Measuring the Impact of Brexit on migration in UK: The Case of Wales, from 2016 Referendum to 2022 Invasion of Ukraine

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Introduction

In this section, I will introduce the history of Brexit as a political and economic agenda, debates regarding Brexit and its migration restriction policies, and reasons why I choose Wales as the very case.

“

Of course, Brexit means that something is wrong in Europe. But Brexit means also that something was wrong in Britain.

by Jean-Claude Juncker,
former President of European Commission

Brexit: Past & Present

- Brexit has been considered one of the most significant and debatable political and socioeconomic issues not only for UK but also for Europe in past decades.
- Brexit proposal started in 1975 Referendum of leaving EC.
- Euroscepticism began to grow since the 1990s and reached an extremely high level since 2004 EU Great Enlargement.
- The 2016 Referendum decided to go Brexit.
- Transition period: Jan 31, 2020 – Dec 31, 2020.

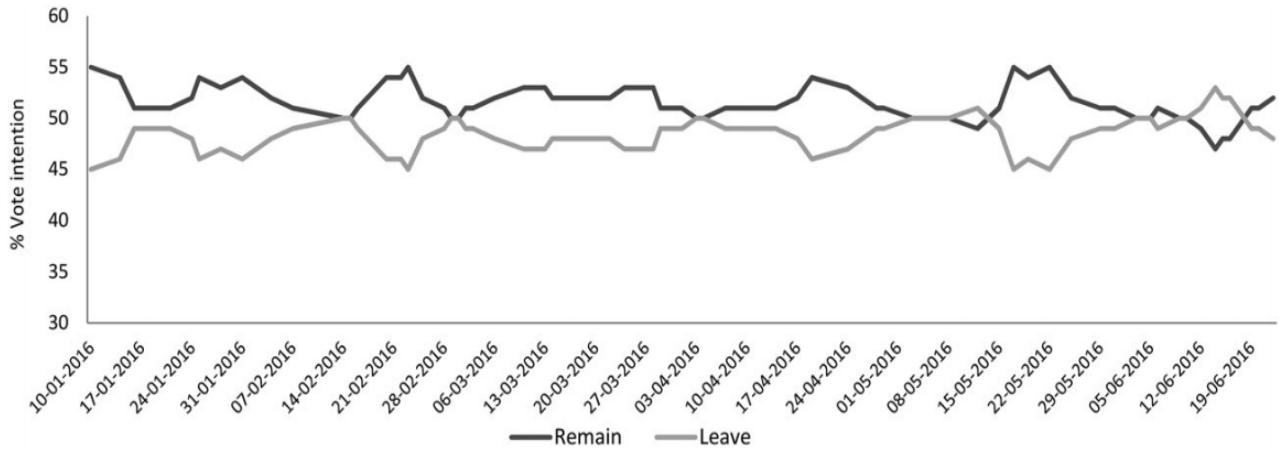


Figure 1. “Tight race”: 2016 Referendum poll (10/01/2016-19/06/2016)

Source: YouGov poll centre, 2016

Brexit: Migration Matters

- The migration issue ranked top 3 with high weights of major Brexit arguments in almost all polls before the 2016 Referendum.
- The number of EU migrants to UK increased more rapidly than that of non-EU migrants to UK.
- EU migrants started to occupy more than 50% of total migrants to UK in 2014, right after last two EU expansions in 2007 and 2013.

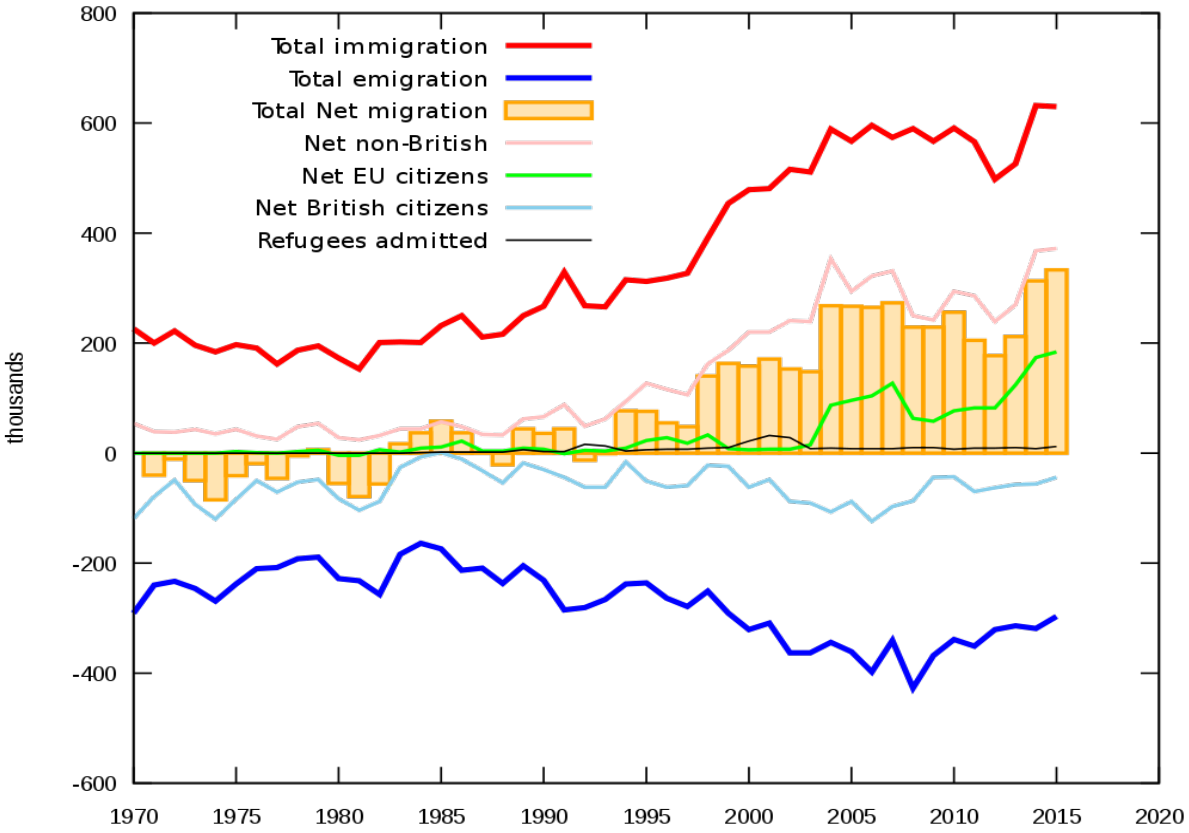


Figure 2. Come or Go: Migration to and from UK, 1970-2015.

Data Source: Office of National Statistics

Brexit: Migration Differs

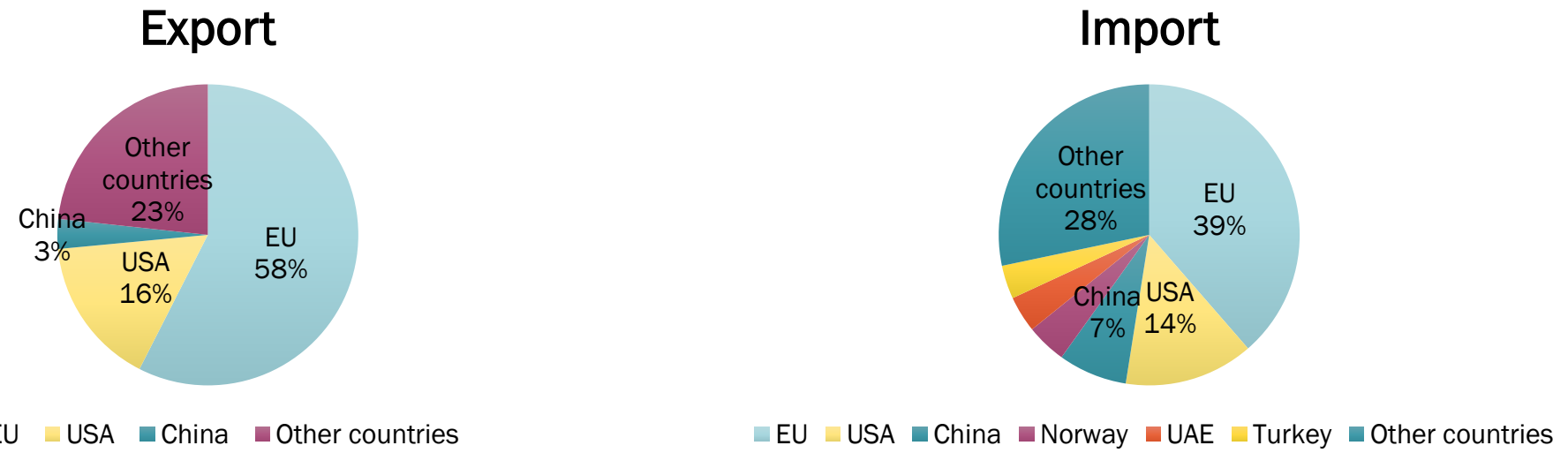
- Migrants from EU countries to UK are estimated to be most impacted by Brexit-related restrictions on migration (Gregg et al., 2021; Lomax et al., 2020; Tani, 2020).
- Portes (2022) claims that the changing restrictions of migration would have considerable impacts on EU citizens who decide to move to UK and had free movement rights before Brexit, while non-EU citizens will be hardly impacted by such changes.
- 2020 Covid-19 pandemic and 2022 Russian Invasion of Ukraine could bring unexpected impacts on migration.

	≥ £25,600 per annum	< £25,600 per annum
EU migrants	Point-based workers visa required	
Non-EU migrants	Point-based workers visa required	Not eligible

Table 1. Current UK immigration requirement categorization

Source: UK Home Office, https://www.gov.uk/guidance/new-immigration-system-what-you-need-to-know

Why Wales?



- In 2022, export values to the EU accounted for 57.5% of Welsh export value compared with 52.0% for the UK (ONS data).
- In 2022, import values from the EU accounted for 38.6% of the total Welsh import value, compared with 45.4% for the UK.

Chart 1&2. Export and import values in Wales, 2022

Source: Office of National Statistics

Wales has one of the strongest trade and economic ties with the EU region among all UK subregions (Portes, 2022).

Why Wales?

- Migration decisions are highly motivated by economic ties between move-in and move-out regions (Hoover, 1969).
- As a result, Wales and EU share a close relationship regarding migration.
- Wales has become the second most popular destination for EU migrants to UK since 2005 (StatsWales, 2021).
- Current literature on Brexit's impacts on migration to Wales is inadequate.

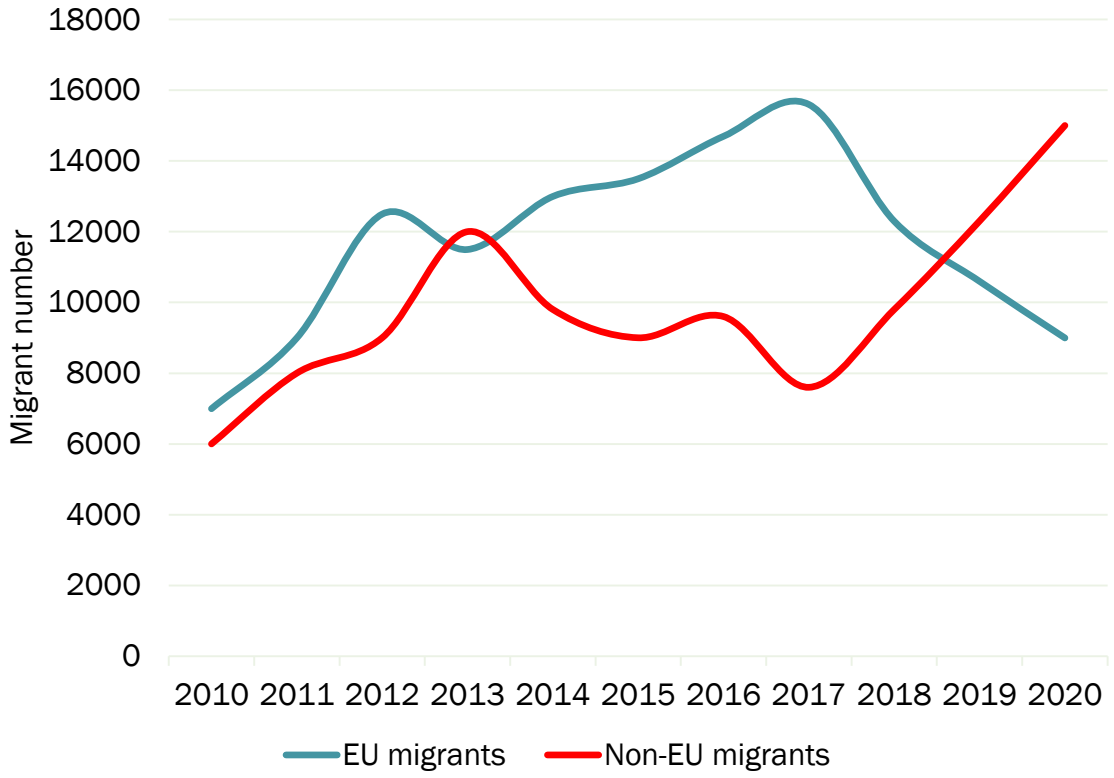


Chart 3. Migration to Wales, 2010-2020

Source: ONS and StatsWales


Finally...
TAPAS BAR
ROSA'S THAI
BUB'S BAR + KITCHEN
BUB'S BAR + KITCHEN
CASK CRAFT
BRAINS
BRAINS

My Research Questions:

- How did Brexit impact migration patterns to Wales after the 2016 referendum, and can these impacts be differentiated with respect to other external shocks, namely the Covid-19 pandemic and the war in Ukraine?
- To what extent will Brexit impact and reshape future migration patterns to Wales for both EU and non-EU migrants in the future?
- What public policies, especially migration-related administrative policies can Welsh Government implement to assure a “healthy and balanced migration governance”?

Methodology

In this section, I will introduce two major models (and methodologies) that were applied to solving my research questions in my paper.

FEVD-based Gravity Model

- It is based on an extension form of classical gravity model of migration developed by Lowry (1966). The general form of the original model is shown below.

- M_{ij} represents the number of migrants from region i to j, which is considered to depend positively on the population size in each region (P_i, P_j) and negatively on the distance between them (D_{ij}).

- $X_{s,j}$ includes all exogenous variables that attract migration (pull factors) while $X_{s,i}$ includes all exogenous variables that encourage out-migration decisions (push factors).

$$M_{ij} = k^{\gamma_0} \cdot \frac{P_i^{\gamma_1} P_j^{\gamma_2}}{D_{ij}^{\gamma_3}} \cdot \prod_{s=1}^{n} \frac{X_{s,j}^{\alpha_s}}{X_{s,i}^{\beta_s}},$$

- Take the log-linearized form:

$$\ln M_{ij} = \gamma_0 \ln k + \gamma_1 \ln P_i + \gamma_2 \ln P_j - \gamma_3 \ln D_{ij} + \sum_{s=1}^{n} \left(\ln X_{s,j}^{\alpha_s} - \ln X_{s,i}^{\beta_s} \right).$$

FEVD-based Gravity Model

- Plumper and Troeger (2007) developed the fixed-effect vector decomposition (FEVD) method to allow estimations of time-invariant variables (such as the distance between move-in and move-out regions) based on an FEM setup.

- Even though FEVD has been often criticised, it is highly consistent with econometric requirements of the gravity model, especially for some of variables such as the distance and location, which makes it a powerful estimator. As a result, it has been widely used in spatial analysis and regional economic papers.

- Finally, the empirical FEVD-based Gravity Model is as follows:

$$M_{i,j,t} = \beta_0 + \beta_1 P_{i,t-1} + \beta_2 P_{j,t-1} + \beta_3 D_{i,j} + \beta_4 U_{i,t-1} +$$
$$\beta_5 U_{j,t-1} + \beta_6 G_{i,t-1} + \beta_7 G_{j,t-1} + \beta_8 EU_{i,t-1} + \beta_9 Covid_{i,j,t-1} + \varepsilon_{i,j,t}$$

- $M_{i,j,t}$ is divided into three groups: the number of 1) EU migrants earning more than £30,000 per annum, 2) EU migrants earning less than £30,000 per annum, 3) Non-EU migrants earning more than £30,000 per annum. Regression analysis repeated for 3 times in accordance with top 3 industries receiving most migrant labour in Wales.

NIGEM Model

- Benefited from the cooperation between NIESR and Cardiff Business School (Cardiff University) and co-developed by both institutions above.
- Spatial DSGE approach embedded in the NIGEM model.
- All dependent and independent variables used in the NIGEM model are identical to those used in FEVD-based gravity model except one extra dummy variable $Ukraine_{i,t-1}$ to examine whether the move-out country is contiguous to Ukraine.
- Numerous papers published in 2022 estimated that Russian Invasion of Ukraine could last for months, even years, which is believed to have considerable impacts on migration decisions for citizens close to Ukraine.
- Data analysis process was fully completed on the NIGEM modelling and analysis portal.

Data

Labour Force Survey data (2011-2020)

Migration Annual Survey data, StatsWales (2011-2020)

WHO Covid-19 Database (2020-2022)

World Bank Database (2011-2020)

Results

In this section, I will introduce three major parts: descriptive statistics, empirical results of fixed effect model analysis, and NIGEM-based forecasts.

Descriptive Statistics

Variables	Observations	Mean	S.D.	Min	Max
P_i	850	129.23577	29.46768	2	1452
$D_{i,j}$	85	4238.299	2874.121	368	9889
U_i	850	7.33872	.7988233	3	12
G_i	850	16882.111	3489.445	2065	35789
EU_i	850	.3277781	.4672899	0	1
$Covid_{i,j}$	170	5.642211	328.932015	0.05	12.35

Table 2. Descriptive Statistics for both FEVD and NIGEM model

- Population in million; Distance in kilometre; Unemployment rate in percentage; GDP per capital in dollar; EU dummy; Covid in ratio.

- All descriptive statistics above have not been log-linearized. Logarithmic values were applied in modelling process to make it easier for regression analysis.

Results: FEVD-based Gravity Model

- Generally, more people in the move-out country contributed to more migration from this country to Wales.
- Distance discouraged migration.
- Higher unemployment rate in the move-out country contributed to more migration to Wales.
- Migration to Wales tended to be from regions with lower GDP per capital to the region with higher GDP per capital (Wales), which is consistent with numerous empirical findings.
- EU free movement attracted migration, while Covid-19 surge caused risks of migration.

TABLE 3: Gravity Model (FEVD)

Variable	I	II	III
Population (Move-out)	1.002***	0.932***	0.966***
t-stat	293.63	183.73	188.93
Population (Wales)	0.659**	0.843**	0.784**
t-stat	181.55	170.38	179.43
Distance	−0.728***	−0.560***	−0.675***
t-stat	−32.97	−46.88	−57.02
Unemployment rate (Wales)	−0.322***	−0.382***	−0.314***
t-stat	−11.33	−12.05	−8.23
Unemployment rate (Move-out)	0.445***	0.456***	0.442***
t-stat	11.03	13.66	9.45
GDP per capita (Wales)	0.157***	0.147***	0.157***
t-stat	8.46	11.62	9.26
GDP per capita (Move-out)	−0.208***	−0.162***	−0.155***
t-stat	−14.33	−13.51	−14.43
EU free movement	–	0.831***	0.414***
t-stat	–	16.32	13.45
Covid-19	–	–	0.416***
t-stat	–	–	16.76
cons	−2.516***	−3.475***	−3.445***
t-stat	−43.88	−34.95	−27.62
Observations	850	850	850
F-stat 1st Eq	F(18, 821) = 566.25	F(22, 833) = 889.45	F(26, 845) = 759.02
I-P-Shin test W[t-bar]	−2.56	−3.11	−6.19

Note: Two-stages least-squares Panel Fixed-Effect Regression with Vector Decomposition (FEVD). Covariates are treated as rarely changing variables. Standard errors are robust to heteroskedasticity. The F-statistics tests the hypothesis that the instruments do not enter the first stage of regression.

Discussions

- I conducted further analysis on whether Brexit led to changes in the number of EU/Non-EU migrants in 3 categories and top 3 industries in Wales, as mentioned.
- I repeated the regression procedure for 6 times in total, investigating industrial and income heterogeneity.
- Results show that the number of EU migrants earning less than £30,000 per annum in the manufacturing industry decreased most significantly due to Brexit-related migration policy changes.
- Results also demonstrate that non-EU migrants earning more than £30,000 per annum (or else they cannot get legal immigration status in UK) increased possibly due to Brexit after 2016 Referendum, though such correlation is not statistically significant. Some other economists claimed it might be the result of the extension of PSW visa and other loosening immigration policies in UK (Henderson et al., 2020; Li et al., 2018).

Discussions (continue…)

- To test whether the 2016 Referendum caused perceptual concerns over abolishing EU-UK free movement, I inserted another dummy variable to check whether the move-out country belonged to EU at time t.

- Results show that the 2016 Referendum contributed to a rapid increase in the number of EU migrants in Wales and such causal effect is statistically significant. Hewings et al. (2020) claimed that the decision of Brexit made by referendum and the publication of step-by-step manuals on Brexit (especially the aim of Brexit completion in 2020) might have encouraged EU migrants to speed up their migration schedules.

- To test the robustness of whether Covid-19 brought the endogeneity issue, I inserted three IV, namely population density, the number of hospital beds per 1000 people, and the number of registered physicians. However, no statistically significant coefficients for these three IV were found, indicating that Covid-19 did not impose endogeneity to changes in migration patterns due to Brexit.

Results: NIGEM Forecast

- Results show that the number of Category 1 migrants (EU migrants earning no less than £30,000 per annum) and Category 2 migrants (EU migrants earning less than £30,000 per annum) are expected to have rapidly increased in 2022 and remained at a high level of increase until 2024, with 17% and 12% of increase in 5 years until 2026, respectively.

- The number of Category 3 migrants (non-EU migrants earning no less than £30,000 per annum) is expected to increase steadily from 2021 to 2025 and to experience a slight decrease in 2026, making a 21% increase in 5 years until 2026.

- Brexit-related restrictions on EU migration to UK have statistically significant causal effects on such trends.

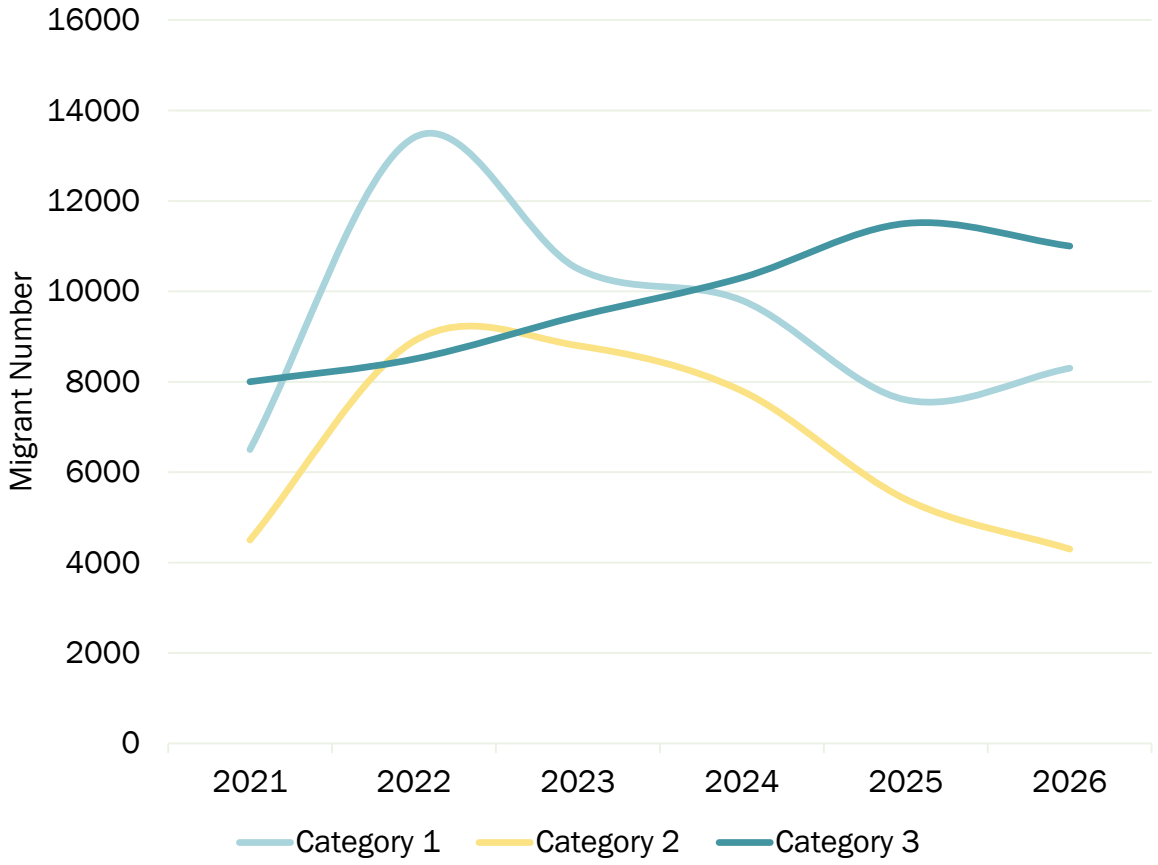
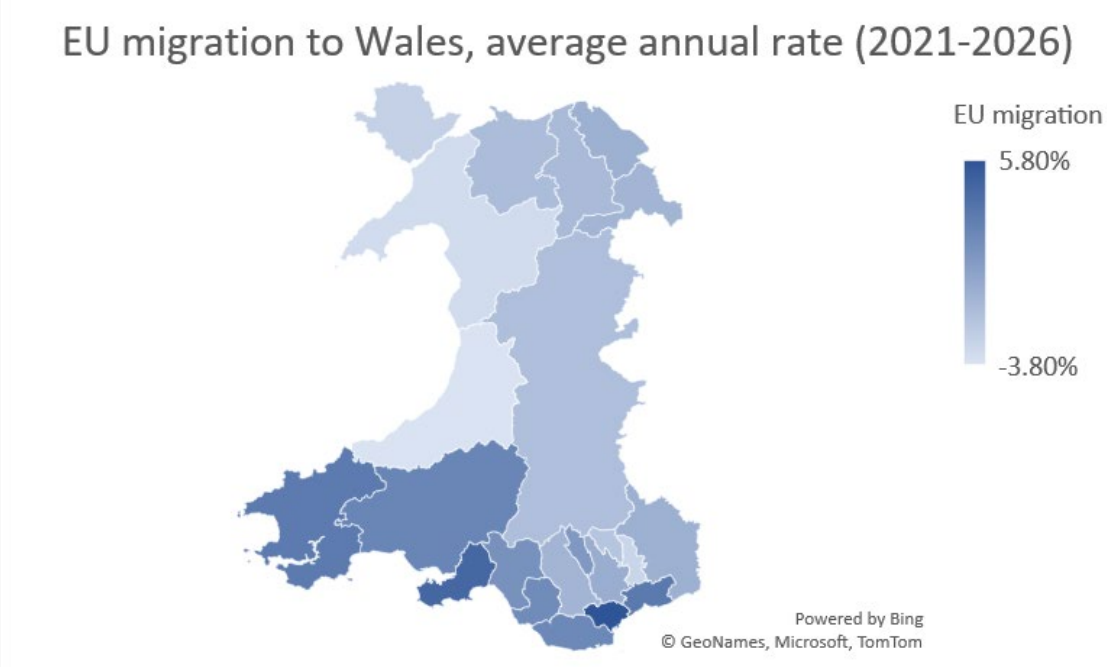


Chart 4. Migration to Wales forecast, 2021-2016. Based on NIGEM model estimations.

Results: Geography of Migration



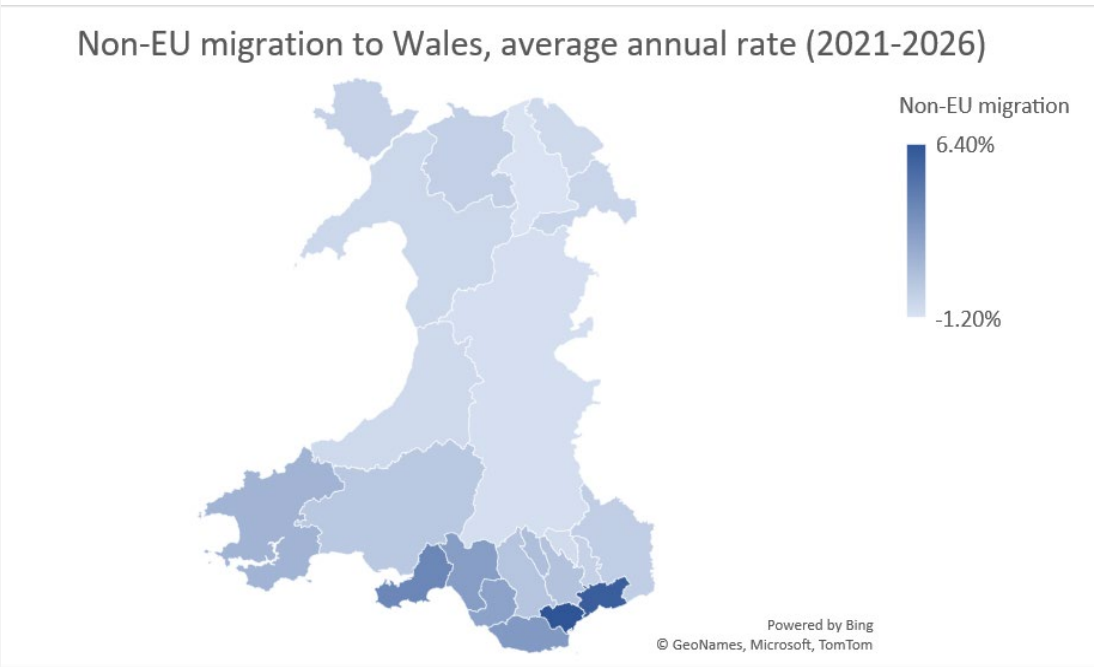


Figure 1&2. Forecasts of EU and non-EU migration geographical patterns in Wales in average annual rate from 2021 to 2026. ArcGIS and GeoNames tools were applied during the process of mapping.
All figures are extracted from my working paper *Measuring impacts of Brexit on migration in UK: the case of Wales.*

Discussions

- Previous literature also noted that the industrial heterogeneity could lead to regression and forecast bias regarding regional economic topics such as migration analysis, leading to divergent results (Rabe et al., 2012; Ozgen et al., 2011).

- For my research project, this raises a question that how EU and non-EU migrants in different industries will respond to Brexit-related restrictions on migration, which apparently involves further microeconomic individual or firm-level analysis on this topic.

- Unfortunately, the current version of Wales-based NIGEM model has not included such approach or data to forecast how migrants will change their migration decisions to Wales based on their occupations and expertise in different industries but will collect and include firm and individual-level data in near future.

Conclusions

- Brexit had causal effects on the reduction of EU migrants to Wales in major industries, especially after the 2016 Referendum caused fear of Brexit.
- Brexit did not impact non-EU migrants to Wales in major industries, possibly due to plans of loosening immigration policies such as extension of PSW visa and start of BNO visa application.
- EU migration is expected to be “encouraged” by 2022 Ukrainian War and last for at least one year due to perpetuation of the war.
- Welsh government needs to cooperate with UK Home Office to develop a balanced and merit-based immigration policy that meets the requirement of economic growth.

Thank you

Please feel free to ask questions and I will try my best to answer them.

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