

POLICY PAPER

Modelling and Measuring Gains from Labour Market Desegregation in Northern Ireland

Hannah KM Kling*

Belmont Abbey College, United States

Abstract: Over the past decades, Catholic-Protestant relations in Northern Ireland have gradually improved. Agglomeration theories would predict that the resulting workplace desegregation would increase productivity. This paper presents a model of the impact of labour force segregation on the agglomeration benefits of matching. The paper then provides the first thorough, micro-level estimate of employment desegregation in Northern Ireland since 2001. Finally, the calibrated model estimates the effect of desegregation on output, wages, and number of firms. The model estimates that each percentage point decrease in segregation would increase net output by 0.04 per cent to 0.29 per cent.

I INTRODUCTION

The conflict between Protestants and Catholics in Northern Ireland has a long history, with a predominantly Catholic movement for independence clashing with largely Protestant support of United Kingdom governance. Although ‘The Troubles’ of the late twentieth century ended over two decades ago, the two groups remain significantly segregated in where they live and work (see Todd and Ruane, 2011).

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* hkmkling@gmail.com

In 1998, the Good Friday Agreement largely ended sectarian violence, and established political power-sharing and peace agreements between Catholic republican and Protestant loyalist factions (Shirlow and Coulter, 2014). In the economic realm, the 1989 Fair Employment Act strengthened earlier legislation seeking to end discrimination based on creed, and set in place stronger monitoring and enforcement attempting to improve Catholic representation in the labour market (Gallagher, 1992). Workforce equality has improved, and labour market segregation has diminished but not disappeared (ECNI, 2015). Researchers have noted the persistence and feedback between low skill levels, a small travel-to-work radius, and susceptibility to a sectarian ‘chill factor’ (see Green *et al.*, 2005).

Northern Ireland’s struggles have attracted researchers in many disciplines, as we seek to understand the sources, consequences, and potential solutions to the situation. For economists studying the role of cities in economic growth, the self-segregation in Northern Ireland has broad implications. Urban economic theories of agglomeration seek to explain why workers and firms concentrate in cities, and why per-person productivity tends to be higher in high-density areas. One explanation is that the larger number of employers and employees create the opportunity for better matching between employees’ strengths and skills and firms’ needs (see, for example, Andersson *et al.*, 2007). Applied to Northern Ireland, this theory would predict the region would suffer from lower productivity and lower wages due to labour market segregation. In a hypothesised extreme case of full segregation, there would be two independent labour markets in which Catholic firms could only draw from the pool of Catholic workers and Protestant firms could only draw from the pool of Protestant workers.

Workplace segregation may stem from a variety of sources; employer discrimination, employer desire to prevent workplace strife, or homophily, where locational and social choices lead to segregated networks, naturally leading to segregated workforces (see Currarini *et al.*, 2009). Many neighbourhoods remain significantly segregated despite the peace. This is unsurprising, as residential patterns can lag behind social changes. It is possible that workplace segregation today is driven more by residential location than by sectarian animosity. Regardless of the source, however, urban agglomeration theories would predict that the observed segregation in the labour market would lead to lower workforce productivity.

Segregation can affect productive efficiency through channels other than matching. Spatial segregation may lead to longer commutes, housing inefficiencies, and duplication of public services and stores to serve each segment of the population (Shirlow and Murtagh, 2006; Deloitte, 2007). Further, risk of workplace violence may reduce foreign direct investment (Deloitte, 2007).

This paper focuses on the matching implications of segregation. I present a model of how labour force segregation limits the agglomeration benefits of matching. Then, I provide a thorough estimate of the degree of employment

desegregation in Northern Ireland since 2001. Finally, I use these estimates to calibrate the agglomeration model to estimate the productivity gains from that desegregation.

II PREVIOUS LITERATURE

Existing models and theories of a dual labour market, or labour market segmentation, focus on tiers, with an ‘underclass’ at a disadvantage to access the normal labour market with its returns to education and skill (see, for example, Dolado *et al.*, 2009 and Hudson, 2007). In the United States, Hsieh *et al.* (2019) analyse the increased labour market participation among blacks and women, particularly in skilled occupations, and find the occupational convergence explains one-quarter of the increase in output per person since 1960. Cavalcanti and Tavares (2016) calibrate the effects of the gender wage gap on output.

For much of the twentieth century, Northern Ireland resembled this kind of dual labour market. Skilled job participation, labour market success, and public sector employment were higher among the Protestant population (Borooah, 1999; Gallagher; 1992, Todd and Ruane; 2011). However, by 2014, Catholic economic activity rates, unemployment rates, and representation in all occupational classifications had converged toward Protestant ones; Catholics had higher levels of education and training qualifications than Protestants (OFMDFM, 2014); and by 2013, 41 per cent of firms had majority Catholic workforces (ECNI, 2013). Thus, the current labour market in Northern Ireland less resembles a primary and secondary labour market, and operates more as two semi-isolated labour markets operating in the same physical space.

The Equality Commission of Northern Ireland (ECNI) is tasked with upholding the requirements of the Fair Employment Act and publishes an annual monitoring report. The report contains the number of employees by religion at all companies with greater than 25 employees, as well as aggregate findings based on these data. The Commission reports that segregation has been decreasing, with workforce participation in both the private and public sectors approaching a mix reflecting the economically active population (ECNI, 2015). Some researchers have questioned whether this adequately captures labour market segregation or inequality in Northern Ireland. O’Leary and Li (2006) note while unemployment has decreased among Catholics, Catholic males lag in terms of earnings. The ECNI data are not site-specific but are reported at the firm level. Shirlow (2006) argues that the monitoring data understate worksite segregation by reporting company-wide numbers; a firm with a largely Catholic worksite and a largely Protestant one would appear unsegregated in the data. However, to my knowledge, no researchers have provided a comprehensive measure of the change in workforce segregation, other than the aggregate indicators reported in the Equality Commission reports. In this

paper, I establish a consistent measure of workforce segregation that utilises the microdata available in the ECNI reports since 2001, the first year for which these data are readily attainable.

III MODEL

This paper adapts a model by Duranton and Puga (2004). In this model, a firm h 's production is linear in labour.

$$y_h = \beta l_h - \alpha \quad (1)$$

where y_h is output of firm h , β is the marginal product of labour, l_h is the firm's workforce, and α denotes the firm's fixed cost. This linear model is observationally equivalent to a model with constant returns in capital and labour, as long as capital is flexible. For the total economy,

$$Y = \beta L - \alpha n \quad (2)$$

where Y captures output net of the fixed costs. Workers' skills and firms' skill requirements are modelled as evenly distributed around a unit circle. The skill distance, or mismatch, between a worker and a firm is denoted z . The cost of the mismatch is μz . The labour force L is exogenous. The number of firms, n , is endogenous, and firms are located $1/n$ distance apart around the unit circle.

The equilibrium conditions derive from firms' competition for workers, yielding

$$w_h - \mu z = w - \mu \left(\frac{1}{n} - z \right) \quad (3)$$

where firm h offers wage w_h , a worker is located at skill distance z from firm h , and the competing firm offers wage w and is $\left(\frac{1}{n} - z \right)$ from the worker.

In the symmetric zero-profit equilibrium, $w_h = w$, and that wage¹ is:

$$w = \beta \frac{\mu}{n} \quad (4)$$

The equilibrium number of firms is:

$$n = \sqrt{\frac{\mu L}{\alpha}} \quad (5)$$

¹ Since $\pi_h = \beta l_h - w l_h - \alpha$, in the equilibrium with zero profits, $w = \beta l_h - \alpha = \frac{Y}{L}$. That is, wage is equal to net output divided by number of workers.

Net output is a function of the size of the labour force L , the marginal product of labour β , the firm's fixed cost α , and the cost of mismatch between employee and firm, μ :

$$Y = L\left(\beta - \sqrt{\frac{\mu\alpha}{L}}\right) \quad (6)$$

3.1 Applying the Model to Full Segregation

Using this model, one can compute the net output loss from a fully segregated labour market, in which the labour force is evenly divided into two types, and these types will only work with others of their type. Let the two types be P and C, and $L_P = L_C = .5L$. Let Y_S denote the net output under full segregation, and Y_U denote the net output with zero segregation.

The net output in the unsegregated market will be the same as that in the original model:

$$Y_U = L\left(\beta - \sqrt{\frac{\mu\alpha}{L}}\right) \quad (7)$$

The net output in the fully segregated market will be the sum of the two identical, smaller labour markets:

$$Y_s = Y_p + Y_c = 2Y_p = 2\left(\frac{L}{2}\right)\left(\beta - \sqrt{\frac{\mu\alpha}{\frac{L}{2}}}\right) = L\left(\beta - \sqrt{\frac{\mu\alpha}{2}}\right) \quad (8)$$

Thus, the difference between the unified and segregated net output will be:

$$Y_u - Y_s = (\sqrt{2} - 1)\sqrt{L\mu\alpha} = 0.414 \sqrt{L\mu\alpha} > 0 \quad (9)$$

Furthermore, the equilibrium number of firms will be higher than in the unsegregated case. In the model, as the labour force increases, the number of firms rises less than proportionately. As proportionally fewer fixed costs are required, output per worker rises. In the segregated case of two smaller workforces, there are too many firms, thereby incurring excessive fixed costs.

$$n_s = 2\sqrt{\frac{\mu L}{2\alpha}} > \sqrt{\frac{\mu L}{\alpha}} = n_u \quad (10)$$

The wages in the segregated case are lower than in the unified labour market:

$$w_s = \beta - \frac{\mu}{n_s} < \beta - \frac{\mu}{n_u} = w_u \quad (11)$$

3.2 Applying the Model to Partial Segregation

To incorporate partial segregation into the above model, I introduce a segregation factor φ . Higher values of φ indicate greater levels of segregation, and $0 \leq \varphi \leq 1$.

This segregation factor affects the cost of mismatch between workers and firms. In this model, segregation is a cost borne by the worker. A worker is more willing to endure an extra skill distance in order to work for a firm of the same type, or endures a personal cost of working for a firm of the opposite type that is a closer skill match. Specifically, the worker is indifferent between a firm of the same type h and a competing firm of the opposite type when:

$$w(h) - (1 + \varphi)\mu z = w - (1 + \varphi)\mu\left(\frac{1}{n} - z\right) \quad (12)$$

This leads to the following estimates for net output, number of firms, and wages:

$$Y = L\left(\beta - \sqrt{\frac{(1 + \varphi)\mu\alpha}{L}}\right) \quad (13)$$

$$n = \sqrt{\frac{(1 + \varphi)\mu L}{\alpha}} \quad (14)$$

$$w = \beta - \frac{(1 + \varphi)\mu}{n} \quad (15)$$

Substituting Equation 14 into 15, the wage equation in terms of exogenous variables is:

$$w = \beta - \left(\sqrt{\frac{(1 + \varphi)\mu\alpha}{L}}\right) \quad (16)$$

It is worth noting that this wage equation is equal to Y/L , which can be obtained from Equation (13).

Unsurprisingly, when $\varphi = 1$, the results reproduce those of the full segregation results above, and when $\varphi = 0$, results are identical with those of the basic, unified model results.

This model generates the following predictions:

$$(1) \text{ Effect of segregation on net output: } \frac{\partial Y}{\partial \varphi} = -\frac{\sqrt{L\mu\alpha}}{2\sqrt{(1 + \varphi)}} < 0$$

(2) Effect of segregation on number of firms:
$$\frac{\partial n}{\partial \phi} = \frac{\sqrt{\mu L}}{2\sqrt{(1 + \phi)\alpha}} > 0$$

(3) Effect of segregation on wages:
$$\frac{\partial w}{\partial \phi} = -\frac{\mu}{2\sqrt{\frac{\mu L(1 + \phi)}{\alpha}}} < 0$$

The model predicts that net output is lower in places where labour force segregation is higher. This follows from the intuition of the agglomeration benefits from better skill matches between job-seekers and employers in high-density places. With workforce segregation, job-seekers and employers have to match not just in skills but in religious community. Segregation leads to worse skill matching between workers and firms, and thus results in lower productivity.

The model also predicts that with higher segregation, the number of firms is higher. This follows from segregation increasing the cost to workers of matching with a firm of the other religious community. It is costly for workers to have a poor skill match with the job needs, and also costly for them to work for a firm of the opposite religious community. With segregation, workers will accept a larger skill mismatch in order to work for a firm of the same religious community. Because of this, more firms enter the market as the higher cost to workers allows firms to reduce wages further below workers' marginal product. There is a fixed cost to starting a firm, so having a larger number of firms because of segregation is economically inefficient. More intuitively, because workers wish to be a part of a workforce that shares their religion, we observe the inefficient creation of a Catholic and a Protestant version of many types of businesses (Shirlow and Murtagh, 2006; Deloitte, 2007).

Given the exogeneity of labour force in the model, the number of workers per firm falls as the number of firms rises, meaning that segregation also yields smaller firms than in the unsegregated case. Finally, as mentioned above, wages are lower with segregation, as the greater ϕ allows firms to pay further below workers' marginal product. Thus, this model confirms the notion laid forth in Becker 1957 that it is costly to indulge in discrimination. Here, the preference for workers to work alongside those of the same religious community results in lower wages.

3.3 Data

To calibrate the model, I use data from various United Kingdom and Northern Ireland statistical agencies. These are shown in Table 1.

In 2012, the labour share of gross value added in Northern Ireland was 57 per cent (NISRA, 2015). Because this labour share is calculated using total compensation, and wages are negatively affected by segregation, 0.57 represents the lower bound of ε_L . Gollin (2002) estimates the labour share of most countries

Table 1: Data Sources and Calculations

<i>Exogenous</i>	<i>Description</i>	<i>Data source</i>	<i>Calculation</i>
α	Fixed cost	Author's calculation	$(1 - \varepsilon_L)(GVA)$
β	Marginal product of labour	Author's calculation	$\left(\frac{GVA}{L}\right)$
μ	Cost of mismatch	Author's calculation	$\frac{\alpha n^2}{(1 + \phi)L}$ (see Eq. 13)
φ	Segregation	ECNI (2001-2015)	Dissimilarity index (see Eq. 17)
L	Labour force ²	NISRA (2017)	
<i>Endogenous</i>			
w	Wage	Author's calculation	$\beta - \sqrt{\frac{\alpha\mu}{L}}$
Y	Net output	Author's calculation	$(\varepsilon_L)(GVA)$
n	Number of firms	DBEIS (2016)	
<i>Other</i>			
GVA	Gross value added	ONS (2016)	Deflated using CPI
CPI	Consumer price index	ONS (2017)	
ε_L	Labour share of income	NISRA (2015), Gollin (2002)	0.57 to 0.9

Source: Author's analysis.

lies between 65 per cent and 80 per cent. I allow the estimates for ε_L , the labour share of income, to vary between 0.57 and 0.90, and report results using these values.

Following Equation (2), βL constitutes productivity, of which Y captures net output, or labour's share of output, and α can be thought of as capturing capital's share. This interpretation differs slightly from the original model's description of α as the fixed cost to the firm, but it follows mathematically from the model that α be the residual of labour's share. Allowing ε_L to vary mitigates inaccuracies in estimates of Y and α .

3.4 Segregation

Data on workplace segregation come from the Equality Commission of Northern Ireland, which annually collects and publishes the number of Catholic, Protestant and 'Non-determined'³ employees at all firms with greater than 25 employees

² Because there is no unemployment in this model, I use the total number of employed workers rather than the number of economically active adults.

³ All employees are included in one of these categories. Non-determined covers any employee not identifying with either the Catholic or Protestant community.

operating within Northern Ireland. All firms above the specified size are legally required to report these figures (ECNI). For firms with fewer than ten Catholic or Protestant employees, the data are truncated, with only the total number of employees reported, along with an identifier for ‘Less than 10 Roman Catholic employees’, ‘Less than 10 Protestant employees’, or ‘Less than 10 Protestant employees and less than 10 Roman Catholic employees’,⁴ as the cause of truncation for that firm.

To impute numbers for this censored data, I calculate the average number of Non-determined employees within other firms of the same size. I assume that the censored firm has the average number of Non-determined employees in its firm size, that the censored number of employees is 9, and that the rest of the employees are in the remaining category. For example, if a firm with 30 employees is censored as ‘few Protestant,’ and the average number of Non-determined employees for uncensored firms with 30 employees is one, the imputed numbers for this firm are: 20 Catholic, nine Protestant, and one Non-determined. Since it is highly unlikely that all firms with fewer than ten employees from a particular community will have nine representatives of that group, this will lead to slightly underestimated levels of segregation. In 2001, 927 out of 2,329 reporting firms were truncated. In 2013, it was 706 out of 2,231 firms.

To measure workplace segregation, I use the standard D dissimilarity index:

$$D = \frac{1}{2} \sum_{i=1}^n \left(\frac{l_{RC,i}}{L_{RC}} - \frac{l_{P,i}}{L_P} \right) \quad (17)$$

where $l_{RC,i}$ ($l_{P,i}$) is the number of Catholics (Protestants) at an individual firm, and L_{RC} (L_P) is the proportion of working age Catholics (Protestants) times the total number of workers in the sample. L_{RC} (L_P) is computed in this manner for two reasons. First, due to the truncation of the data, it is not possible to compute the total number of Catholics or Protestants employed in the entire sample. Second, using the proportion of working age individuals captures segregation stemming from differences in workforce participation, as well as workplace segregation among employed individuals. In the absence of segregation, $D = 0$. With full segregation, $D = 1$.

This measure has its critics. Echenique and Fryer (2005) point out that this index of dissimilarity is sensitive to artificial boundaries of the units i , which are often census tracts or other arbitrary boundaries. Since firms are a meaningful unit, however, this weakness is not a reason to reject this index for this paper. Second, they note that the index measures segregation at the level of i , rather than the level of the individual. This is a problem for studies of the effect of segregation on

⁴ This truncation only occurs for Catholic and Protestant communities; data are not censored for firms with fewer than ten Non-determined employees.

individual outcomes; however, this paper focuses on aggregate outcomes, so the index remains appropriate for this study. In fact, this dissimilarity index best captures the notion of workplace segregation by measuring the difference between the makeup of each workplace and the makeup of the working age population from which the workplaces draw.

Aslund and Skans (2009) develop a more sophisticated measure of segregation that incorporates sorting along education and skills. Using extensive individual-level data, they present a non-parametric measure of workplace segregation between native and foreign-born populations in Sweden. Such worker-level data are not available for Northern Ireland. Furthermore, the evenness of Catholic and Protestant representation among occupational classifications and skill levels indicates that human capital differences are not a large factor in the Northern Ireland setting.⁵

Figure 1 shows the change in workplace segregation for all reporting firms and for large firms with greater than 25 employees from 2001 to 2013. Segregation levels have fallen, but by a modest four percentage points. It is possible that workforce segregation experienced a dramatic drop prior to 2001. However, both survey responses (NISRA, 2016) and sociological analysis (Shirlow and Coulter, 2014), indicate that sectarian relations are improving slowly following the Good Friday Agreement of 1998.

3.5 Censored Firms

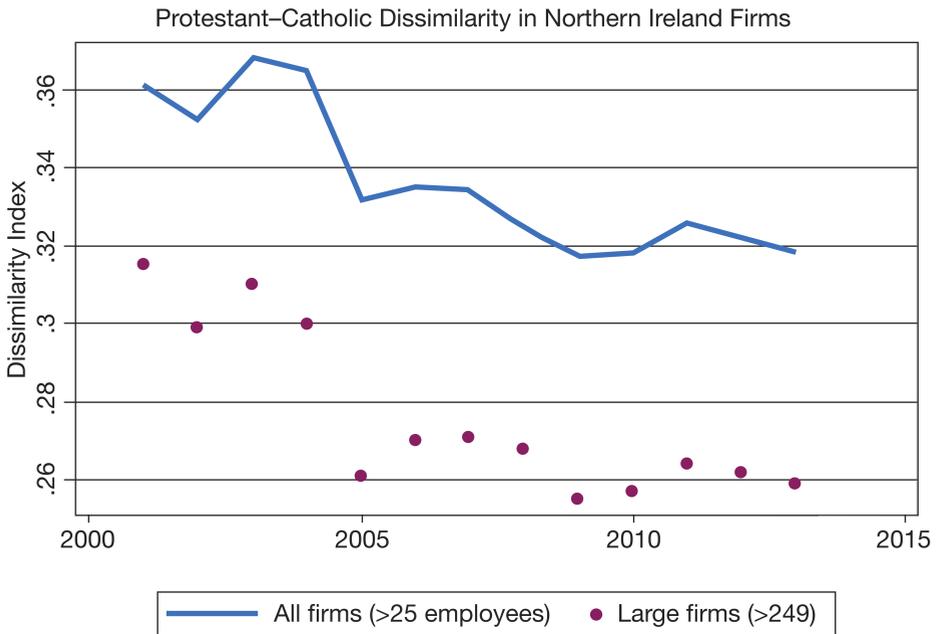
As noted above, approximately one-third of firms have censored data, meaning they have fewer than ten Protestant or Catholic workers. Especially among firms with smaller workforces, a random draw of employees from the economically active would result in some positive number of firms having numbers that would be censored. I use a binomial distribution to estimate the probability that the number of censored firms within each firm size decile could have arisen from firms randomly drawing employees from the working age population. For all deciles in all years the number of censored firms is statistically extremely unlikely to be the result of randomness ($p < 0.00001$).

3.6 Calibrations

Having established estimates for the relevant variables, it is possible to calculate the partial derivatives above and estimate the effects of segregation on output, number of firms, and wages. The years for which all variables are available are 2010 through 2013; I report mean estimates among these years. In Table 2, the partial derivatives, elasticities, and semi-elasticities show the predicted magnitude of segregation's impact on output, number of firms, and wages. The semi-

⁵ In 2014, for example, the Catholic/Protestant split for all standard occupational classifications were within 6 percentage points from the overall split of 48/52 for the whole sample (OFMDFM, 2014). The skill qualification gaps were similarly small (Equality and Good Relations Directorate, 2017).

Figure 1: Dissimilarity Index for Catholics and Protestants in Northern Ireland Workplaces



Source: Author’s calculations.

Note: Dissimilarity index defined in Equation (17). In the absence of any segregation, the dissimilarity index equals 0. With complete segregation, it equals 1.

elasticities, denoted by s , show the per cent change in the variable of interest given a one-percentage-point change in φ . For example, in Column (1), the semi-elasticity between number of firms and segregation is 0.378, indicating that a one-percentage-point increase in segregation would lead to a 0.378 per cent increase in the number of firms.

The estimate in the first row implies that when net output is 57 per cent of gross value added, moving from a fully segregated to a fully desegregated labour market would increase annual output by approximately £3.86 billion. The estimated difference in annual wages between the fully segregated and unsegregated labour market is £4,920. These are rough estimates, since the partial derivative is calculated at current values of the variables.

The elasticity and semi-elasticity offer more targeted estimates. Since wage and net output per worker are mathematically equivalent in this model, the elasticities are also equal in this calibration. When labour’s share of output is higher, the sensitivity of net output and wages to segregation falls. A one-percentage-point

Table 2: Estimated Relationships Between Segregation and Output, Number of Firms and Wages

		(1) $\varepsilon_L = 0.57$	(2) $\varepsilon_L = 0.70$	(3) $\varepsilon_L = 0.80$	(4) $\varepsilon_L = 0.90$
Derivative of output with respect to segregation	$\frac{\partial Y}{\partial \phi}$	–£3.86 billion	–£2.69 billion	–£1.79 billion	–£0.897 billion
Derivative of number of firms with respect to segregation	$\frac{\partial n}{\partial \phi}$	44,170	44,170	44,170	44,170
Derivative of wages with respect to segregation	$\frac{\partial w}{\partial \phi}$	–£4,920	–£3,433	–£2,288	–£1,144
Semi-elasticity of output with respect to segregation	$s_{Y\phi}$	–0.285	–0.162	–0.095	–0.042
Semi-elasticity of number of firms with respect to segregation	$s_{n\phi}$	0.378	0.378	0.378	0.378
Semi-elasticity of wages with respect to segregation	$s_{w\phi}$	–0.285	–0.162	–0.095	–0.042

Source: Author's calculations.

Note: The semi-elasticity measures the effect of a one-percentage-point change in segregation on the variable of interest.

increase in segregation would lead to an estimated drop in net output and wages by between 0.04 per cent and 0.29 per cent, depending on the assumed labour share.

Regardless of the value for labour's share of output, the number of firms under the fully segregated market is estimated at 44,170 higher than in the unsegregated case. From current levels, a one-percentage-point increase in segregation would be predicated to increase the number of firms by approximately 0.4 per cent.

As Duranton and Puga state in the original model (2004), the cost of mismatch can be thought of as training costs. The average mismatch cost is $\frac{\mu}{4n}$, which calibrates to £2,460 when labour's share of output is 0.57, and £572 when ε_L is 0.90.

IV CONCLUSION

This paper develops a model of partially bifurcated labour market, and estimates relationships between changes in segregation and agglomeration benefits from improved matching. I then calibrate this model using data from Northern Ireland,

where there is substantial labour market segregation between Catholics and Protestants.

Using firm-level data, I estimate workforce segregation between Catholics and Protestants in Northern Ireland. To my knowledge, this is the first thorough, micro-level estimate of the extent of this phenomenon in Northern Ireland. My data show that over the period from 2001 to 2013, workforce segregation has modestly declined by approximately four percentage points. This is somewhat surprising given the extensive political and social efforts to increase unity in Northern Ireland. As mentioned above, it is possible that sectarian animosity has in fact declined to a large degree but that the underlying residential segregation may perpetuate the observed economic segregation.

The calibrated model estimates that there are economic gains to be had from desegregation. For each percentage point decrease in segregation, net output would increase by 0.04 per cent to 0.29 per cent – approximately £5.3 million to £37.9 million. For each percentage-point decrease in segregation, wages would increase by £7 to £51 per year, and the number of firms would fall by 443, improving economies of scale.

This paper measures the extent of workforce segregation in Northern Ireland and estimates the economic costs of that segregation. These findings estimate the costs from inefficiencies arising from a segregated economy. This paper also finds that while progress has been made in integrating communities in Northern Ireland, workforce segregation has not dramatically declined over the decade studied.

Further research is needed to determine the source of the remaining workforce segregation. How important is enduring animosity relative to structural economic and residential patterns that have been slow to change? The ECNI provides a remarkable source of data on the number of Catholic and Protestant workers, and this is a rich dataset for those interested in the Northern Ireland experience over the past several decades. To identify the link between residential demographic changes and worksite segregation, it would be even more useful to also have worksite-specific data.

Another valuable avenue for research would be to empirically measure the economic cost of segregation in Northern Ireland. For this, disaggregated productivity data would be critical, allowing researchers to identify how much firms' productivity increases as their workforce desegregates over time. In lieu of firm-level data, gross value added statistics broken out by industry and narrow region would be useful. Unfortunately, these data are not currently available to academic researchers.⁶

⁶ Northern Ireland's statistical agencies are currently barred by law from providing disaggregated information to academic researchers, even using controlled computer terminals that ensure data security. Authorised researchers can access disaggregated productivity data for the UK, but Northern Ireland has more restrictive data laws.

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