual\ Utilisation = \sum_{i,t} In-Patient\ Bed\ Days\ Used_{pu},$$

$$Estimated\ Potential\ Utilisation = Number\ of\ In-Patient\ Beds_{i,t,pu} \times 365,$$

and for private (*pr*) discharges:

$$Utilisation\ Ratio_{i,t,pr} = \frac{Estimated\ Actual\ Utilisation_{i,t,pr}}{Estimated\ Potential\ Utilisation_{i,t,pr}}$$

where:

$$Estimated\ Actual\ Utilisation = \sum_{i,t} In-Patient\ Bed\ Days\ Used_{pr},$$

$$Estimated\ Potential\ Utilisation = Number\ of\ In-Patient\ Beds_{i,t,pr} \times 365.$$

Thus, a ratio in excess of (below) 1 would indicate that the estimated actual number of in-patient bed days used by private patients in hospital *i* in year *t* exceeded (was lower than) the potential number estimated to be available. On the basis of this ratio, hospitals were assigned to one of three categories in each year – under utilising both private and public capacity or over utilising either public or private capacity. Comparisons were then undertaken between the characteristics of the hospitals and their discharges in each of the three categories. As in Section 3, data on the number and private/public designation of in-patient beds for each hospital were obtained from the Department of Health and Children.

Calculation of the utilisation ratio in practice throws up a number of problems. First, this ratio relies on the use of the HIPE public/private status designation, which relates to consultant care, as a proxy for patients' use of public/private beds. In 2002, an optional variable was introduced to the HIPE data collection process, which recorded the number of days spent in a private bed for each discharge. However, using these data is hindered by the problems that they are not routinely collected and are only available for a short period of the time period of interest in this study. Consequently, it is assumed that private (public) consultant care is synonymous with private (public) bed utilisation, which may not be an

unreasonable assumption particularly if patients pay for their care through private health insurance.[16]

A second problem is the existence of 'fractional day use' where a given bed is occupied by more than one patient during a particular day. In the absence of information on the times of admission and discharge, fractional day use may lead to overestimation of the utilisation ratio. To minimise this source of bias, the analysis concentrates on in-patient discharges alone as fractional day use is likely to be more prevalent among day patient discharges. Third, because HIPE does not capture all discharges, the numerator and hence the ratio may be underestimated. Fourth, the analysis assumes 100 per cent potential bed occupancy and non-designated beds have been classified as private.[17] Both assumptions lead to overestimation of the denominator and hence underestimation of the utilisation ratio.

In summary, the calculation of the utilisation ratio is imperfect. However, in the absence of other information, it is useful nonetheless because it permits a new examination of the issue of the re-allocation of public resources to private care. Furthermore, the aforementioned issues leading to over- or underestimation of the utilisation ratio may cancel each other out. Even if this is not the case, it is likely that the assumptions made in the construction of the utilisation ratio will be biased against finding excessive utilisation by either public or private patients.

### *4.3 Results*

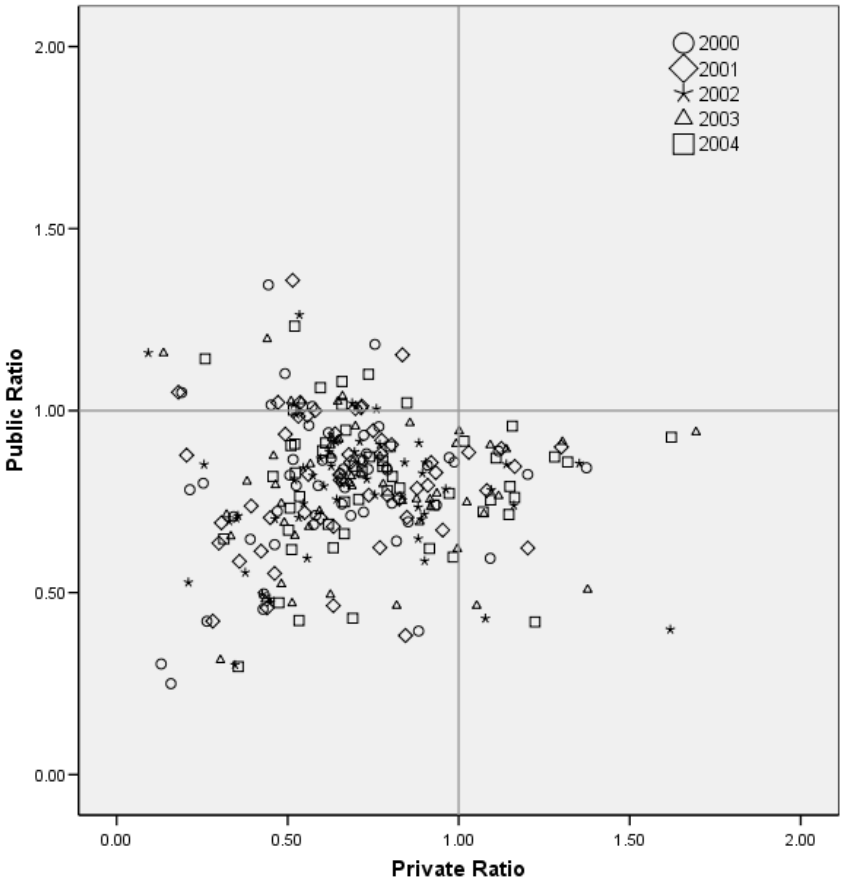
Figure 2 presents the 270 estimated ratios of actual to potential utilisation for public and private in-patient discharges for the 54 hospitals over the period 2000 to 2004 (one observation is one pair of public and private ratios for one hospital in one year). The majority (73.3 per cent) of observations lie in the bottom left quadrant indicating that, for both public and private in-patient discharges, potential capacity was not actually exceeded.

[16] As a test of the reliability of this assumption, private bed days were compared with the proposed proxy private status. The results of this comparison indicated that in 2003 and 2004, approximately 74 per cent of in-patient discharges which recorded positive private bed days were classified as being private to the consultant. This relatively high level of agreement suggests that it is not unreasonable to use the private status of discharges as a proxy for private bed use.

[17] Typically non-designated beds include those located in specialised units, such as intensive care. The majority of beds are designated for use by public or private patients, with a relatively low proportion of beds being non-designated.

There are a few observations in the top left quadrant, where actual public utilisation exceeded the public potential capacity available while there was underutilisation of private capacity. There are also a number of observations in the bottom right quadrant where, conversely, actual private utilisation exceeded potential private capacity while public capacity was underutilised. Reassuringly, no observations were in the upper right quadrant where estimated utilisation exceeded potential capacity for both public and private patients. For the purposes of this analysis, the observations in the top left and bottom right quadrants are of particular interest and may be consistent with the possible crowding out of one group of discharges by another.

**Figure 2: Estimated Ratio of Actual to Potential Utilisation for Public and Private In-Patients by Hospital, 2000-2004**



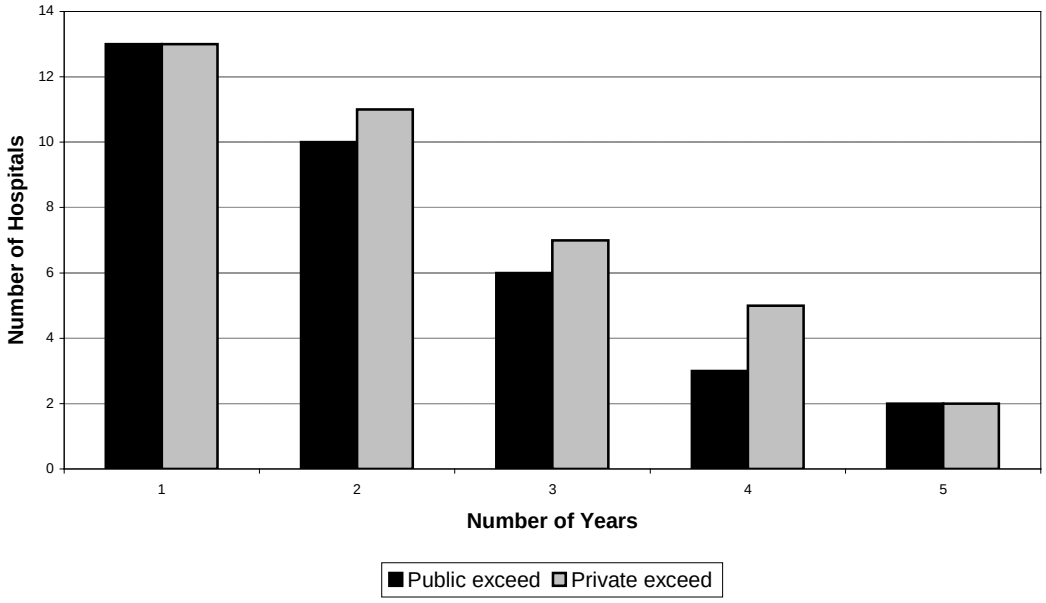

Over the five-year period, there were 38 observations where private utilisation exceeded private capacity but public capacity was underutilised, indirectly suggesting that private

patients possibly crowded out public patients. Conversely, excessive public utilisation but underused private utilisation was recorded for 34 observations which could be consistent with the crowding out of private patients by public patients. Taken together, these excess utilisation observations represented a relatively small proportion (26.7 per cent) of the total number of observations. Moreover, the number of observations with excess private or excess public utilisation was very similar. Both points suggest that excessive utilisation was not a very significant problem when viewed at an aggregate level. However, of more concern is the apparent concentration of excess utilisation in particular hospitals and the fact that the number of observations where potential private capacity was exceeded increased steadily throughout the period. Almost one-third of observations of excess private utilisation were reported in 2004, the latest year for which data are available. By comparison, a smaller proportion (23.5 per cent) of observations of excess public utilisation occurred in 2004. Thus, the growing trend toward excess private utilisation should be a policy concern.

Unfortunately, the nature of the data precludes rigorous multivariate analysis. Particularly, the relatively small proportion of observations with excess utilisation mean that, in a logit analysis, there would be limited variation in the dependent variable. Therefore, a simple univariate analysis follows.

The observations in which capacity was exceeded in at least one year for either public or private in-patients corresponded to 24 of the 54 hospitals. Two of these 24 hospitals exceeded both public and private capacity in different years. Figure 3 shows the number of hospitals with excess private or excess public utilisation throughout the five-year period under study. In total, four hospitals persistently recorded public or private in-patient activity above their estimated potential capacity available in all five years. Of the 13 hospitals that exceeded their private capacity in only one year, just two did so in 2004. On average, private capacity was exceeded for 2.92 of the five years under study, while public capacity was exceeded for 2.62 years.

**Figure 3: Frequency of Excessive Utilisation**




The following analysis is divided into two strands. Following an examination of the characteristics of hospitals that had under- and over-utilisation, the analysis then proceeds to investigate the profile of public and private discharges treated in these hospitals.

As shown in Table 4, there were differences in the type and governance structures of observations with under- and over-utilisation. Approximately two out of every three observations with excess private utilisation involved voluntary hospitals. This was in stark contrast with the hospital breakdown for under-utilisation and excess public utilisation, where the majority of observations involved health board hospitals. The vast majority of observations with excess public utilisation were general hospitals, while this group of hospitals accounted for a relatively lower proportion of observations with excess private utilisation or under-utilisation. Almost one-third of excess private utilisation observations were from hospitals concentrating on a particular specialty.

In hospital-year observations where there was excess private utilisation, 17 per cent of beds, on average, were designated private or non-designated. This was substantially lower than that for hospital-year observations with excess public utilisation (35 per cent of beds designated private or non-designated) and underutilisation (27 per cent). Thus, where there

is excess private utilisation, access to hospital beds for private discharges was seemingly not constrained despite the relatively smaller proportion of designated private beds. Contrary to the hypothesis of private discharges crowding out public discharges, treating more private discharges may be an efficient response if there was spare public bed capacity. However, where excess private utilisation is evident when public patients are on waiting lists for hospital services, this suggests support for the hypothesis that private discharges have better access to hospital services than public patients. Unfortunately, it is not possible to easily test this hypothesis due to the absence of data on the waiting lists for public and private patients.

There were notable differences in the geographical distribution of discharges where there was under- and overutilisation. Almost two-thirds of observations where private capacity was exceeded were concentrated in the Eastern Regional Health Authority. In contrast, two-fifths of observations with excess public utilisation were located in the Mid-Western Health Board.

While there are many factors which could be proposed to explain these findings, further research would be required to enable us to put forward a definitive explanation.

**Table 4: Hospital Characteristics by Under- and Overutilisation**

| | Under Utilisation | Excess Public Utilisation, Under Private Utilisation | Excess Private Utilisation, Under Public Utilisation |
|---|---|---|---|
| Voluntary Hospital | 67 | 5 | 25 |
| (%) | (33.8) | (14.7) | (65.8) |
| Health Board Hospital | 131 | 29 | 13 |
| (%) | (66.2) | (85.3) | (34.2) |
| **Total observations** | **198** | **34** | **38** |
| **(%)** | **(100)** | **(100)** | **(100)** |
| | | | |
| General Hospital | 137 | 32 | 26 |
| (%) | (69.2) | (94.1) | (68.4) |
| Special Hospital | 61 | 2 | 12 |
| (%) | (30.8) | (5.9) | (31.6) |
| **Total observations** | **198** | **34** | **38** |
| **(%)** | **(100)** | **(100)** | **(100)** |
| | | | |
| Mean proportion of in-patient beds designated as private or non-designated | 0.27 | 0.35 | 0.17 |
| (SD) | 0.10 | 0.10 | 0.05 |
| | | | |
| Eastern | 69 | 1 | 25 |
| (%) | (34.8) | (2.9) | (65.8) |
| Midland | 9 | 3 | 3 |
| (%) | (4.5) | (8.8) | (7.9) |
| Mid-Western | 16 | 14 | 0 |
| (%) | (8.1) | (41.2) | – |
| North-Eastern | 23 | 2 | 0 |
| (%) | (11.6) | (5.9) | – |
| North-Western | 3 | 7 | 0 |
| (%) | 1.5 | 20.6 | – |
| South-Eastern | 25 | 2 | 3 |
| (%) | (12.6) | (5.9) | (7.9) |
| Southern | 32 | 1 | 7 |
| (%) | (16.2) | (2.9) | (18.4) |
| Western | 21 | 4 | 0 |
| (%) | (10.6) | (11.8) | – |
| **Total observations** | **198** | **34** | **38** |
| **(%)** | **(100)** | **(100)** | **(100)** |

*Note*: SD, standard deviation.

The profiles of public and private discharges in hospital-years with under- and overutilisation are reported in Table 5. In spite of the lower proportion of beds designated as private in observations with excess private utilisation (see Table 4), the proportion of private discharges treated in observations with excess private utilisation were similar to

those observations where there was under utilisation or excess public utilisation. This result is suggestive of disequilibrium between the demand for, and supply of private beds in observations where there was excess private utilisation.

The results are generally comparable with those discussed in Section 3.3 in that, when compared with private discharges, public discharges were older, more likely to be male, not married and holders of a medical card, irrespective of whether there was under- or overutilisation. It is interesting, however, to compare the characteristics of public and private discharges across the three categories. Where there was excess private utilisation, both private and public discharges were older, more likely to be male, unmarried and medical card holders than those where there was excess public utilisation and under-utilisation. Moreover, discharges from hospital-year observations with excess private utilisation stayed in hospital for almost ten days on average, which was approximately three days longer than that for observations with under utilisation and four days more than observations with excess public utilisation. The level of morbidity (as measured by the number of diagnoses) among discharges where there was excess private utilisation was higher than that where there was excess public utilisation or under utilisation. The number of procedures performed on discharges from hospital-year observations with excess public utilisation was higher that those undertaken on discharges from observations with under utilisation, but was lower than the number of procedures conducted on discharges from observations with excess public utilisation. However, not too much should be made of these differences in the patterns of utilisation because it is clear from the standard deviations that the differences are not statistically significant.

There are distinct differences between the three categories of utilisation in relation to the distribution of in-patient activity between planned and emergency discharges. Almost half of public and private discharges from observations with excess private utilisation were planned. With a higher proportion of planned activity, hospitals with excess private utilisation had greater control over the discharges which they treated, which may imply that under the incentives inherent in the Irish health care system, discussed in Section 3, these hospitals targeted private discharges, with the consequence that public discharges were crowded out. In contrast, observations with excess public utilisation recorded the highest proportion of emergency activity, which suggests that, even facing the same incentives, this group was understandably not in a position to select private discharges. It is surprising to

note that even with the high proportion of planned activity the mean number of procedures performed in hospital-years with excess private utilisation was lower than that for hospital-years with excess public utilisation.

In spite of the longer mean duration of hospital stays, the turnover of private discharges (ratio of planned or emergency private in-patients to private beds) was higher in observations where there was excess private utilisation, irrespective of whether these in-patients were planned or emergency. For public discharges, however, turnover tended to be lower for observations with excess private utilisation.

**Table 5: Profile of Public and Private Discharges by Under- and Overutilisation**

| | **Under Utilisation** | | **Excess Public Utilisation, Under Private Utilisation** | | **Excess Private Utilisation, Under Public Utilisation** | |
|---|---|---|---|---|---|---|
| | **Public Discharges** | **Private Discharges** | **Public Discharges** | **Private Discharges** | **Public Discharges** | **Private Discharges** |
| Private discharges (proportion) | 0.25<br>0.09 | | 0.23<br>0.11 | | 0.26<br>0.06 | |
| Age (years) | 45.52<br>(12.97) | 44.02<br>(11.81) | 47.85<br>(10.30) | 44.96<br>(7.93) | 48.94<br>(18.07) | 47.82<br>(18.64) |
| Male (proportion) | 0.42<br>(0.15) | 0.40<br>(0.16) | 0.44<br>(0.11) | 0.41<br>(0.12) | 0.49<br>(0.10) | 0.49<br>(0.11) |
| Married (proportion) | 0.38<br>(0.09) | 0.57<br>(0.15) | 0.38<br>(0.02) | 0.59<br>(0.09) | 0.37<br>(0.15) | 0.50<br>(0.19) |
| Medical card holders (proportion) | 0.56<br>(0.19) | 0.12<br>(0.12) | 0.62<br>(0.16) | 0.17<br>(0.11) | 0.63<br>(0.16) | 0.20<br>(0.18) |
| Average length of stay (days) | 6.94<br>(3.90) | 6.50<br>(3.77) | 5.90<br>(1.49) | 5.32<br>(1.08) | 9.92<br>(5.30) | 9.76<br>(5.94) |
| Number of diagnoses | 3.01<br>(0.87) | 2.70<br>(0.73) | 3.36<br>(0.79) | 2.89<br>(0.59) | 3.53<br>(1.10) | 3.27<br>(1.15) |
| Number of procedures | 1.96<br>(1.11) | 2.04<br>(1.10) | 2.40<br>(1.42) | 2.46<br>(1.29) | 2.28<br>(1.47) | 2.34<br>(1.60) |
| Planned (proportion) | 0.37<br>(0.30) | 0.44<br>(0.28) | 0.17<br>(0.10) | 0.26<br>(0.15) | 0.46<br>(0.30) | 0.49<br>(0.27) |
| Emergency (proportion) | 0.63<br>(0.30) | 0.56<br>(0.28) | 0.83<br>(0.10) | 0.74<br>(0.15) | 0.54<br>(0.30) | 0.51<br>(0.27) |
| Planned in-patient/bed ratio | 15.51<br>(12.97) | 17.48<br>(13.64) | 11.04<br>(5.98) | 9.39<br>(5.96) | 12.64<br>(4.48) | 28.13<br>(22.51) |
| Emergency in-patient/bed ratio | 33.05<br>(18.24) | 26.34<br>(15.58) | 59.45<br>(16.59) | 28.38<br>(12.35) | 24.20<br>(13.17) | 41.14<br>(25.14) |

*Note*: Figures relate to means, with standard deviations reported in parentheses.

The results of this initial analysis suggest that crowding out of public patients in acute public hospitals in Ireland is limited, although the potential for this problem to occur appears to have grown in recent years. In the absence of detailed information on public patients who are waiting to receive treatment, it is not possible to state definitively to what extent private practice affects the allocation of resources between public and private patients. What the results presented above do indicate, though, is that the potential for hospitals to target private discharges may be greater for planned activity. This finding, together with the rapid growth in elective activity (among both day and in-patients) in recent years raises concerns about the potential for hospitals to use public resources to treat private patients.

## 5. Conclusion

The provision of private health care by public hospitals in Ireland has given rise to concerns regarding equity of access to services by those in need. The issue of efficiency is also a concern as it relates to the way in which existing hospital bed capacity is used for the treatment of public and private patients. Undertaking new analysis of data from the Hospital In-Patient Enquiry, which contains objective measures of utilisation and proxies for complexity, this paper has focused on analysing variability in the ratio of private to public discharges found to occur both across hospitals and over time. Methodological constraints have limited the scope of the exploration which can be attempted here. Nonetheless, the first part of the analysis identified factors which may explain the variability observed, and the second strand considered some of the potential consequences of these findings for the allocation of public hospital resources between public and private discharges.

Demand- and supply-side factors were both found to be statistically significant in explaining the ratio of private to public discharges across hospitals and over time. The regression analysis indicated that the private/public discharge ratio was higher in hospitals treating discharges who were, on average, younger, male, married and not medical card holders. As may have been expected, the proportion of hospital beds designated for private patients and county disposable income both had positive and statistically significant effects on the ratio of private to public discharges. Although comorbidity did not explain the

private/public ratio of day and planned in-patient discharges, the mean number of procedures was found to have a statistically significant and positive effect. This was consistent with the results of the univariate analysis. The higher levels of utilisation of surgical procedures observed for private discharges compared with public discharges, despite not having an obviously higher level of comorbidity, would be expected to be associated with differences in the types of treatment received by the two groups of patients. This raises the possibility of potential enhanced access among private discharges to elective surgical procedures, although it is not possible to provide a definitive conclusion on this issue using the analysis presented here. There was a different story for emergency in-patients because the mean number of procedures had a statistically significant negative effect on the private/public ratio. In short, these results are suggestive that private discharges have higher levels of utilisation of surgical procedures, other things being equal.

Although policy measures have been adopted to attempt to maintain control over private practice in public hospitals, the second part of the analysis confirmed previous conjecture that a number of hospitals were, rightly or wrongly, circumventing these controls. In almost a quarter of all hospitals, the treatment of private discharges was apparently in excess of estimated available private capacity. This analysis also found an equivalent number of hospitals where public utilisation was in excess of the estimated potential capacity available. However, what is of concern is the finding that the problem of excess private utilisation has become more common in recent years. Given fixed capacity constraints in the short term, such excess private utilisation implies a re-distribution of resources from public to private discharges and is consistent with allegations of crowding out of public patients by their private counterparts (although the results may also be compatible with the efficient use of scarce resources by hospitals where there is a relative lack of demand from public patients). Although only a univariate analysis was possible, a number of interesting differences were highlighted between observations on hospital-years characterised by excess private utilisation and those observations characterised by either under utilisation or excess public utilisation. The proportion of beds designated for private patients was lower in hospital-years where there was excess private utilisation, but the proportion of discharges who were private was comparable with the other types of observations. Thus, for the excess private utilisation group, there appears to be a greater disequilibrium between the demand for, and supply of, private beds. Furthermore, in hospital-years characterised by excess private utilisation, the profiles of both public and

private discharges were older and had a higher level of co-morbidity. This group of hospitals did, however, have potentially more control over these discharges as almost half of them were planned, compared to approximately 40 per cent of discharges who were elective in hospitals in years characterised by under utilisation, and approximately 20 per cent in hospitals characterised by excess public utilisation.

However, the limitations of the available data and methods should not be underestimated. The absence of a unique patient identifier in HIPE constrains the issues for analysis, as well as the methodology adopted. Unlike previous Irish studies, the analysis had to be undertaken on aggregated hospital-level data, rather than individual discharge- or patient-level data, although this approach had the advantage that the effects of both supply- and demand-side factors on discharges could be determined. The utilisation ratio analysis also suffered from a number of limitations in calculating the number of bed days actually used and potentially available. Moreover, in using data from HIPE, the study implicitly focused on those who had already accessed hospital services. Therefore, issues regarding the influence of the public/private mix on the decision to utilise, or the ability to gain access to, services could not be fully addressed. Nevertheless, despite these constraints, the analysis provides useful insights into the factors driving private and public utilisation in the acute public hospital system in Ireland.

## References


BARRINGTON, R., 1987. *Health, Medicine and Politics*, Dublin: IPA.

BLOOR K. AND A. MAYNARD, 1992. *Rewarding Excellence? Consultants' Distinction Awards and the Need for Reform*, Discussion Paper No. 100, Centre for Health Economics, University of York.

BRAMELD K., D. HOLMAN, AND R. MOORIN, 2006. "Possession of Health Insurance in Australia – How does it Affect Hospital Use and Outcomes?", *Journal of Health Services Research and Policy*, Vol. 11, pp. 94-100.

BUCHMUELLER, T. C., A. COUFFINHAL, M. GRIGNON, AND M. PERRONNIN, 2004. "Access to Physician Services: Does Supplemental Insurance Matter? Evidence from France", *Health Economics*, Vol. 13, pp. 669-687.

CENTRAL STATISTICS OFFICE, 2007. *County Incomes and Regional GDP 2004*, Dublin: Central Statistics Office.

COLOMBO, F. AND N. TAPAY, 2003. *Private Health Insurance in Australia: A Case Study*, OECD Health Working Papers No. 8.

COLOMBO, F. AND N. TAPAY, 2004a. *Private Health Insurance in Ireland: A Case Study*, OECD Health Working Papers No. 10.

COLOMBO, F. AND N. TAPAY, 2004b. *Private Health Insurance in OECD Countries: The Benefits and Costs for Individuals and Health Systems*, OECD Health Working Papers No. 15.

COMMISSION ON FINANCIAL MANAGEMENT AND CONTROL SYSTEMS IN THE HEALTH SERIVCE ('Brennan Commission'), 2003. Dublin: Stationery Office.

COMPTROLLER AND AUDITOR GENERAL, 2002. *2001 Annual Report of the Comptroller and Auditor General*, Dublin: Stationery Office.

DEPARTMENT OF HEALTH AND CHILDREN, 1999. *White Paper: Private Health Insurance*, Dublin: Stationery Office.

DEPARTMENT OF HEALTH AND CHILDREN, 2001. *Quality and Fairness: A Health System for You. Health Strategy*, Dublin: Stationery Office.

DEPARTMENT OF HEALTH AND CHILDREN, 2002. *Acute Hospital Bed Capacity: A National Review*, Dublin: Stationery Office.

DEPARTMENT OF HEALTH AND CHILDREN, CASEMIX UNIT, 2004. *The Modernisation of the National Casemix Programme in Ireland*, Dublin: Department of Health and Children.

DEPARTMENT OF HEALTH AND CHILDREN, 2006. *Health Statistics 2005*, Dublin: Stationery Office.

DONALDSON, C. AND K. GERARD, 1989. "Paying General Practitioners: Shedding Light on the Review of Health Services", *Journal of the Royal College of General Practitioners*, Vol. 39, pp. 114-117.

FELDSTEIN, M., 1997. "Quality Change and the Demand for Hospital Care", *Econometrica*, Vol. 45, No. 7, pp. 1681-1702.

GOSDEN, T., F. FORLAND, I. S. KRISTIANSEN, M. SUTTON, B. LEESE, A. GIUFFRIDA, M. SERGISON, AND L. PEDERSEN, 2001. "Impact of Payment Method on Behaviour of Primary Care Physicians: A Systematic Review", *Journal of Health Services Research and Policy*, Vol. 6, pp. 44-55.

GREENE, W. H., 2003. *Econometric Analysis*, Fifth Edition, NJ: Prentice Hall.

HAGEN, T. P., M. VEENSTRA AND K. STAVEM, 2006. *Efficiency and Patient Satisfaction in Norwegian Hospitals*, HORN Working Paper 2006:1.

HARMON, C. AND B. NOLAN, 2001. "Health Insurance and Health Services Utilization in Ireland", *Health Economics*, Vol. 10, No. 2.

HEALTH INSURANCE AUTHORITY, 2005a. *Annual Report & Accounts '04*, Dublin.

HEALTH INSURANCE AUTHORITY, 2005b. *The Private Health Insurance Market in Ireland: A Market Review*, Dublin.

HEALTH INSURANCE AUTHORITY, 2006. *Annual Report & Accounts 2005*, Dublin.

HIPE & NPRS UNIT, ESRI, 2002. *Activity in Acute Public Hospitals in Ireland 1990-1999*, Dublin: The Economic and Social Research Institute.

HIPE & NPRS UNIT, ESRI, 2006. *Activity in Acute Public Hospitals in Ireland 1992-2001*, Dublin: The Economic and Social Research Institute.

HIPE & NPRS UNIT, ESRI, 2007. *Activity in Acute Public Hospitals in Ireland: 2002 Annual Report*, Dublin: The Economic and Social Research Institute.

HURST J. W., 1991. "Reforming Health Care in Seven European Nations", *Health Affairs*, Fall, pp. 7-21.

JONES, A. M., X. KOOLMAN, E. VAN DOORSLAER, 2005. "The impact of supplementary private health insurance on the use of specialists in selected European countries", part of the ECuity II and III Projects.

KEELER, E. B., 1992. "Effects of Cost Sharing on Use of Medical Services and Health", *Medical Practice Management*, Summer, pp. 317-321.

MADDEN, D., A. NOLAN AND B. NOLAN, 2005. "GP Reimbursement and Visiting Behaviour in Ireland", *Health Economics*, Vol. 14, No. 10, pp. 1047-1060.

MANNING, W. G., J. P. NEWHOUSE, N. DUAN, E. B. KEELER AND A. LEIBOWITZ, 1987. "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment", *American Economic Review*, Vol. 77, No. 3, pp. 251-277.

MORGA A. AND A. XAVIER, 2001. *Hospital Specialists' Private Practice and its Impact on the Number of NHS Patients Treated and on the Delay for Elective Surgery*, Discussion Papers in Economics No. 2001/01, York: The University of York.

MOSSIALOS, E., A. DIXON, J. FIGUERAS AND J. KUTZIN (eds.), 2002. *Funding Health Care: Options for Europe*, Buckingham: Open University Press.

NATIONAL HOSPITALS OFFICE/COMHAIRLE AND HEALTH SERVICES EXECUTIVE, 2005. *Consultant Staffing: January 2005*.

NOLAN, A. AND B. NOLAN, 2003. *A Cross-Sectional Analysis of the Utilisation of GP Services in Ireland: 1987-2001*, ESRI Working Paper No. 1, Dublin: The Economic and Social Research Institute.

NOLAN, A. AND B. NOLAN, 2004. *Ireland's Health Care System: Some Issues and Challenges*, ESRI Working Paper No. 14, Dublin: The Economic and Social Research Institute.

NOLAN, B., 2004. *Health Insurance in Ireland: Issues and Challenges*, ESRI Working Paper No. 10, Dublin: The Economic and Social Research Institute.

NOLAN, B. AND M. M. WILEY, 2000. *Private Practice in Irish Public Hospitals*, Dublin: Oak Tree Press in association with The Economic and Social Research Institute.

POPULATION HEALTH INTELLIGENCE SYSTEM, http://www.inispho.org/phis/indicators/searchresults.php; date accessed: 26 March 2007.

PROPPER C. AND K. GREEN, 2001. "A Larger Role for the Private Sector in Financing UK Health Care: the Arguments and the Evidence", *Journal of Social Policy*, Vol. 30, No. 4, pp. 685-704.

SICILIANI L. AND J. HURST, 2003. *Explaining Waiting Times Variations for Elective Surgery across OECD Countries*, OECD Health Working Papers No. 7.

SEANAD ÉIREANN, 2006. *Public Hospital Land: Motion*, Vol. 183, 31 May 2006; http://historical-debates.oireachtas.ie/S/0183/S.0183.200605310008.html; date accessed: 11 January 2007.

SIMOENS, S. AND J. HURST, 2006. *The Supply of Physician Services in OECD Countries*, OECD Health Working Papers No. 21.

TUOHY C. H., C. M. FLOOD, M. STABILE, 2000. "How Does Private Finance Affect Public Health Care Systems? Marshalling the Evidence from OECD Nations", *Journal of Health Politics, Policy and Law*, Vol. 29, No. 3, pp. 359-396.

VAN DOORSLAER, E., X. KOOLMAN AND F. PUFFER, 2002. *Equity in the Use of Physician Visits in OECD Countries: Has Equal Treatment for Equal Need been Achieved?*, Chapter 13 in Measuring Up: Improving the Performance of Health Systems in OECD Countries, OECD Publishing.

WAGSTAFF, A., E. VAN DOORSLAER, H. VAN DER BURG, S. CALONGE, T. CHRISTIANSEN, G. CITONI, U-G. GERDTHAM, M. GERFIN, L. GROSS, U. HÄKINNEN, P. JOHNSON, J. JOHN, J. KLAVUS, C. LACHAUD, J. LAURITSEN, R. LEU, B. NOLAN, E. PERÁN, J. PEREIRA, C. PROPPER, F. PUFFER, L. ROCHAIX, M. RODRÍGUEZ, M. SCHELLHORN, G. SUNDBERG, O. WINKELHAKE, 1999. "Equity in the Finance of Health Care: Some Further International Comparisons", *Journal of Health Economics*, Vol. 18, pp. 263-290.

WILEY, M. M., 2005. "The Irish Health System: Developments in Strategy, Structure, Funding and Delivery since 1980", *Health Economics*, Vol. 14, pp. S169-S186.

ZUVEKAS, S. H. AND G. S. TALIAFERRO, 2003. "Pathways to Access: Health Insurance, the Health Care Delivery System, and Racial/Ethnic Disparities, 1996-1999", *Health Affairs*, Vol. 22, No. 2, pp. 139-153.

**Acknowledgements**
This analysis was undertaken as part of the research programme on "Health Services, Health Inequalities and Health and Social Gain". This programme is supported by the Health Research Board, and was carried out by researchers at the Economic and Social Research Institute (ESRI), University College Dublin and the University of Ulster.

The authors would like to acknowledge the comments received from participants at an internal ESRI seminar and the Autumn 2006 meeting of the European Health Policy Group. We are very grateful to Professor Denis Conniffe for advice on the statistical methodologies applied in this paper.

## Appendix A: Alternative Estimation using Least Squares Dummy Variable Regression

**Table A1**

| | Day Patients | | Planned In-Patients | | Emergency In-Patients | |
|---|---|---|---|---|---|---|
| | **Coefficient** | **T-statistic** | **Coefficient** | **T-statistic** | **Coefficient** | **T-statistic** |
| Age | - | -0.01 | 0.0053 | 0.28 | -0.0007 | -0.08 |
| Age Squared | -0.0001 | -0.43 | -0.0001 | -0.37 | 0.0000 | 0.05 |
| Male | -0.3026 | -0.73 | 0.7256 | 3.51*** | -0.2478 | -1.78* |
| Married | 1.6426 | 3.30*** | 0.8957 | 4.21*** | -0.0025 | -0.02 |
| Medical card | -0.2045 | -1.55 | -0.2548 | -2.10** | -0.1191 | -1.26 |
| Diagnosis | 0.0565 | 1.36 | 0.0098 | 0.62 | 0.0338 | 2.58** |
| Procedure | -0.0123 | -0.18 | 0.0377 | 3.34*** | -0.0024 | -0.29 |
| Private bed ratio | 0.1464 | 1.09 | -0.7396 | -2.86*** | 0.3714 | 1.37 |
| County income index | -0.0008 | -0.13 | 0.0060 | 1.63 | 0.0009 | 0.36 |
| 2001 | 0.0088 | 0.36 | 0.0034 | 0.23 | 0.0103 | 0.79 |
| 2002 | 0.0155 | 0.80 | 0.0126 | 0.71 | 0.0055 | 0.37 |
| 2003 | 0.0392 | 1.58 | 0.0247 | 1.42 | 0.0242 | 1.50 |
| 2004 | 0.0467 | 1.86* | 0.0296 | 1.53 | 0.0313 | 1.87* |
| Constant | 1.0056 | 1.18 | -0.3930 | -0.84 | 0.3371 | 1.05 |
| | | | | | | |
| N[a] | 165 | | 270 | | 250 | |
| $R^2$ | 0.9698 | | 0.9432 | | 0.9205 | |
| $R^{2\,b}$ | 0.9559 | | 0.9181 | | 0.9090 | |
| RESET Test (P-value)[c] | 2.30 (0.0806) | | 4.83 (0.0029) | | 1.93 (0.1256) | |
| Joint significance of year dummy variables (P-value) | 1.21 (0.3108) | | 0.98 (0.4203) | | 1.96 (0.1030) | |
| Joint significance of hospital dummy variables (P-value) | 73.27 (0.0000) | | 45.05 (0.0000) | | 52.12 (0.0000) | |
| Variance inflation factor (mean) | 207.86 | | 52.54 | | 32.60 | |

*Notes*: Regressions were estimated with robust standard errors to correct for heteroscedasticity. Reference group: females, non-married, not medical card holders, 2000, Hospital 1.

Although included in the models reported above, the coefficients for the individual hospital dummy variables are not reported in Table A1.

*** significant at 1 per cent level. ** significant at 5 per cent level. * significant at 10 per cent level.

[a] Relates to number of hospital/year observations. Not all hospitals provide day care treatment or emergency treatment.

[b] Relates to $R^2$ for regression models which include year and hospital dummy variables only as independent variables.

[c] Null hypothesis for RESET test is that there are no omitted variables in the model.

| Year | Number | Title/Author(s)<br>ESRI Authors/Co-authors Italicised |
|---|---|---|
| **2007** | 217 | Regret About the Timing of First Sexual Intercourse: The Role of Age and Context<br>*Richard Layte*, Hannah McGee |
| | 216 | Determinants of Water Connection Type and Ownership of Water-Using Appliances in Ireland<br>*Joe O'Doherty, Seán Lyons* and *Richard S.J. Tol* |
| | 215 | Unemployment – Stage or Stigma?<br>Being Unemployed During an Economic Boom<br>*Emer Smyth* |
| | 214 | The Value of Lost Load<br>*Richard S.J. Tol* |
| | 213 | Adolescents' Educational Attainment and School Experiences in Contemporary Ireland<br>*Merike Darmody, Selina McCoy, Emer Smyth* |
| | 212 | Acting Up or Opting Out? Truancy in Irish Secondary Schools<br>*Merike Darmody, Emer Smyth* and *Selina McCoy* |
| | 211 | Where do MNEs Expand Production: Location Choices of the Pharmaceutical Industry in Europe after 1992<br>*Frances P. Ruane*, Xiaoheng Zhang |
| | 210 | Holiday Destinations: Understanding the Travel Choices of Irish Tourists<br>*Seán Lyons, Karen Mayor* and *Richard S.J. Tol* |
| | 209 | The Effectiveness of Competition Policy and the Price-Cost Margin: Evidence from Panel Data<br>Patrick McCloughan, *Seán Lyons* and William Batt |
| | 208 | Tax Structure and Female Labour Market Participation: Evidence from Ireland<br>*Tim Callan,* A. Van Soest, *J.R. Walsh* |
| | 207 | Distributional Effects of Public Education Transfers in Seven European Countries<br>*Tim Callan,* Tim Smeeding and Panos Tsakloglou |
| | 206 | The Earnings of Immigrants in Ireland: Results from the 2005 EU Survey of Income and Living Conditions<br>*Alan Barrett* and *Yvonne McCarthy* |

205 Convergence of Consumption Patterns During Macroeconomic Transition: A Model of Demand in Ireland and the OECD
*Seán Lyons, Karen Mayor* and *Richard S.J. Tol*

204 The Adoption of ICT: Firm-Level Evidence from Irish Manufacturing Industries
*Stefanie Haller* and *Iulia Traistaru-Siedschlag*

203 EU Enlargement and Migration: Assessing the Macroeconomic Impacts
Ray Barrell, *John Fitz Gerald* and Rebecca Riley

202 The Dynamics of Economic Vulnerability: A Comparative European Analysis
*Christopher T. Whelan* and *Bertrand Maître*

201 Validating the European Socio-economic Classification: Cross-Sectional and Dynamic Analysis of Income Poverty and Lifestyle Deprivation
*Dorothy Watson, Christopher T. Whelan* and *Bertrand Maître*

200 The 'Europeanisation' of Reference Groups: A Reconsideration Using EU-SILC
*Christopher T. Whelan* and *Bertrand Maître*

199 Are Ireland's Immigrants Integrating into its Labour Market?
*Alan Barrett* and *David Duffy*

198 "Man Enough To Do It"? Girls and Non-Traditional Subjects in Lower Secondary Education
*Emer Smyth* and *Merike Darmody*

197 Analysing the Effects of Tax-benefit Reforms on Income Distribution: A Decomposition Approach
Olivier Bargain and *Tim Callan*

196 Heterogeneous Exporter Behaviour: Exploring the Evidence for Sunk-Costs and Hysteresis
*Frances Ruane*

195 The Regional Dimension of Taxes and Public Expenditure in Ireland
*Edgar Morgenroth*

194 Do Consultation Charges Deter General Practitioner Use Among Older People? A Natural Experiment
*Richard Layte*, Hannah McGee and Ann O'Hanlon