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Conference Paper

Identifying macroeconomic effects of refugee migration to Germany

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Abstract. This study investigates causal impacts of immigration on the German economy, explicitly distinguishing refugee and non-refugee migration. We propose a macroeconometric modelling approach complemented by IV techniques. We find that non-refugee migration has more beneficial medium-run effects on GDP and the labour market.

Keywords. Immigration, economic effects, macroeconometric modelling, instrumental variables

JEL-Classification. F22, E24, C32, C36.

1 Introduction

The recent five years witnessed a strong upsurge of migration to Germany. Immigration from Southern and Eastern Europe due to the European economic crisis was added by refugees from the Middle East and other regions. In view of the high number of migrants, the discussion on economic consequences gains momentum all throughout Europe. However, still little is known about the macroeconomic effects of different types of immigration. Particularly, refugees naturally differ from other migrants in several aspects such as a decisive role of concrete push factors (Ruist 2013), no sorting e.g. with regard to labour market needs of the host country, specific institutional regulations, need of immediate support and special prospects for the duration of stay.

Against this backdrop, the underlying study investigates immigration impacts on the German economy, explicitly distinguishing refugee migration (RM) and non-refugee migration (NRM). It contributes to the macroeconometric modelling of migration effects (e.g. Boubtane et al. 2013, Damette/Fromentin 2013, Kiguchi/Mountford 2013), introducing an instrumental variables (IV) identification of shocks into a structural vector autoregressive (SVAR) setting estimated by ridge techniques. This measurement approach combines the advantages of very generally taking into account comprehensive macroeconomic effects and interactions of migration shocks while being based on a minimal set of identifying assumptions. Furthermore, data requirements are low, whereas broad micro data on RM to Germany are not available. Inference does not rely on a priori specification of specific structures, e.g. regarding wage behaviour or complementarity relations. On the downside, interpretations can be less clearly guided by explicit economic mechanisms. Thus, our study should be seen as complementing approaches such as those based on structural equilibrium modelling or regional variation (e.g. Borjas 2003, Borjas 1999, for Germany Pischke/Velling 1997, D'Amuri et al. 2010, Brücker et al. 2014).

The next section introduces our data, followed by a description of the model and the identification methods. Section 4 discusses the resulting impulse responses and the last section concludes.

2 Data

We employ yearly data for the period 1970-2014. While migration statistics by reason of immigration are not available, RM is proxied by the number of asylum applications from the Federal Office for Migration and Refugees. Even though there were substantial delays in 2015, immigration and application usually fall within the same year. NRM is given by the overall gross immigration from destatis minus RM. Figure 1 shows the two variables.

While the decline of immigration during the 1970s and 1980s following the oil price shocks was due to tightening migration restrictions, the increase in the 1990s resulted from the collapse of the Eastern European communist regimes and the civil wars in Yugoslavia for RM. Then, immigration slowed down due to economic slack and tighter restrictions, before the current migration wave started with the European economic and the refugee crisis.

The variables representing the macroeconomy are log real GDP, the wages share (gross wages divided by GDP) as well as unemployment, all from destatis. GDP and unemployment are divided by working-age population. RM and NRM are per capita of total population. Finally, all variables are multiplied by 100. To account for the German reunification, the West-German pre-unification series of GDP, wages and population are proportionally adjusted to match the German figure of 1991, where an overlap exists. Migration flows and unemployment per working-age population are not adjusted for reunification effects.

In order to avoid biases from endogeneity, we employ an IV approach with push factors for migration. World (less German) population from the UN World Population Prospects serves as a general instrument for migration. To gain an instrument specifically for RM, we make use of the UCDP Battle-related Deaths Dataset, Version 5.0-2015[1] that provides the number of deaths resulting directly from violence in armed conflicts with at least one national government involved. An instrument specifically for NRM is given by unemployment in Europe[2], filtered by an orthogonal projection on the German unemployment rate, which accounts for international cyclical linkages. The IVs are displayed in Figure 2.

Auxiliary regressions of RM and NRM on the three instruments (as well as an autoregressive

[1] See `http://www.pcr.uu.se/research/ucdp/datasets/ucdp_battle-related_deaths_dataset/`. The dataset is extended back to 1970 using older data from the PRIO dataset, version 3; see Lacina/Gleditsch (2005).

[2] We collected unemployment figures from the ILO database of those countries with data availability since the 1970s. Usually, this concerns registered unemployment.

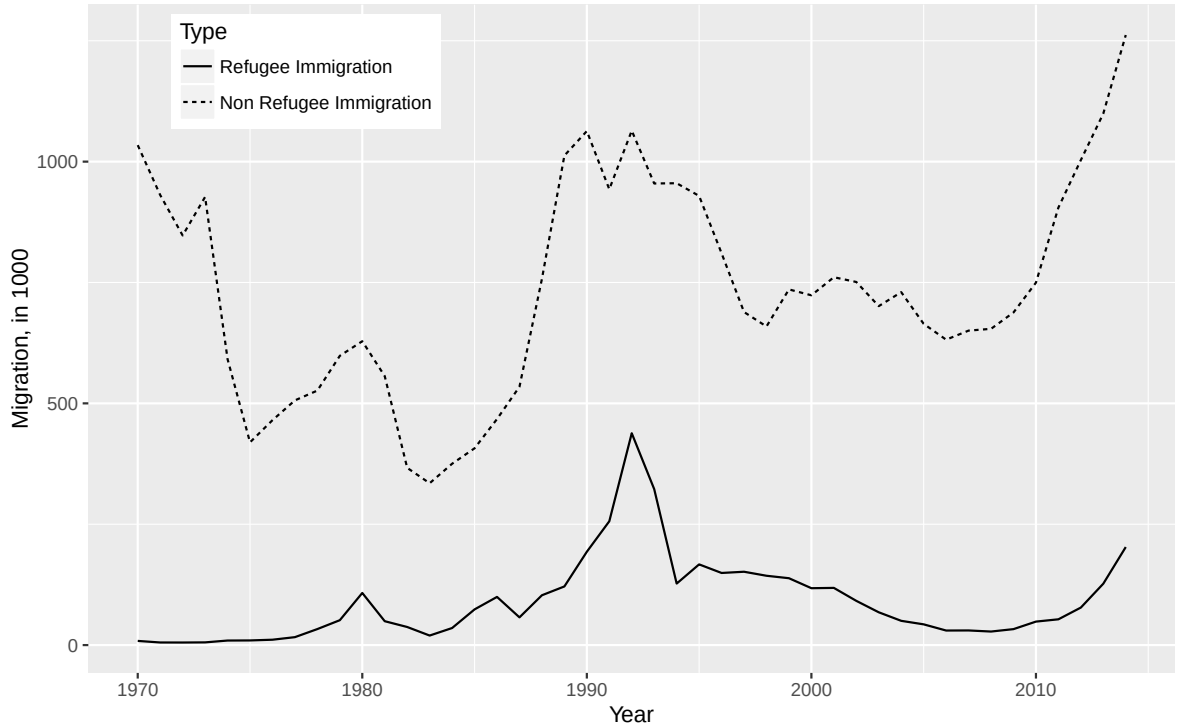

Figure 1: Refugee immigration and non-refugee immigration.

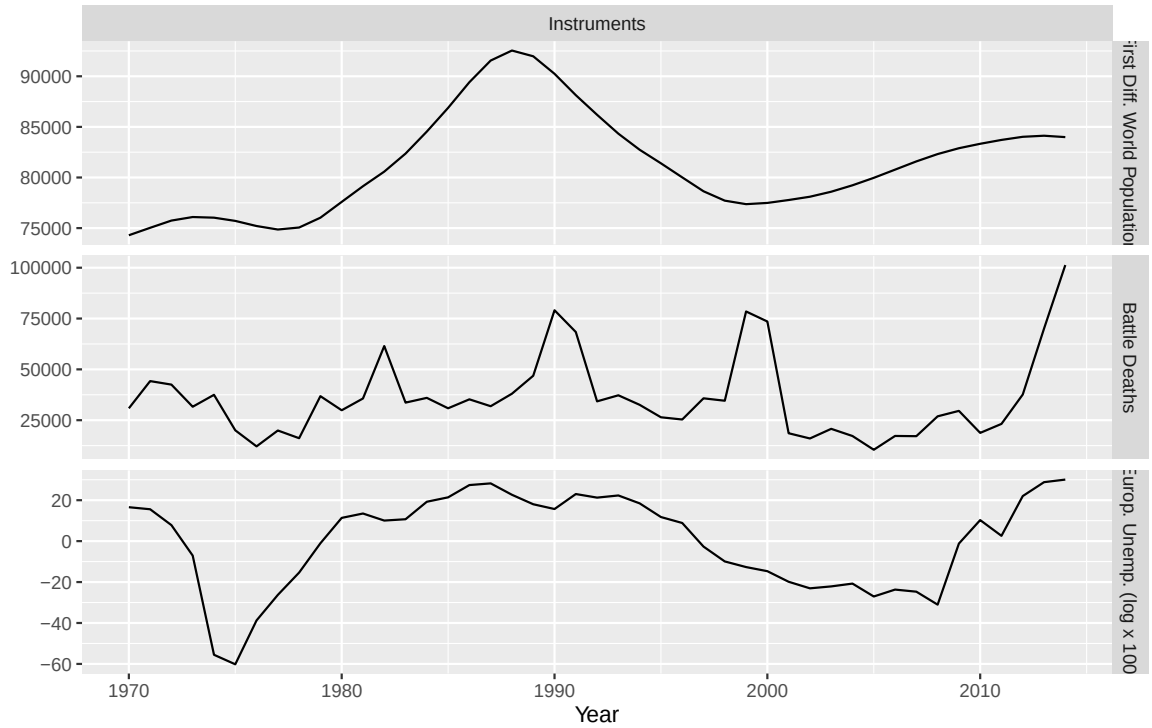

Figure 2: Instruments: battle deaths, European unemployment, world population.

lag, a constant and a linear trend) delivered F-statistics for the IVs of 13.5 and 9.3, respectively. Indeed, it turned out that the battle deaths are only relevant for RM, while unemployment only affects NRM. Thus, we have separate instruments of sufficient strength available.

3 Model and Identification

We proceed in a SVAR framework that allows measuring structurally identified shocks and dynamic interactions. The vector y consists of RM, NRM as well as the block of macroeconomic variables GDP, wage share and unemployment. x holds the instruments in first differences.

$$Ay_t = C_1 + C_2 t + \sum_{i=1}^{p} B_i y_{t-i} + Dx_t + \varepsilon_t \tag{1}$$

The matrix A (with diagonal elements normalised to one) contains the bidirectional contemporaneous spillovers, the dynamic interaction is covered by the lag coefficients in B_i, $i = 1, \ldots, p$. D holds the coefficients of the instruments in the first rows and zeros else. C_1 is a vector of constants, C_2 a vector of time trend coefficients and ε includes the shocks. Besides, we consider an impulse dummy in the GDP equation for the extreme observation in 2009.

An analysis of residual autocorrelation and information criteria showed that $p = 3$ lags are sufficient to capture the system dynamics. All endogenous variables are included in levels in order to avoid imposing unit roots by differencing. In a VAR with sufficient lag length, this allows for flexible formation of quasi differences or level relations.

The migration shocks are identified by IVs that exert direct effects on RM (except European unemployment) and NRM (except battle deaths), but are not directly linked to the other innovations. No further identifying restrictions are imposed, i.e., all bidirectional contemporaneous spillovers between the migration and macroeconomic variables are left free. While the contemporaneous effects of the macroeconomic variables on NRM turned out to be significant, those on RM could be excluded (p-value of a LR-test 0.666). Since both migration variables are separately instrumented, besides bilateral contemporaneous impacts, we can allow for correlation of their shocks. This corresponds to typical simultaneous systems and prevents potential exposure to common factors from distorting the estimates of the direct spillovers. Furthermore, the innovations within the block of the macroeconomic variables are allowed to be correlated, since our research question does not require identification here.

We estimate the SVAR by a multivariate ridge regression approach, using the `glmnet` package in R (Friedman et al. 2010). The reguralization parameter is estimated by 10-fold cross validation on coherent blocks of the sample. Confidence bands for impulse responses are constructed using a residual-based moving block bootstrap as described by Brüggemann et al. (2016). The standard percentile method is applied to obtain 66.67% pointwise confidence intervals, after centering the simulated impulse responses around the estimates.

4 Results

We present impulse responses to structural RM and NRM shocks. Figure 3 shows that a RM shock has adverse effects on per capita GDP and the unemployment rate in the medium run. This is likely to be explained by relatively low qualification and a rather poor fit of refugees to the needs in the German labour market. This would represent a labour supply shock concentrated in segments with low wage flexibility and rather high unemployment risks (cf. Brücker et al. 2014). Since the wage share is constant in the medium run, per capita wages are affected proportionately to per capita GDP.

In the longer run, the adverse effects are reduced. This could be connected to further qualification and integration of the immigrants and adjustment of the capital stock that remains rather fixed in the short run (compare e.g. Ottaviano / Peri 2012). However, the unemployment rate can remain higher since the composition of the work force changes. Short-run effects are still more positive. These results are presumable connected to the demand side of the macroeconomy. RM requires immediate investments, social assistance payments and hiring in fields such as administration, education or social work. These expenses usually go along with high multiplier effects.

The impulse responses for shocks to NRM are depicted in Figure 4. Here, in contrast to the case of RM, unemployment shows no clear reaction. The wage share is only on impact negative but in general remains constant. Per capita GDP is affected positively. While the magnitude is relatively imprecisely measured, at least the confidence band reveals that there is no scope for a relevant negative response. Thus, unlike RM, NRM does not lower per capita GDP. This is likely due to the fact that NRM is on average more labour-market-oriented and higher skilled. I.e., it is more likely that an immigration surplus and gains from complementarities can be realised. Moreover, domestic lower-skilled labour market segments could benefit from

increasing labour supply in higher-skilled segments. In general, based on the separation of RM and NRM, our results favour the view that immigration (at least NRM) has no adverse effects on the German economy (e.g. Felbermayr et al. 2010).

5 Conclusion

We analyse migration effects in a macroeconometric model setting, explicitly distinguishing RM and NRM. We find that in Germany, NRM has more beneficial medium-run effects. An RM shock first causes some positive (demand-side) reactions, but then lowers per capita GDP and increases the unemployment rate. Nonetheless, these effects recede over time.

The implications for the current peak of RM to Germany are twofold. On the one hand, there are clear risks that economic conditions are adversely affected. However, on the other hand, the results for NRM show that immigration to Germany in general is not accompanied by negative effects. Therefore, if efforts regarding language competences, qualification and integration succeed, economic results can be expected to improve visibly. Such a strategy requires high initial investments.

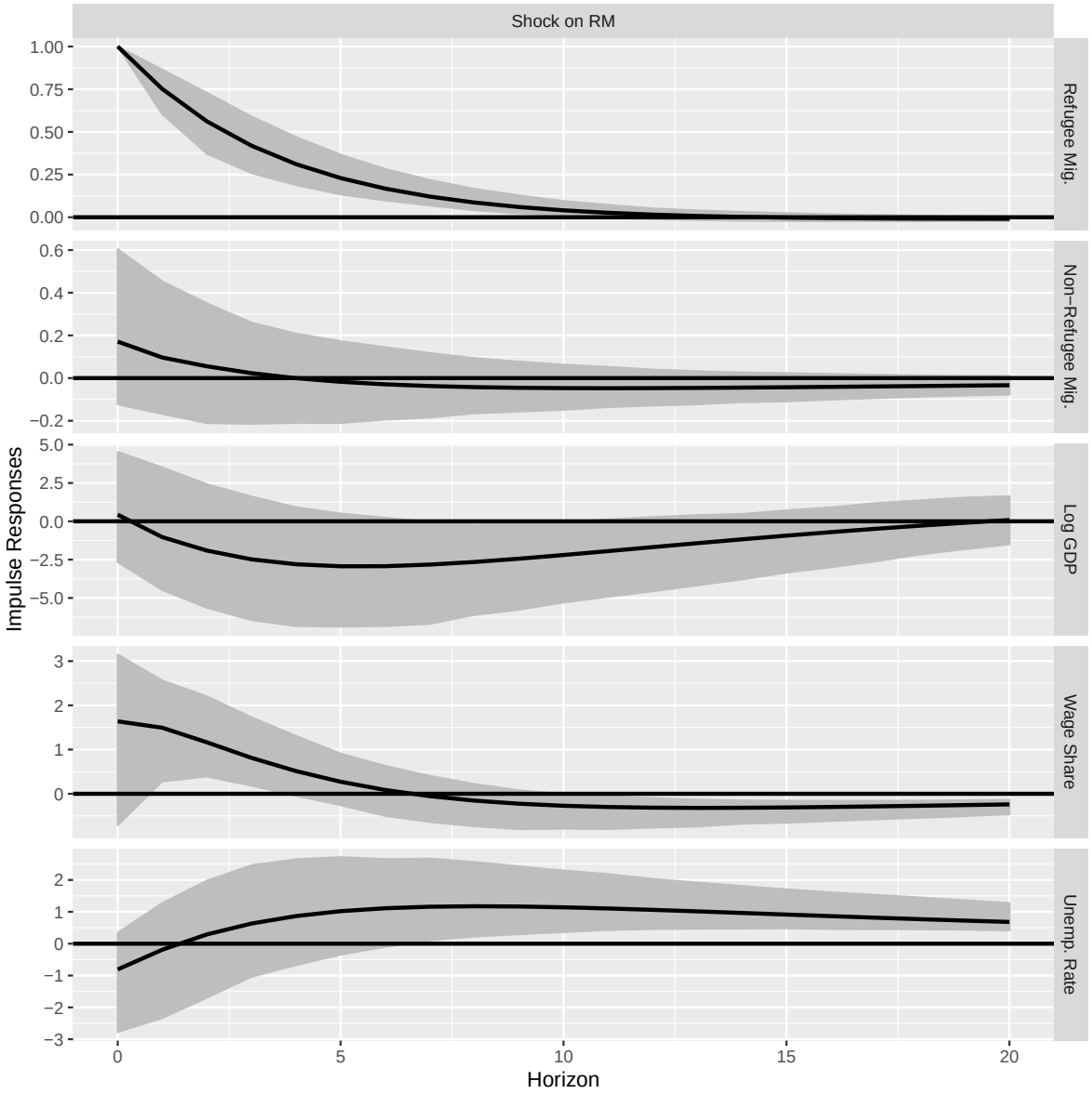

Figure 3: Responses to RM shocks

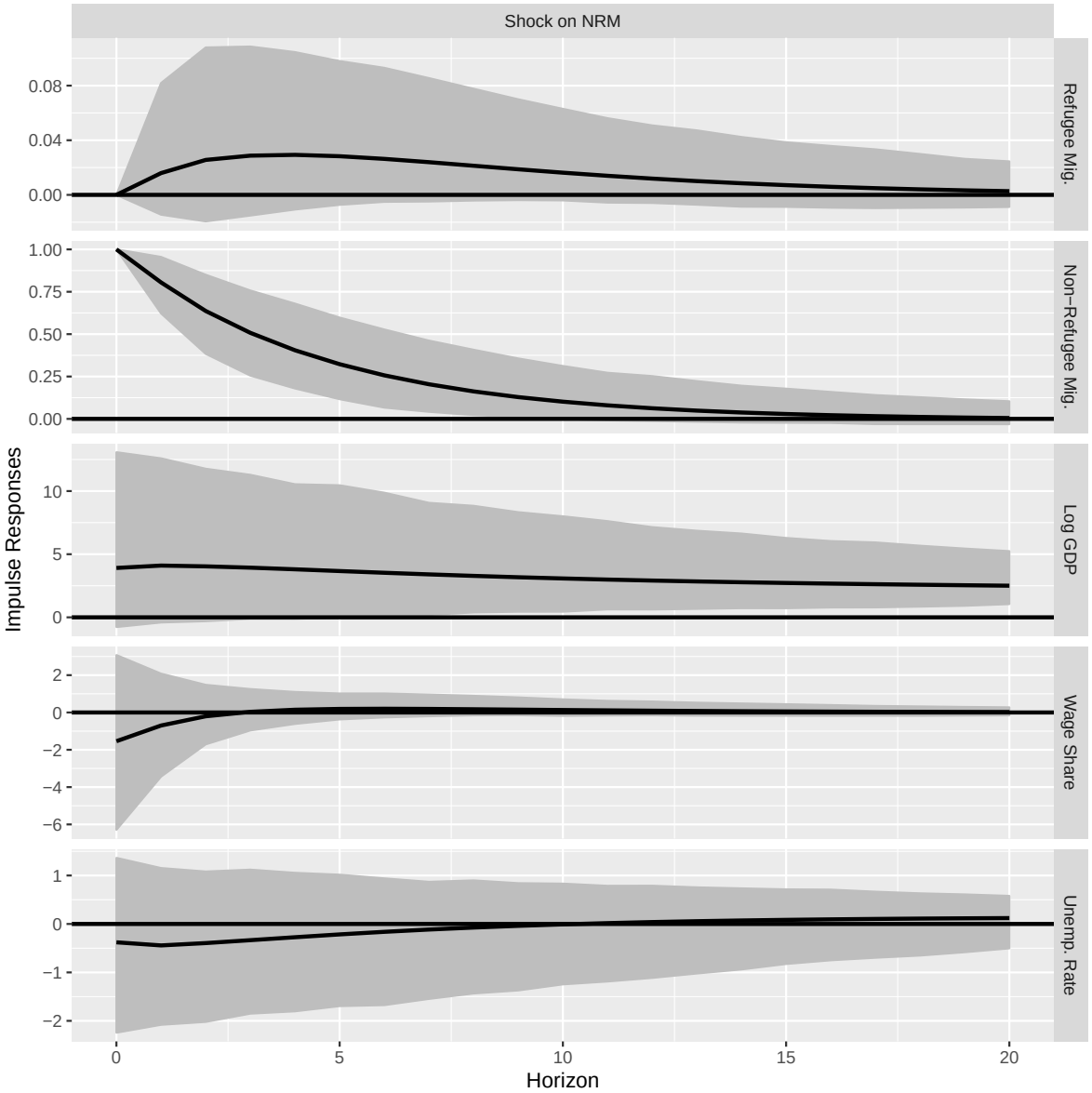

Figure 4: Responses to NRM shocks

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