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Maternal Country of Birth Differences in Breastfeeding at Hospital Discharge in Ireland

AOIFE BRICK*
The Economic and Social Research Institute, Dublin
Trinity College Dublin

ANNE NOLAN
TILDA, Trinity College Dublin
The Economic and Social Research Institute, Dublin

Abstract: In 2010, 46 per cent of Irish-born mothers were breastfeeding at hospital discharge, in comparison with 84 per cent of non-Irish-born mothers. Using data from the Irish National Perinatal Reporting System, we find that maternal country of birth is a large and highly significant predictor of breastfeeding at hospital discharge in Ireland over the period 2004-2010. Furthermore, we find that most of the difference in breastfeeding rates between Irish-born and non-Irish-born mothers is unexplained, i.e., not due to differences in observable characteristics. Our findings suggest that there are strong cultural/attitudinal differences in breastfeeding behaviour between Irish-born and non-Irish-born mothers.

I INTRODUCTION

The benefits of breastfeeding for babies, mothers and society have been demonstrated in a large scientific literature (Department of Health and Children, 1994; Weimer, 2001; American Academy of Pediatrics, 2005;

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* Email: aoife.brick@esri.ie

Department of Health and Children, 2005; van Rossum *et al.*, 2006; Horta *et al.*, 2007; Ip *et al.*, 2007; Bartick and Reinhold, 2010; McCrory and Layte, 2011; 2012). Reflecting the proven benefits, the WHO recommends that babies should be exclusively breastfed for the first six months and that some breastfeeding should continue up to two years old and beyond (WHO, 2003). The advice also states that, save for a small number of medical conditions, exclusive breastfeeding should be possible for the vast majority of mothers. Despite such recommendations, breastfeeding initiation and duration rates remain varied across developed countries.

Cross-country comparisons of breastfeeding rates are complicated by a lack of comparable data; countries use a variety of data sources and collection methods, and the accepted WHO definitions of breastfeeding initiation and duration are not universally applied. Nonetheless, the available data show rates of breastfeeding in Ireland that are considerably lower than in other European countries. In 2010, Ireland had the lowest "any" breastfeeding rate of 14 European countries, measured both at birth and 48 hours postpartum ('any' breastfeeding refers to both exclusive breastfeeding and breastfeeding combined with artificial feeding methods) (EURO-PERISTAT Project *et al.*, 2013). While the rate in Ireland has been increasing over time, it remains below national targets (Department of Health and Children, 1994; 2005).

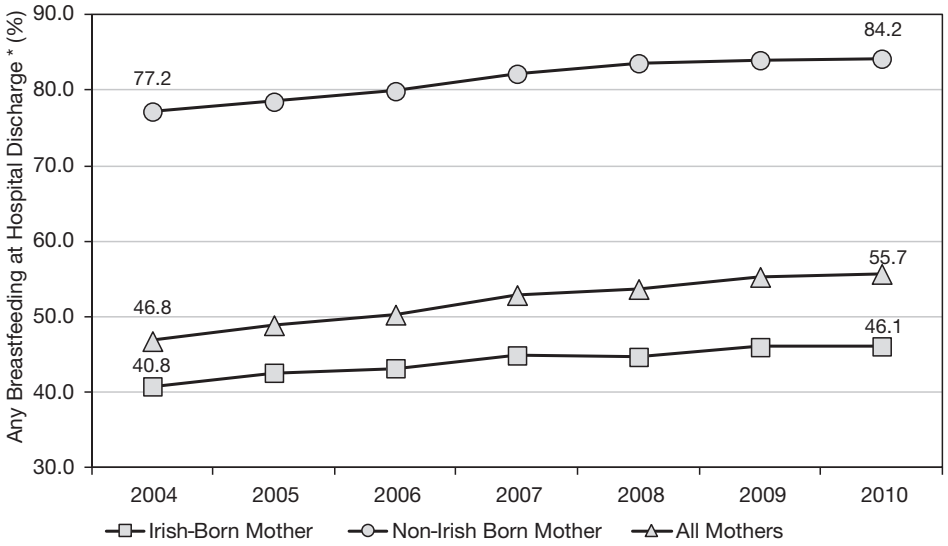
As well as the breastfeeding rate being much lower in Ireland than in other European countries there are distinct patterns within Ireland by maternal country of birth. As illustrated in Figure 1, there are large absolute differences in the "any" breastfeeding at hospital discharge rate between Irish-born and non-Irish-born mothers, and these differences have persisted over time. In 2010, 46.1 per cent of Irish-born mothers were breastfeeding at hospital discharge, in contrast to 84.2 per cent of non-Irish-born mothers.

These figures are broadly consistent with national data from the countries that represent the most common countries of birth among Irish immigrants.[1] However, as noted above, obtaining comparable country-level data is difficult. According to the European Perinatal Health Report, the "any" breastfeeding rate 48 hours postpartum in 2010 was 81.0 per cent in the UK and 86.6 per cent in Poland, in comparison with 54.0 per cent in Ireland (EURO-PERISTAT Project *et al.*, 2013). Rates of breastfeeding in non-EU countries from which large numbers of immigrants to Ireland originate such as Nigeria, India and the Philippines are also considerably higher than in Ireland (see Table 1).

Differences in breastfeeding rates within countries by maternal country of birth/race/ethnicity are not unique to Ireland, although the scale of the

[1] Taken from Table CD610: Population Usually Resident and Present in the State by Sex, Birthplace, Age Group and Census Year (www.cso.ie/px) [last accessed 12 June 2013].

Figure 1: *Percentage of Mothers Breastfeeding at Discharge from Hospital by Maternal Country of Birth, 2004-2010*



Notes: * Includes exclusive breastfeeding and breastfeeding combined with artificial feeding.
Source: Sample derived from the National Perinatal Reporting System – See Section II for description.

differential between Irish-born and non-Irish-born mothers is particularly distinctive (Begley *et al.*, 2009; Tarrant *et al.*, 2009). The existence of racial/ethnic differences in breastfeeding rates is highlighted by a large body of literature from, in particular, the US and the UK. Griffiths *et al.* (2005) found that after adjustment for a variety of characteristics, those most likely to breastfeed in England were women of black Caribbean origin. A similar study by Kelly *et al.* (2006) found that women of black Caribbean and black African origin in the UK were most likely to breastfeed.

In contrast to the UK results, US research has found that children of black mothers were significantly less likely to be breastfed (Li and Grummer-Strawn, 2002; Singh *et al.*, 2007). However, children of black mothers who were born outside the US were significantly more likely to be breastfed, and within ethnic groups, children who had mothers who were born outside the US were significantly more likely to be breastfed than children of US-born mothers (Merewood *et al.*, 2006; Singh *et al.*, 2007). Celi *et al.* (2005) found that immigrants of all races/ethnicities were significantly more likely to breastfeed than their US-born counterparts, but that there were no significant racial/ethnic differences in breastfeeding rates among US-born women. This

Table 1: *National Breastfeeding Rates, Selected Countries, Selected Years*

	2008[a] %	2010[b] %
Ireland	n/a	54.0
UK	76.0[c]	81.0
Poland	–	86.6
Lithuania	–	–
US	73.9	–
Latvia	–	96.9
Nigeria	97.3	n/a
Romania	88.3[d]	–
India	95.7[c]	n/a
Philippines	87.7	n/a
Germany	–	–

Notes: Countries are ranked in order of numbers of persons resident in Ireland in 2011 with that country of birth (see Table CD610: Population Usually Resident and Present in the State by Sex, Birthplace, Age Group and Census Year from www.cso.ie/px) [last accessed 12 June 2013].

a Refers to "ever" breastfeeding rate in 2008. Data are from the WHO.
b Refers to "any" breastfeeding rate in the first 48 hours postpartum in 2010. Data are from the European Perinatal Health Report.
c Data refer to 2005.
d Data refer to 2004.

Sources: EURO-PERISTAT Project *et al.* (2013); www.who.int/nutrition/databases/infantfeeding/countries/en/index.html [last accessed 12 June 2013].

suggests the existence of the "healthy immigrant effect", whereby upon arrival immigrants display better health behaviours/outcomes than natives. However, they may deteriorate over time as immigrants "acculturate" and adopt the values, behaviours, attitudes, etc. of their new home. Significant effects for "time since migration" on breastfeeding have also been observed for Puerto Ricans and Hispanics in the US (Anderson *et al.*, 2004; Gibson-Davis and Brooks-Gunn, 2006; Harley *et al.*, 2007; Sussner *et al.*, 2008) and Vietnamese in Australia (Rossiter and Yam, 2000).

In the Irish context, there has been comparatively little research on the "healthy immigrant" effect, largely due to the relatively recent nature of large-scale immigration to Ireland. A recent study found little evidence for a "healthy immigrant" effect in Ireland using three broad indicators of health status, but did not examine health behaviours such as breastfeeding (Nolan, 2012). Examining the health status and health behaviours of Irish migrants to England, both in comparison to the native English-born and the "stayers" in Ireland, Delaney *et al.* (2011) found that selected cohorts of Irish migrants

to England exhibited an *unhealthy immigrant* effect, particularly in terms of mental health and some behaviours such as smoking and alcohol consumption. Data from the *Growing Up in Ireland* study on Irish children confirm that non-Irish-national mothers have significantly higher rates of breastfeeding, although the analyses did not distinguish among more disaggregated non-Irish national groups (McCrory and Layte, 2011; 2012).

As a potential indicator of differential attitudes towards breastfeeding, international research has also highlighted the importance of paternal country of birth/race/ethnicity, in addition to maternal country of birth/race/ethnicity, in determining breastfeeding rates (Griffiths *et al.*, 2005; Gibson-Davis and Brooks-Gunn, 2006; 2007). Research from the UK and US suggests that the independent effect of paternal ethnicity may reflect differences in the nature of social support for breastfeeding across ethnic groups, with non-white mothers more likely to rely on their immediate family rather than health-care professionals for support with regard to breastfeeding (Griffiths *et al.*, 2005; Gibson-Davis and Brooks-Gunn, 2006). However, Griffiths *et al.* (2005) found a significant effect for white mothers of having a partner of a different ethnic group (and that the effects were insignificant for mothers of other ethnic groups).

Much of the previous research in Ireland has focused on the determinants of breastfeeding initiation and duration, using information collected from small samples (Fitzpatrick *et al.*, 1994; Ward *et al.*, 2004; Tarrant *et al.*, 2009). A number of studies have found that non-Irish-nationals and non-white ethnic groups were significantly more likely to breastfeed (Begley *et al.*, 2009; Tarrant *et al.*, 2009; McCrory and Layte, 2011). A recent study, using the same data employed in this paper, found that the increasing share of mothers from Eastern Europe explained nearly 40 per cent of the increase in the breastfeeding rate observed over the period 2004-2010. The next most important driver of the increase in breastfeeding at hospital discharge over the period was increasing maternal age, leading the authors to conclude that existing policy initiatives have been relatively ineffective in increasing breastfeeding rates in Ireland, i.e., most of the observed increase occurred simply because the characteristics of mothers were changing in ways that made them increasingly likely to breastfeed (Brick and Nolan, 2013). The importance of paternal attitudes (Begley *et al.*, 2009; Tarrant *et al.*, 2009; Tarrant *et al.*, 2011), and attitudes among wider society have also been highlighted in Irish research (Connolly *et al.*, 1998; Tarrant *et al.*, 2009), although the role of paternal country of birth/race/ethnicity has not been analysed to date.

With the exception of the few studies that have noted the discrepancy in breastfeeding behaviour in Ireland on the basis of maternal country of

birth/race/ethnicity, more detailed analysis of the differences is absent. This is partly due to a lack of data (the National Perinatal Reporting System (NPRS), the only source of micro data on all births in Ireland, first collected information on maternal country of birth in 2004, and no information is available on race/ethnicity). Using data from the NPRS, the aims of this paper are to:

(i) examine the determinants of breastfeeding at hospital discharge, with a particular focus on maternal country of birth,

(ii) examine the extent to which the difference in breastfeeding at hospital discharge rates between Irish-born and non-Irish-born mothers is due to differences in characteristics.

To further unpick the role of culture or attitudes, we also extend the analysis to a sub-sample of mothers for whom we also have information on the paternal characteristics, including country of birth.

Section II describes the data, Section III outlines our methods, Section IV presents empirical results, and Section V discusses the findings and concludes.

II DATA

2.1 *Data Source*

In this paper we use the NPRS which reports data on all births over 500 grams in the Republic of Ireland (ROI). The data contain information on maternal characteristics (i.e., age, marital status, country of birth, etc.), and baby characteristics (i.e., gestational age, birthweight, type of delivery, etc.). More detailed clinical data are not available from NPRS.

A total of 489,170 live and stillborn births are available for analysis over the period 2004-2010. Non-hospital births (2,967), births in private hospitals (15,171), and births from one hospital where breastfeeding was under-reported (34,905)[2] are excluded. In common with other studies, stillbirths and early neonatal deaths (3,481) and multiple births (15,674) are excluded. In the absence of detailed clinical data we include only healthy babies (Merewood *et al.*, 2006; Tarrant *et al.*, 2011) by using the following exclusions as a proxy: babies of less than 37 weeks gestation (29,258), less than 2.5kg (26,433) and

[2] Following an audit, one hospital was found to be under-reporting data on breastfeeding at hospital discharge. See (HRID ESRI, 2010) p. 72).

where the discharge date of mother and baby are different (21,381). After excluding a further 4,164 observations with missing values on variables of interest, the final data set contains 385,549 births, which represents 78.8 per cent of all babies born in the ROI between 1 January 2004 and 31 December 2010.

As noted, we also undertake our analysis on a sub-sample of mothers for whom we have information on paternal characteristics. In the NPRS, paternal characteristics are only recorded where the mother is married. The total number of complete observations for this analysis amounts to 230,750, which represents 47.2 per cent of all babies, and 70.9 per cent of all babies born to married mothers in the ROI between 1 January 2004 and 31 December 2010.

2.2 *Dependent Variable*

The dependent variable is a binary indicator of whether the mother was engaged in "any" breastfeeding upon discharge from hospital. It is important to note that the "any" breastfeeding at hospital discharge rate as reported by NPRS is not the same as a breastfeeding initiation rate. That is, a mother may have initiated breastfeeding following the birth of the baby but stopped before she was discharged from hospital. Research studies suggest that there is little difference between the rates in Ireland (Begley *et al.*, 2009; Tarrant *et al.*, 2009). No follow-up data are available on breastfeeding duration in the NPRS. Data from the *Growing Up in Ireland* study show that among mothers of nine-year olds who had "ever" breastfed, only 23.2 per cent breastfed for at least 26 weeks (the WHO recommended length) (McCrory and Layte, 2012).[3]

2.3 *Independent Variables*

The main independent variable of interest is maternal country of birth, which is disaggregated into seven mutually exclusive categories: ROI; UK; EU-15 (excluding ROI and UK); EU-27 Accession States (excluding ROI, UK, and EU-15 – referred to as EU-27 for the remainder of the paper); Africa; Asia; and Other. Information on length of time since migration is not available. The data reveal a steady decrease in the proportion of births in this sample to Irish-born mothers, from 83.6 per cent in 2004 to 74.9 per cent in 2010. The most noticeable change has been the large increase in the proportion of mothers from the EU-27 (1.7 per cent in 2004 to 11.7 per cent in 2010). Ideally information describing maternal ethnic/racial background, as well as length of time resident in the ROI, would be available. However, an examination of other Irish data sources confirms that country of birth is a good proxy for citizenship and racial/ethnic background (Nolan, 2012).

[3] The figure of 23.2 per cent is not reported directly in McCrory and Layte (2012) but was calculated by the authors from the data presented in Table 2 of that paper.

Other independent variables include those familiar from previous research on breastfeeding determinants (see Dennis (2002) for a review). Maternal characteristics include age, marital status, socio-economic group and parity. Socio-economic group is derived from information on maternal occupation, and coded, with minor modifications, using the schema employed by the Central Statistics Office (see Appendix C in HIPE and NPRS Unit ESRI (2012) for further details).[4] Variables describing the child's sex, birthweight, gestation length, type of delivery and postpartum length of stay (LOS) are also included. A binary variable that indicates whether the hospital in which the mother gave birth was designated "baby friendly" is also included. The Baby Friendly Hospital Initiative (BFHI) is a worldwide programme of the WHO and UNICEF, and was established in 1991 to encourage maternity hospitals to implement the "Ten Steps to Successful Breastfeeding" and to practise in accordance with the International Code of Marketing of Breastmilk Substitutes. Hospitals that are assessed as meeting the standards of the BFHI are designated "baby friendly" (WHO and UNICEF, 2009). The continuous variables describing maternal age, parity, postpartum LOS and birthweight are capped at values of 45, 7, 10 and 5,000 respectively.

Potentially important independent variables that are not available in our data include maternal education (Dubois and Girard, 2003; Tarrant *et al.*, 2009; Jones *et al.*, 2011); maternal smoking (Di Napoli *et al.*, 2006; Kristiansen *et al.*, 2010); prenatal intentions (Donath and Amir, 2003); previous exposure to breastfeeding (Meyerink and Marquis, 2002; Celi *et al.*, 2005); length of maternity leave (including unpaid leave) and maternal expectations/plans regarding return to employment (although there is some evidence that length of maternity leave has little effect on initiation) (Baker and Milligan, 2008). While we have no direct information on maternal or paternal attitudes (Scott *et al.*, 2006; Kohlhuber *et al.*, 2008; Tarrant *et al.*, 2009), we use additional information on paternal characteristics, including country of birth, to further unpick the role of cultural or attitudinal influences on breastfeeding behaviour in Ireland.

[4] Using the 12 occupational categories used by the CSO, a seven-category variable to identify socio-economic group is constructed. "Professional/managerial" comprises higher professionals, lower professionals and employers/managers; "clerical" comprises salaried employees, intermediate non-manual workers and other non-manual workers; "skilled/semi-skilled" comprises skilled, semi-skilled and unskilled manual workers; "unemployed" comprise unknowns who classify themselves as unemployed and provide no previous occupation; "home duties" comprise unknowns who record their occupation as full-time mother/father/parent, stay at home mother/father/parent, housewife or home duties; "other" comprises farmers, farm managers, other agricultural occupations and fisherman and unknowns who provide no information on occupation, i.e., not stated.

2.4 *Summary Statistics*

2.4.1 Determinants of Breastfeeding at Hospital Discharge

Examining the proportion of mothers in the sample who were engaged in "any" breastfeeding at hospital discharge in 2010 by various characteristics in Table 2, we find that mothers that were non-Irish-born, older, married, in

Table 2: *Breastfeeding at Hospital Discharge by Maternal and Birth Characteristics, 2010 (%)*[a]

	All		*All*
Total	55.7	39-41 weeks	55.8
		42 weeks and over	60.7
Maternal Age at Delivery			
<20 years	24.5	*Method of Delivery*	
20-29 years	51.2	Spontaneous	55.7
30-34 years	59.5	Caesarean	53.2
35 years and over	59.5	Other	59.1
Maternal Marital Status		*Birthweight*	
Married	61.6	2,500-2,999g	50.9
Not married[a]	44.4	3,000-3,499g	55.1
		3,500-3,999g	56.9
Maternal Socio-Economic Group		4,000g and over	56.7
Professional/managerial	69.4		
Clerical	49.6	*Sex of Baby*	
Skilled/semi-skilled	63.5	Male	55.6
Unskilled	51.8	Female	55.7
Unemployed	40.1		
Home duties	47.1	*Maternal Postpartum LOS*	
Other[b]	53.3	0-1 Days	50.6
		2 Days	55.1
Parity		3-5 Days	59.1
Primiparous	61.6	More than 5 days	57.5
Multiparous	51.5		
		Baby Friendly Hospital Designation	
Gestational Age at Delivery		Yes	56.9
37-38 weeks	53.6	No	55.1

Notes: Includes exclusive breastfeeding and breastfeeding combined with artificial feeding. Percentages columns subject to rounding.
Data for 2004-2009 are available from the authors.

[a] Includes divorced, separated, and widowed.

[b] Includes farmers and farm managers, other agricultural occupations and fisheries workers, and not classifiable.

Source: Sample derived from the National Perinatal Reporting System – See Section II for description.

higher socio-economic groups, with fewer previous children and with a longer postpartum LOS had higher rates of breastfeeding (see also Guttman and Zimmerman, 2000; Kelly and Watt, 2005; Scott *et al.*, 2006; Kohlhuber *et al.*, 2008; Skafida, 2009; Kristiansen *et al.*, 2010). In terms of baby characteristics, mothers of low birthweight babies, those of shorter gestational age and those born via Caesarean section had lower rates (see also Meyerink and Marquis, 2002; Scott *et al.*, 2006; Tarrant *et al.*, 2009; Kristiansen *et al.*, 2010). Data for 2004-2009 are available from the authors.

2.4.2 Decomposition of the Difference in Breastfeeding at Hospital Discharge Rates between Irish-Born and Non-Irish-Born Mothers

A key objective of this research is to examine the extent to which the difference in breastfeeding at hospital discharge rates between Irish-born and non-Irish-born mothers can be explained by the differences in maternal characteristics. In other words, do non-Irish born mothers breastfeed at higher rates primarily because they have characteristics that are associated with higher breastfeeding rates? Columns (1) to (7) of Table 3 illustrate the characteristics of mothers in each of the seven country of birth groupings for the year 2010 (data for 2004-2009 are available from the authors). The data indicate that in some cases non-Irish-born mothers have characteristics that are predictive of higher rates of breastfeeding, e.g., EU-15 mothers are on average older than Irish-born mothers. However, many group characteristics are predictive of *lower* rates of breastfeeding, e.g., mothers born in the EU-27 are on average younger and in lower socio-economic groups, and a lower proportion are married, than Irish-born mothers.

III METHODS

3.1 *Determinants of Breastfeeding at Hospital Discharge*

We first analyse the determinants of breastfeeding at hospital discharge in Ireland in Ireland over the period 2004-2010 by estimating the following model:

$$y_i = X_i \beta + C_i \gamma + \varepsilon_i \tag{1}$$

where y_i is the dummy variable which indicates whether the mother was breastfeeding at hospital discharge, X_i is a vector of maternal characteristics (and year dummies) and C_i is the indicator of maternal country of birth. As the indicator of breastfeeding at hospital discharge is dichotomous, we use probit regression methods.

Table 3: *Distribution of Maternal and Birth Characteristics, by Maternal Country of Birth, 2010*

	(1) ROI	*(2) UK*	*(3) EU-15*	*(4) EU-27*[c]	*(5) Africa*	*(6) Asia*	*(7) Other*[d]
Maternal Age at Delivery (years)	31.8	31.6	33.0	28.6	30.9	31.3	31.4
Maternal Marital Status							
Married	65.1	57.2	59.0	61.5	67.7	87.2	76.8
Not married[a]	34.9	42.8	41.0	38.5	32.3	12.8	23.2
Maternal Socio-economic Group							
Professional/managerial	32.4	27.9	38.3	10.8	10.8	36.8	24.1
Clerical	25.3	17.1	22.4	22.1	7.1	7.5	13.3
Skilled/semi-skilled	3.8	2.8	3.2	15.7	2.1	2.5	4.2
Unskilled	12.6	12.9	14.2	20.2	11.9	9.4	12.2
Unemployed	3.4	5.4	2.1	6.1	7.7	3.0	5.0
Home duties	18.3	28.6	14.5	22.1	47.0	32.4	34.2
Other[b]	4.1	5.3	5.2	3.0	13.3	8.4	7.0
Parity	1.0	1.1	0.7	0.6	1.8	0.8	0.8
Gestational Age at Delivery (weeks)	39.7	39.7	39.7	39.7	39.5	39.4	39.7
Method of Delivery							
Spontaneous	57.3	64.4	61.4	61.6	62.4	56.9	62.5
Caesarean	25.5	20.4	19.3	18.3	29.1	26.2	22.4
Other	17.2	15.2	19.3	20.2	8.5	16.9	15.1
Birthweight (g)	3,594.8	3,561.3	3,520.8	3,554.2	3,496.5	3,394.0	3,595.4
Sex of Baby							
Male	51.0	51.2	51.2	50.8	51.6	50.4	49.8
Female	49.0	48.8	48.8	49.2	48.4	49.6	50.2
Maternal Postpartum LOS (days)	2.5	2.3	2.3	2.3	2.5	2.4	2.4
Baby Friendly Hospital Designation							
Yes	28.4	26.3	32.7	36.2	40.1	27.6	33.6
No	71.6	73.7	67.3	63.8	59.9	72.4	66.4

Notes: Percentages columns subject to rounding.
Data for 2004-2009 are available from the authors.

a Includes divorced, separated, and widowed.
b Includes farmers and farm managers, other agricultural occupations and fisheries workers, and not classifiable.
c Accession States – Bulgaria and Romania are included from 2004.
d Includes the Rest of Europe, the Americas, Australia, New Zealand (incl. Oceania), multi-nationality, non-Irish, and no nationality.

Source: Sample derived from the National Perinatal Reporting System – See Section II for description.

3.2 *Decomposition of the Difference in Breastfeeding at Hospital Discharge Rates between Irish-Born and Non-Irish-Born Mothers*

To examine the extent to which the difference in the breastfeeding rate between Irish-born and non-Irish-born mothers is due to differences in observed characteristics between the two groups, we use a non-linear approximation of the Blinder-Oaxaca decomposition technique (Blinder, 1973; Oaxaca, 1973; Fairlie, 2005). The technique is used to study group differences in an outcome variable, and has been employed in analyses of racial/ethnic differences in birthweight (Lhila and Long, 2012); child mortality (Panis and Lillard, 1995; Bhalotra *et al.*, 2010); child health insurance cover (Wehby *et al.*, 2011); and life expectancy (Geruso, 2012).

The average difference in the breastfeeding at hospital discharge rate between Irish-born and non-Irish-born mothers may be expressed as:

$$\bar{Y}^I - \bar{Y}^F = \left[\sum_{i=1}^{N^I} \frac{F(X_i^I \hat{\beta}^I)}{N^I} - \sum_{i=1}^{N^F} \frac{F(X_i^F \hat{\beta}^I)}{N^F}\right] + \left[\sum_{i=1}^{N^F} \frac{F(X_i^F \hat{\beta}^I)}{N^F} - \sum_{i=1}^{N^F} \frac{F(X_i^F \hat{\beta}^F)}{N^F}\right] \quad (2)$$

where $\bar{Y}^I$ is the average probability of breastfeeding at hospital discharge for group J ($J = I, F$), X_i^J is the vector of independent variables of observation i in group J, $\hat{\beta}^J$ is the vector of coefficient estimates and N^J is the number of observations in group J. In this case, group I is the sample of Irish-born mothers, group F is the sample of non-Irish-born mothers, and the reference is group I. We also undertake the decomposition using the estimated coefficients of group F and the pooled coefficients as the reference (Costa-Font *et al.*, 2008; Bhalotra *et al.*, 2010; Lhila and Long, 2012).

In this application, the first term on the right hand side of (2) measures the amount of the breastfeeding gap that is due to differences in the characteristics of the two groups. The second term captures the degree to which Irish-born and non-Irish-born mothers with similar observable characteristics breastfeed at different rates. This may be interpreted as reflecting group-specific attitudes, cultural norms, or other omitted variables. The first part may be further decomposed into the relative contributions of each of the observed independent variables. We estimate seven of these models for each year, first comparing Irish-born mothers with non-Irish-born mothers in aggregate, and then comparing Irish-born mothers to each of the disaggregated country of birth groups (UK; EU-15; EU-27; Africa; Asia; and Other). We use the "Fairlie" decomposition command in STATA 12.1 (Jann, 2006).

3.3 *Extension*

As noted, paternal attitudes have been found to be significant in determining breastfeeding behaviour in a number of contexts, and paternal

country of birth/race/ethnicity has been used as a proxy for culture and attitudes in a number of studies. Unfortunately, paternal characteristics are only recorded in NPRS when the mother is married. Therefore, any conclusions from the extended analysis need to be interpreted in this context.

We run both the probit and Fairlie analyses on this sub-sample of mothers, including the additional information on paternal characteristics. We replace the indicator for maternal country of birth with a categorical indicator of various combinations of maternal and paternal country of birth. However, using the fully disaggregated variables, some combinations of maternal and paternal country of birth were very uncommon (e.g., EU-15 mother and Asian father), so the fully disaggregated 49-category maternal/paternal country of birth variable could not be used. Instead, we aggregate any combinations with small cell sizes to the "non-Irish mother and non-Irish-father" group (essentially, this corresponds to the off-diagonal combinations). This results in a more detailed dependent variable with 20 categories, as described in the notes to Table 6. We construct the variable in this way as we are particularly interested in the interaction between maternal and paternal country of birth; for example, do Irish-born mothers married to non-Irish fathers have higher breastfeeding rates than Irish-born mothers married to Irish-born fathers?

3.4 *Robustness Checks*

A unique health identifier is not available in NPRS; while it is possible that the same woman could give birth twice in one year, it is unlikely. However, over the period 2004-2010, it is possible that the same woman could give birth more than once. To test whether our results are dependent on this assumption, we also estimate the models on the sample of primiparous women. To control for hospital-specific unobserved factors, we correct the estimated standard errors for clustering at the hospital level (we also ran the models with fixed effects for each hospital; results are very similar and are available on request from the authors). As noted in Section 2.1, in the absence of detailed clinical data we include only healthy babies (Merewood *et al.*, 2006; Tarrant *et al.*, 2011), i.e., we exclude babies of less than 37 weeks gestation, less than 2.5kg and where the discharge date of mother and baby are different. However, we also run the analyses on the full sample while controlling for these characteristics. In an attempt to determine whether the results differ when examining breastfeeding at hospital discharge rather than breastfeeding initiation (i.e., immediately post-birth), we also run the models on a restricted sample of mothers who left hospital either on the day of birth, or one day later. Finally, for the sub-sample analysis, there are a small proportion of observations with missing values on paternal age and country of birth; to ensure that our results are robust to this exclusion of these cases, we

also run the models with indicators for missing cases. Full details of all these robustness checks are available on request from the authors.

IV RESULTS

4.1 *Determinants of Breastfeeding at Hospital Discharge*

The pronounced differences in breastfeeding by maternal country of birth that were presented in Figure 1 persist in the multivariate analysis, where all country of birth groups are significantly more likely to breastfeed than Irish-born mothers (results are presented in Table 4).[5] These effects remain large and statistically significant even when other important determinants of breastfeeding are included in the model. The marginal effects are particularly high for mothers from the EU-27, Africa and other countries. The marginal effects for UK-born mothers are lower than those for the other groups, although the difference between UK and Irish-born mothers is still large and highly significant. Similarly, the effect of the year dummies included in the model remain positive, if slightly reduced in magnitude, and significant when the determinants of breastfeeding are added. Running the robustness checks detailed in Section 3.4 does not change the results.

Consistent with the descriptive patterns presented in Table 2, the remaining independent variables have effects that are similar to those found in international analyses of breastfeeding determinants. Mothers that are older, married, in higher socio-economic groups, with fewer previous children and with a longer postpartum LOS have significantly higher rates of breastfeeding (Guttman and Zimmerman, 2000; Kelly and Watt, 2005; Scott *et al.*, 2006; Kohlhuber *et al.*, 2008; Skafida, 2009; Kristiansen *et al.*, 2010). In terms of baby characteristics, mothers of low birthweight babies, those of shorter gestational age and those born via Caesarean section have significantly lower rates (Meyerink and Marquis, 2002; Scott *et al.*, 2006; Tarrant *et al.*, 2009; Kristiansen *et al.*, 2010). The effect of socio-economic group is particularly large and significant, with previous research suggesting that the effect may in part reflect the level and nature of social support available to mothers when breastfeeding, e.g., mothers from higher socio-

[5] We also estimated an alternative model (for 2010 only) that replaces the country of birth dummies with a continuous variable that represents the national breastfeeding rate 48 hours postpartum. As these data are only available for Ireland, UK, Poland and Latvia, we excluded mothers born elsewhere. While the country of birth breastfeeding rate was positive and statistically significant, the model with country of birth dummies was more informative than the model on the restricted sample with a continuous variable reflecting national breastfeeding rates.

economic groups may have more supportive partners, have relatives or friends who are familiar with breastfeeding, etc. (Dennis, 2002). It is also possible that mother's socio-economic group is picking up the effect of other important determinants of breastfeeding such as maternal smoking and education level that are likely to be highly correlated with socio-economic group.

Having been assessed as fully meeting the BFHI criteria was found to be a positive but statistically insignificant determinant of breastfeeding. In the years in question (2004-2010) only seven of the 19 maternity units included in this analysis were designated as fully meeting the BFHI criteria in some or all of the years.

Table 4: *Determinants of Breastfeeding at Hospital Discharge, 2004-2010*

	(1)	*(2)*
Maternal Country of Birth		
ROI	ref	ref
UK	0.146	0.158
	(0.017)***	(0.017)***
EU-15 (excl. ROI and UK)	0.435	0.402
	(0.014)***	(0.017)***
EU-27 (excl. ROI, UK and EU-15)[c]	0.440	0.470
	(0.018)***	(0.015)***
Africa	0.397	0.450
	(0.034)***	(0.025)***
Asia	0.375	0.372
	(0.022)***	(0.024)***
Other[d]	0.424	0.423
	(0.015)***	(0.016)***
Year		
2004	ref	ref
2005	0.016	0.015
	(0.006)***	(0.006)***
2006	0.021	0.001
	(0.008)***	(0.006)*
2007	0.037	0.024
	(0.008)***	(0.005)***
2008	0.037	0.022
	(0.007)***	(0.005)***
2009	0.047	0.032
	(0.012)***	(0.009)***
2010	0.048	0.030
	(0.012)***	(0.010)***
Maternal Age at Delivery		
Age (years)		0.014
		(0.001)***

Table 4: *Determinants of Breastfeeding at Hospital Discharge, 2004-2010 (Contd.)*

	(1)	*(2)*
Maternal Marital Status		
Married		0.061
		(0.009)***
Not married[a]		ref
Maternal Socio-economic Group		
Professional/managerial		ref
Clerical		–0.163
		(0.005)***
Skilled/semi-skilled		–0.180
		(0.007)***
Unskilled		–0.161
		(0.004)***
Unemployed		–0.252
		(0.017)***
Home duties		–0.190
		(0.009)***
Other[b]		–0.117
		(0.009)***
Parity		
Parity		–0.056
		(0.004)***
Gestational Age at Delivery		
Gestational Age (weeks)		0.009
		(0.001)***
Method of Delivery		
Spontaneous		ref
Caesarean		–0.109
		(0.007)***
Other		–0.028
		(0.004)***
Birthweight		
Birthweight (g)		0.032
		(0.002)***
Sex of Baby		
Male		–0.004
		(0.002)***
Female		ref
Maternal Postpartum LOS		
Length of stay (days)		0.021
		(0.003)***
Baby-Friendly Hospital Initiative		
BFHI		0.017
		(0.015)

Table 4: *Determinants of Breastfeeding at Hospital Discharge, 2004-2010 (Contd.)*

	(1)	*(2)*
N	385,549	370,537
Log-Likelihood	–244,263.97	–214,541.91

Notes: Results are presented as marginal effects, with robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Column (1) includes controls for year and mother's country of birth only, while column (2) adds all other variables. A third model (which includes all year interactions) was also estimated. As the results for country of birth are unchanged, the results are not presented here but are available from the authors.

a Includes never married, divorced, separated, and widowed.
b Includes farmers and farm managers, other agricultural occupations and fisheries workers, and not classifiable.
c Accession States – Bulgaria and Romania are included from 2004.
d Includes the Rest of Europe, the Americas, Australia, New Zealand (inc. Oceania), multi-nationality, non-Irish, and no nationality.

Source: Samples derived from the National Perinatal Reporting System – See Section II for description.

4.2 *Decomposition of the Difference in Breastfeeding at Hospital Discharge Rates between Irish-Born and Non-Irish-Born Mothers*

We first undertake a decomposition of the difference in breastfeeding rates between Irish-born and non-Irish-born mothers (in aggregate). Results are presented in column (1) of Table 5 (for 2010; results for the years 2004-2009 are available on request from the authors). The results indicate that none of the differential in breastfeeding at hospital discharge between Irish-born and non-Irish-born mothers is explained by differences in observable characteristics between the two groups. In fact, on average, the characteristics of non-Irish-born mothers are predictive of lower breastfeeding rates than those observed, and thus a positive differential of 4.9 percentage points in the breastfeeding at hospital discharge rates between Irish-born and non-Irish-born mothers (rather than the negative differential of 38.2 percentage points that is observed).

Columns (2) to (7) present the results of the decomposition for each of the disaggregated country of birth groups. The results reveal considerable differences across the various groups that are masked with the use of the aggregated "non-Irish-born" variable. For example, while the raw differential in breastfeeding rates is similar for EU-15 and EU-27 mothers in 2010 (41.2

and 42.2 percentage points respectively), the proportion explained is 11.4 per cent for EU-15 mothers and –17.4 per cent for EU-27 mothers. In other words, while the characteristics of EU-15 mothers are, on average, predictive of higher breastfeeding rates (because they are on average, older and in higher socio-economic groups than Irish-born mothers), the opposite is the case for EU-27 mothers (who are on average younger and in lower socio-economic groups).

As noted, the proportion of the difference in breastfeeding at hospital discharge that is explained by observed characteristics differs considerably across the various maternal country of birth groupings. In particular, the proportion explained is very small for mothers born in Asian and "other" countries, which may reflect the aggregated nature of these groupings. It may also reflect a net contribution that is close to zero if different variables have conflicting individual contributions. For example, Asian-born mothers tend to be younger on average than Irish-born mothers (and younger age is predictive of lower breastfeeding rates), but on the other hand, they are also more likely to be married (and this is predictive of higher breastfeeding rates). More information on the detailed contributions for each of the independent variables is available in Appendix Table A1.

Examining the results using different reference coefficients reveals that while the size of the explained contribution differs, the differences are not large, and the main conclusions still hold.[6] Running the various robustness checks detailed in Section 3.4 does not change these results.

4.3 *Extension*

The analysis of the sub-sample of married mothers, for whom we have information on paternal characteristics, indicates that paternal country of birth exerts a large and statistically significant effect on the probability of breastfeeding at hospital discharge. As indicated in Table 6, in comparison with Irish-born couples, all other combinations of couples were significantly more likely to breastfeed in 2010, with the largest effects observed for couples where both parents were born in EU-27 countries (results for the years 2004-2009 are available from the authors). Similar to the findings from the UK in relation to women from white ethnic groups (Griffiths *et al.*, 2007), the effect of paternal country of birth is even observed for Irish-born mothers, where Irish-born mothers married to non-Irish-born fathers (in particular EU-27-born fathers) have significantly higher breastfeeding rates than those married to Irish-born fathers.

[6] As noted in Section 3.2, results may be sensitive to the choice of reference coefficients (Costa-Font *et al.*, 2008; Bhalotra *et al.*, 2010; Lhila and Long, 2012).

Table 5: *Decomposition of the Differential in Breastfeeding Rates Between Irish-born and Non-Irish-born Mothers, 2010*

	(1) Non-ROI			(2) UK			(3) EU-15			(4) EU-27[a]		
	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt Diff	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt Diff	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt-Diff	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt Diff
$\bar{Y}^I - \bar{Y}^F$	–0.382			–0.162			–0.412			–0.422		
Explained[c]	0.049	–12.8		0.026	–15.8		–0.047	11.4		0.073	–17.4	
Unexplained[d]	–0.430	112.8		–0.188	115.8		–0.365	88.6		–0.495	117.4	

	(5) Africa			(5) Asia			(5) Other[b]		
	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt Diff	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt Diff	% of $\bar{Y}^I - \bar{Y}^F$	z-Stat	% pt Diff
$\bar{Y}^I - \bar{Y}^F$	–0.395			–0.375			–0.418		
Explained[c]	0.114	–28.8		–0.001	0.2		0.010	–2.5	
Unexplained[d]	–0.509	128.8		–0.375	99.8		–0.428	102.5	

Notes: Using the group I (i.e., Irish-born) coefficients as the reference.
The full set of results, i.e., including the contributions of each independent variable, is presented in Appendix Table A1.
Results for the years 2004-2009 are available from the authors.

a Accession States – Bulgaria and Romania are included from 2004.
b Includes the Rest of Europe, the Americas, Australia, New Zealand (inc. Oceania), multi-nationality, non-Irish, and no nationality.
c The differential that is estimated based on differences in observed characteristics (i.e., the first term in Equation (2)).
d The differential that is estimated based on differences in group-specific attitudes, cultural norms, or other omitted variables (i.e., the second term in Equation (2)).

Source: Sample derived from the National Perinatal Reporting System – See Section II for description.

Running the decomposition analysis on the sub-sample of married mothers results in a similar overall effect to that found for the full sample, i.e., most of the differential in breastfeeding rates between Irish-born and non-Irish-born mothers is unexplained, i.e., not due to differences in observable characteristics between the various groups (results available on request from the authors).

Table 6: *Determinants of Breastfeeding at Hospital Discharge (Extended Analysis), 2010*

Maternal and Paternal Country of Birth	
ROI – ROI[a]	ref
ROI – UK	0.079
	(0.025)***
ROI – EU-15	0.229
	(0.029**
ROI – EU-27[b]	0.335
	(0.042)***
ROI- Africa	0.167
	(0.039)***
ROI – Asia	0.234
	(0.052)***
ROI – Otherc	0.147
	(0.020)***
UK – ROI	0.146
	(0.028)***
EU-15 – ROI	0.328
	(0.037)***
EU-27b – ROI	0.382
	(0.034)***
Africa – ROI	0.366
	(0.023)***
Asia – ROI	0.339
	(0.026)***
Otherc – ROI	0.339
	(0.021)***
UK – UK	0.244
	(0.037)***
EU-15 – EU-15	0.373
	(0.036)***
EU-27b – EU-27[b]	0.430
	(0.013)***
Africa – Africa	0.422
	(0.023)***
Asia – Asia	0.368
	(0.026)***

Table 6: *Determinants of Breastfeeding at Hospital Discharge (Extended Analysis), 2010 (Contd.)*

Maternal and Paternal Country of Birth	
Other[c] – Other[c]	0.410
	(0.020)***
Other Non-Irish Mother/Non-Irish Father Combination	0.408
	(0.018)***
Other Covariates?[d]	Yes
N	37,053
Log-Likelihood	–21,119.95

Notes: Results are presented as marginal effects, with robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Results for the years 2004-2009 are available from the authors.

a The first country of birth refers to maternal country, the second to paternal country of birth, e.g., ROI-UK refers to a ROI-born mother and a UK-born father.
b Accession States – Bulgaria and Romania are included from 2004.
c Includes the Rest of Europe, the Americas, Australia, New Zealand (inc. Oceania), multi-nationality, non-Irish, and no nationality.
d Marginal effects for additional covariates (maternal age, socio-economic group, parity, child sex, birthweight, gestation, postpartum LOS, method of delivery, BFHI designation) are available on request from the authors.

Source: Samples derived from the National Perinatal Reporting System – See Section II for description.

V DISCUSSION AND CONCLUSIONS

The benefits of breastfeeding for mothers, babies and society have been demonstrated in a large scientific literature, with the WHO recommending that babies be exclusively breastfed for the first six months and that some breastfeeding should continue up to two years of age and beyond. Irish rates of breastfeeding are very low by international standards, and one of the most striking features of the Irish rates is the pronounced difference by maternal country of birth. A large international literature has examined differences in breastfeeding behaviour by race/ethnicity, but to date this issue has received little attention in Ireland. The availability of detailed micro-data on the full census of births in Ireland over the period 2004-2010 allowed us to examine this issue in greater detail than before.

Despite the size of the data set, there are inevitably some limitations. First, our indicator of breastfeeding behaviour refers to "any" breastfeeding at hospital discharge. Information on breastfeeding initiation at birth or on the

duration of breastfeeding is not available. However, results do not differ when we focus just on mothers who were discharged from hospital on either the day of birth, or one day after. Second, detailed clinical information is not available, although we have attempted to control for this by excluding low birthweight babies, those born early, and those where the discharge data of mother and baby are different. Third, information on race/ethnicity and/or "length of time since migration" is not available. Fourth, there are a number of potentially important variables for which information is not available from NPRS (e.g., smoking status, antenatal intention to breastfeed, etc.). Finally, the analysis incorporating paternal characteristics was limited to the sub-sample of married mothers only, which inevitably limits the implications for policy that may be drawn from the findings.

Despite these limitations, the analysis makes a number of important contributions, with implications for policy aimed at increasing breastfeeding rates in Ireland. First, in common with findings for other countries, we find that maternal country of birth is a large and significant predictor of breastfeeding at hospital discharge, even controlling for other influences on breastfeeding behaviour such as age and socio-economic group. In comparison with Irish-born mothers, EU-27 mothers have the highest probability of breastfeeding at hospital discharge. The differential was lowest for UK-born mothers, although they still have a significantly higher probability of breastfeeding than Irish-born mothers. To what extent does this result reflect a "time since migration" effect? Other data from a representative household survey revealed that a large proportion of UK-born individuals in Ireland arrived before the age of 16, and as such, could be expected to be subject to "acculturation" to Irish habits and behaviours. Notably, those born in Eastern-Europe had the shortest "time since migration" (Nolan, 2012).

Second, in an extension to this analysis which is run on the sub-sample of married mothers, we find that paternal country of birth is also a large and significant determinant of breastfeeding at hospital discharge. In particular, we find that in comparison with Irish-born mothers married to Irish-born fathers, Irish-born mothers married to non-Irish-born fathers have significantly higher rates of breastfeeding. This potentially reflects the effect of more positive attitudes towards breastfeeding on the part of non-Irish-born fathers, or the effect of an increasing likelihood that the mother lived outside Ireland if married to a non-Irish-born father (and was therefore exposed to a more positive breastfeeding environment), or some combination of the two. The fact that the effect is particularly large for Irish-born mothers married to EU-27-born fathers may also suggest a possible "time since migration" effect operating via paternal country of birth.

Finally, we show that nearly all of the differential in breastfeeding at discharge rates between Irish-born and non-Irish-born mothers is unexplained, which suggests a large role for cultural or attitudinal differences in explaining the gap. The proportion that is unexplained is particularly high for the analyses of Irish-born versus EU-27 and African mothers. It must be noted that if additional explanatory variables were available (e.g., maternal smoking, partner attitudes, etc.), then it is possible that the explained component of the differential would increase. However, the fact that these conclusions hold in the analysis of the sub-sample of married mothers for whom we have additional information on paternal characteristics strengthens the case that much of the difference is due to cultural or attitudinal differences in breastfeeding behaviour.

While determining the precise cultural or attitudinal factors that lead to lower rates of breastfeeding among Irish-born mothers is outside the scope of this paper, recognising that these factors rather than differences in observed characteristics (age, socio-economic group, marital status, etc.) explain most of the differential in breastfeeding rates between Irish-born and non-Irish-born mothers is important for policymakers who are seeking to design policies or interventions that will increase breastfeeding rates in Ireland. The international literature points to a number of key factors that are important in encouraging women to breastfeed, in particular the role of attitudes. Attitudes are modifiable with appropriate information and support. However, the particular negative societal attitudes to breastfeeding in public in Ireland that have been noted in previous research, and the importance of paternal characteristics noted in this study, suggest that Irish policymakers need to focus not just on mothers, but also their partners and wider social networks.

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APPENDIX

Table A1: *Decomposition of the Differential in Breastfeeding Rates Between Irish-born and Non-Irish-born Mothers, 2010*

	(1) Non-ROI			(2) UK			(3) EU-15			(4) EU-27[a]		
	% pt Diff	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*	*% pt Diff*	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*	*% pt Diff*	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*	*% pt Diff*	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*
$\bar{Y}^I - \bar{Y}^F$	–0.382			–0.162			–0.412			–0.422		
Explained[c]	0.049	–12.8		0.026	–15.8		–0.047	11.4		0.073	–17.4	
Unexplained[d]	–0.430	112.8		–0.188	115.8		–0.365	88.6		–0.495	117.4	
Detailed contributions												
Maternal Age at Delivery												
Age (years)	0.029	–7.6	31.0	0.004	–2.3	14.5	–0.018	4.4	–30.9	0.052	–12.4	31.5
Maternal Marital Status												
Married	0.000	0.1	–4.0	0.006	–3.6	12.7	0.005	–1.2	12.5	0.003	–0.7	12.5
Not Married[e]	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Maternal Socio-economic group												
Professional/ managerial	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Clerical	–0.014	3.6	–30.9	–0.014	8.4	–29.6	–0.006	1.5	–21.9	–0.004	1.1	–17.1
Skilled/semi-skilled	0.008	–2.1	13.7	–0.001	0.9	–11.5	–0.001	0.2	–9.0	0.019	–4.5	13.5
Unskilled	0.006	–1.6	18.6	0.001	–0.8	6.8	0.001	–0.3	7.6	0.014	–3.4	21.7
Unemployed	0.005	–1.4	16.6	0.005	–3.1	17.0	–0.003	0.7	–16.1	0.006	–1.5	17.3
Home duties	0.019	–5.0	29.4	0.020	–12.6	28.5	–0.008	1.9	–23.2	0.008	–2.0	20.9
Other[f]	0.002	–0.5	7.7	0.001	–0.9	7.0	0.001	–0.3	6.8	–0.001	0.2	–8.4
Parity												
Parity	–0.010	2.7	–21.9	0.004	–2.2	13.8	–0.019	4.7	–24.3	–0.026	6.1	–24.3
Gestational Age at Delivery												
Gestational Age (weeks)	0.001	–0.3	5.2	0.000	–0.1	2.5	0.000	0.0	1.4	0.000	0.0	3.9
Method of Delivery												
Spontaneous	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Caesarean	–0.006	1.5	–17.9	–0.007	4.1	–18.7	–0.008	2.0	–18.8	–0.010	2.3	–18.9
Other	0.000	0.0	3.2	–0.001	0.4	–5.3	0.001	–0.2	5.3	0.001	–0.3	6.0
Birthweight												
Birthweight (g)	0.003	–0.7	7.1	0.001	–0.7	6.7	0.003	–0.7	7.0	0.002	–0.4	7.0
Sex of Baby												
Male	0.000	0.0	–0.1	0.000	0.0	0.1	0.000	0.0	0.0	0.000	0.0	0.0
Female	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Maternal Postpartum LOS												
Length of stay (days)	0.005	–1.4	13.8	0.006	–3.7	14.2	0.006	–1.4	14.4	0.007	–1.7	14.1
Baby Friendly Hospital Designation												
No	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Yes	0.000	–0.1	1.6	0.000	0.1	–1.4	0.000	–0.1	1.5	0.001	–0.1	1.6

Table A1: *Decomposition of the Differential in Breastfeeding Rates Between Irish-born and Non-Irish-born Mothers, 2010 (Contd.)*

		(5) Africa[b]			(5) Asia			(5) Other	
	% pt Diff	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*	*% pt Diff*	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*	*% pt Diff*	*% of* $\bar{Y}^I - \bar{Y}^F$	*z-Stat*
$\bar{Y}^I - \bar{Y}^F$	–0.395			–0.375			–0.418		
Explained[c]	0.114	–28.8		–0.001	0.2		0.010	–2.5	
Unexplained[d]	–0.509	128.8		–0.375	99.8		–0.428	102.5	
Detailed contributions									
Maternal Age at Delivery									
Age (years)	0.015	–3.8	25.9	0.016	–4.3	28.9	0.008	–2.0	25.6
Maternal Marital Status									
Married	–0.001	0.2	–5.2	–0.014	3.8	–12.7	–0.007	1.8	–12.6
Not Married[e]	ref	ref	ref	ref	ref	ref	ref	ref	ref
Maternal Socio-economic group									
Professional/managerial	ref	ref	ref	ref	ref	ref	ref	ref	ref
Clerical	–0.029	7.3	–32.3	–0.032	8.4	–32.1	–0.021	5.0	–32.1
Skilled/semi-skilled	–0.002	0.5	–12.9	–0.002	0.5	–12.2	0.000	–0.1	4.2
Unskilled	0.001	–0.2	3.4	–0.005	1.4	–19.1	0.000	0.1	–2.5
Unemployed	0.010	–2.6	19.6	0.000	0.1	–3.1	0.004	–0.9	14.9
Home duties	0.059	–15.0	31.0	0.028	–7.4	30.4	0.034	–8.2	30.0
Other[f]	0.010	–2.4	8.3	0.005	–1.2	8.2	0.003	–0.8	8.1
Parity									
Parity	0.043	–10.8	24.8	–0.011	2.9	–23.2	–0.011	2.6	–23.2
Gestational Age at Delivery									
Gestational Age (weeks)	0.003	–0.7	5.2	0.004	–1.1	5.2	0.001	–0.2	4.8
Method of Delivery									
Spontaneous	ref	ref	ref	ref	ref	ref	ref	ref	ref
Caesarean	0.004	–1.0	13.6	0.001	–0.3	8.8	–0.005	1.1	–17.3
Other	–0.003	0.8	–6.1	0.000	0.0	–2.5	–0.001	0.2	–5.1
Birthweight									
Birthweight (g)	0.004	–0.9	7.0	0.007	–2.0	7.1	0.000	0.0	0.9
Sex of Baby									
Male	0.000	0.0	0.4	0.000	0.0	–0.4	0.000	0.0	–0.4
Female	ref	ref	ref	ref	ref	ref	ref	ref	ref
Maternal Postpartum LOS									
Length of stay (days)	0.000	0.1	–2.3	0.002	–0.6	12.5	0.004	–1.0	13.4
Baby Friendly Hospital Designation									
No	ref	ref	ref	ref	ref	ref	ref	ref	ref
Yes	0.001	–0.2	1.6	–0.001	0.4	–1.1	0.000	–0.1	1.5

Notes to Table A1

Notes: Using the group I (i.e., Irish-born) coefficients as the reference.
Results for the years 2004-2009 are available from the authors.

a Accession States – Bulgaria and Romania are included from 2004.
b Includes the Rest of Europe, the Americas, Australia, New Zealand (inc. Oceania), multi-nationality, non-Irish, and no nationality.
c The differential that is estimated based on differences in observed characteristics (i.e., the first term in Equation (2)).
d The differential that is estimated based on differences in group-specific attitudes, cultural norms, or other omitted variables (i.e., the second term in Equation (2)).
e Includes never married, divorced, separated, and widowed.
f Includes farmers and farm managers, other agricultural occupations and fisheries workers, and not classifiable.

Source: Sample derived from the National Perinatal Reporting System – See Section II for description.