

REAL EXCHANGE RATES AND THE EARNINGS OF IMMIGRANTS*

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We relate origin-destination real price differences to immigrants' reservation wages and their career trajectories, exploiting administrative data from Germany and the 2004 enlargement of the European Union. We find that immigrants who enter Germany when a unit of earnings from Germany allows for larger consumption at home settle for lower entry wages, but subsequently catch up to those arriving with less favourable exchange rates, through transition to better-paying occupations and firms. Similar patterns hold in the United States data. Our analysis offers one explanation for the widespread phenomenon of immigrants' downgrading, with new implications for immigrant cohort effects and assimilation profiles.

Upon arrival in the host country, new immigrants often accept jobs or wages that are below their observed qualifications. Although the phenomenon of immigrant downgrading is well established in the literature (see, e.g., Eckstein and Weiss, 2004 and Dustmann *et al.*, 2013), less is known about the drivers of such behaviour. In this paper, we propose real price differences (or real exchange rates) between the host and source countries as one plausible driver of immigrants' reservation wages and provide concrete empirical evidence for that.

Our argument stems from the observation that real price levels tend to be higher in rich countries than in poor ones (Balassa, 1964; Samuelson, 1964) and labour migration typically occurs from poorer to richer regions. Consider the case of Poland and Germany as an example. The real exchange rate (RER) between Germany and Poland can be expressed as

$$RER = \frac{P^*}{P} \times e, \quad (1)$$

where P^* and P denote the price levels for a reference basket of goods and services in Germany (in euros) and in Poland (in zlotys), respectively, while e denotes the nominal exchange rate between the two currencies (zlotys per euro). Suppose that the basket costs 30 euros in Germany, and at the prevailing nominal exchange rate, 30 euros can buy 150 zlotys in the currency market. For purchasing power parity (PPP), the same basket should cost 150 zlotys in Poland, consistent with $RER = 1$. Suppose, however, that it actually costs 100 zlotys (instead of 150 zlotys) in

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The data and codes for this paper are available on the Journal repository. They were checked for their ability to reproduce the results presented in the paper. The authors were granted an exemption to publish parts of their data because access to these data is restricted. However, the authors provided a simulated or synthetic dataset that allowed the Journal to run their codes. The synthetic/simulated data and the codes for the parts subject to exemption are also available on the Journal repository. They were checked for their ability to generate all tables and figures in the paper, however the synthetic/simulated data are not designed to reproduce the same results. The replication package for this paper is available at the following address: <https://doi.org/10.5281/zenodo.8224443>.

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Poland. That means that 30 euros earned in Germany can buy 1.5 times as much when spent in Poland, leading to $RER = 1.5$.¹

If migrations are temporary and/or if immigrants (intend to) spend part of their earnings in their region of origin—either through transfers to family members or through consumption and investment upon return (see, e.g., Yang, 2008 and Dustmann and Mestres, 2010)—then their *effective* real wage derived from a given pay will be higher to the extent that the real price level in the origin is lower than that in the destination. All else equal, therefore, immigrants from low-price regions/periods are likely to have lower reservation wages than those from high-price regions/periods, which may be reflected in their observed entry wages.²

To test this RER-reservation wage hypothesis, ideally, we would like a situation in which potential migrants face minimal administrative barriers such as employer-specific work permits or visas that require job offers meeting a pre-specified wage threshold, since such restrictions would make it difficult for immigrants to act on their reservation wages.³ To approximate that situation, we take advantage of the accession of eight Central and Eastern European countries (the A8) to the European Union (EU) in 2004, which greatly facilitated the access of A8 citizens to the labour markets of other EU countries.⁴ Our analysis is based on micro-level longitudinal administrative data from Germany (Social Security records specifically) that allow us to track immigrants over time from their first employment spell, and investigate the evolution of their wages in subsequent years with detailed information on their firms and occupations. In particular, focusing on A8 immigrants arriving in Germany over the period 2004–12, we study the effect of the time-of-arrival real exchange rate (RER) on their entry wages and subsequent career trajectories in the German labour market, conditioning on country-of-origin fixed effects and cohort fixed effects (hence exploiting within-country and across-cohort variations).

We find that immigrants' entry wages are indeed affected by the real exchange rate prevailing at the time of arrival. In particular, we estimate a wage elasticity of -0.3 , implying that a 10% higher real exchange rate (about 1 SD of log RER) between the host and source countries leads to a 3% lower accepted wage in the first employment spell. However, the relation between the time-of-arrival RER and cohort-specific labour market outcomes becomes weaker over time and dissipates by the third year after arrival, suggesting a catch up of those who arrive at high RERs (and accept lower entry wages) to those arriving with low RERs (and accept higher entry wages), convergence achieved through firm changes and occupational upgrading and not by compositional changes due to selective outmigration (see Dustmann and Görlach, 2016 for a discussion).

Overall, we establish that geographic real price differences between where immigrants work versus where they spend (part of) their earnings may influence the *reservation wages* of newly

¹ There are a multitude of reasons why real price ratios between countries may deviate from PPP, including transportation and information costs, price and wage rigidities, and imperfect competition. See Dornbusch (1987) and Rogoff (1996) for a discussion.

² The conceptual framework we have in mind views the real wage one would receive at home in the absence of migration as a new immigrant's outside option, which in turn determines her reservation wage. This person will accept a wage offer from the host country as long as it exceeds her reservation wage. When the prevailing RER is high (low), the reservation wage (expressed in nominal wage in the host country) is low (high), which will then be reflected in the observed entry wages.

³ In the case of immigrants entering without a visa, employment eligibility verification requirements (see, e.g., Ayromloo *et al.*, 2020) can similarly limit the scope for (ineligible) immigrants acting on their reservation wages, at least in the formal sector.

⁴ A8 countries comprise Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.

arrived immigrants, taking advantage of high-quality longitudinal administrative data.⁵ Our analysis thus provides concrete evidence that some immigrants may indeed have lower reservation wages than other comparable workers, a premise that is commonly invoked in the literature and is gaining ground in recent analyses of immigration in non-competitive settings such as Malchow-Møller *et al.* (2012), Naidu *et al.* (2016), Amior (2017), Amior and Manning (2020) and Wang (2021). Understanding the factors driving reservation wages is crucially important as immigrants' willingness to work for less has consequences, not only for their entry wages and assimilation profiles (see, e.g., Chiswick, 1978; LaLonde and Topel, 1992; Bratsberg *et al.*, 2002; Barth *et al.*, 2004; Lubotsky, 2007; 2011; Gathmann and Keller, 2018; Albert *et al.*, 2020; Arellano-Bover and San, 2020; Dostie *et al.*, 2020 and Barsbai *et al.*, 2022), but also for assessing the labour market impacts of immigration (see, e.g., Altonji and Card, 1991; Card, 2001; Borjas, 2003; Glitz, 2012; Manacorda *et al.*, 2012; Ottaviano and Peri, 2012; Llull, 2018; Prantl and Spitz-Oener, 2020 and Tabellini, 2020).

In addition, our analysis also offers a new insight for interpreting the well-known immigrant cohort effects in the literature. In his influential study, Borjas (1985) (see also Borjas, 1995; 2015) argued that in cross-sectional analysis, changes in entry wages of later arriving cohorts can lead to biased estimates of immigrants' assimilation profiles. Borjas goes on to provide evidence for a decline in the 'quality' of newly admitted immigrants to the United States (measured in terms of entry wages) over time, suggesting the changing cohort composition from mainly Europeans to Latin Americans after the Immigration and Nationality Act of 1965 as a possible explanation. Our analysis adds a different perspective to the interpretation of the observed decline in entry wages. In particular, using US census data, we show that the declining entry wages documented in Borjas (1985; 1995) may in part be driven by the higher purchasing power of the US dollar applicable for later arriving cohorts (who originate predominantly from lower-price countries).⁶

Furthermore, by focusing on the RER as a factor determining the reservation and entry wages of new immigrants, we also add to the literature exploiting RER variations to explain a variety of immigrant outcomes in the host country. A common proposition in this literature is that to the extent that immigrants spend (part of) their earnings in their country of origin, their behaviour should be responsive to the prevailing real price differences between the host and source regions. The outcomes so far examined in the literature include return migration and remittances among Philippine migrants overseas (Yang, 2006; 2008), long-run development in the migrant-origin communities within the Philippines (Khanna *et al.*, 2020), location choices of immigrants across US cities (Albert and Monras, 2022) and labour supply (i.e., hours worked) of immigrants in the United States (Nekoei, 2013) and in Australia (Nguyen and Duncan, 2017). We add to this literature by focusing on the impact of *time-of-arrival* RER on immigrants' *entry wages* and their career profiles. In particular, we find that cohorts arriving when the RER is more favourable (i.e., high) settle for lower entry wages than other cohorts, though over time the wages of high-RER arrivals converge to that of low-RER arrivals. In a related work, Nekoei (2013) showed that a rise in the *contemporaneous* (as opposed to the *time-of-arrival*) RER between the United States and their home countries leads to a reduction in the *hours worked* by US immigrants. While

⁵ Using a similar argument, Albert and Monras (2022) built a quantitative spatial equilibrium model in which immigrants who are more likely to spend their US earnings in their home country choose high price (and high nominal wage) cities over low price (and low nominal wage) cities within the United States, with consequences for the aggregate productivity of the US economy. In contrast, our focus is on the effect of the *time-of-arrival* RER for the reservation and entry wages of different immigrant cohorts and their earnings dynamics over time in the host country.

⁶ See Section 4 for a detailed discussion.

the two studies have in common that immigrants' labour market behaviour is responsive to the purchasing power that their foreign earnings would have in their home country, the focus of the present study is on the reservation and entry wages of newly arrived immigrants, whereas Nekoei (2013) focused on the labour supply of incumbent immigrants (with substantial years of tenure, on average 17 years).

1. Background, Data and Sample Description

1.1. *The 2004 EU Enlargement and Migration Flows*

On May 1, 2004 eight Central and Eastern European countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia), also referred to as the A8, and two Mediterranean countries (Malta and Cyprus) joined the EU, thus constituting the largest single enlargement of the European Union, both in terms of the number of countries and people. While citizens of new accession countries could immediately move and live freely in any of the EU member states, a transitional period of up to seven years was agreed upon, during which time countries could restrict access to their labour markets for citizens of the new member states.

The majority of the old EU-15 countries applied some restrictions on access to their labour markets, with the exception of the UK, Ireland and Sweden. Germany delayed elimination of labour market restrictions for A8 workers until May 1, 2011. However, despite these restrictions, Germany nevertheless experienced a large increase in migrant inflows from the new EU member states after their accession in 2004.⁷ For instance, the share of foreigners migrating to Germany who were Polish citizens increased from about 12% in 2003 to 20% in 2004. Between 2000 and 2003, an average of 80,000 Poles migrated to Germany each year, while between 2004 and 2007 this number was 141,000, constituting a 75% increase in the four years after Poland joined the EU (OECD, 2011). Migration flows from other A8 countries increased similarly, e.g., inflows from Hungary, the second largest country in the A8 group after Poland, increased by 20%. Indeed, migration flows from A8 countries to Germany increased faster even than those to countries like the UK that applied no restrictions on labour mobility from the new accession countries.⁸ While Germany did not officially open its labour market to A8 immigrants, the ease with which work permits could be obtained therefore led to a situation that came to resemble closely free mobility of labour.

1.2. *Data*

For our empirical analyses, we use several data sources: individual-level data from German Social Security records, country-level macroeconomic variables and data from the American Community Survey (ACS) and the US census. We describe the various data sources below.

⁷ Even within the transitional period arrangement, nationals from new member states had preferential access to the labour market of the EU15 as compared to third country nationals. In Germany, for instance, a new type of work permit has been created to respond to this new situation, and more than 11,000 of these permits were issued to nationals of A8 countries in 2004 (OECD, 2006, p.108). For detailed regulations affecting the labour market access of A8 nationals, see Holland *et al.* (2011, pp.118–119).

⁸ The inflow of Poles to the UK in 2004 and 2005 amounted to 16,000 and 49,000, respectively, considerably lower than the inflows registered to Germany, where 125,000 and 148,000 Poles arrived in 2004 and 2005, respectively (OECD, 2011). Here, statistics for Germany represent foreigners holding a residence permit and intending to stay in the country for at least one week. Statistics for the UK show non-British citizens admitted to the UK.

1.2.1. *Labour market biographies in Germany*

We use the ‘Weakly anonymous Version of the Sample of Integrated Labour Market Biographies (SIAB) – Version 7514 v1’ from the Research Data Centre of the Federal Employment Agency (BA) at the Institute for Employment Research (IAB). Data access was provided via on-site use at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) and subsequently remote data access. Detailed documentation of the SIAB Version 7514 is available in Antoni *et al.* (2016).⁹ The SIAB is a 2% random sample drawn from the universe of employment biographies of workers who were liable to German Social Security at any point between 1975 and 2014. The data contain detailed information on the labour market outcomes of individuals such as occupation and gross (daily) wages reported by the employer. It also contains some rudimentary information on the demographic characteristics of workers, including age, gender and education. Most importantly, we also observe nationality. This, in conjunction with the longitudinal nature of the data, allows us to identify workers with foreign nationality as they appear for the first time in the German labour market. In the SIAB data, an individual may have multiple employment spells within a year (or even hold multiple jobs concurrently). We focus on the main employment spell each year, which we define as the spell with the longest duration. In the case of ties, we use the spell that appears chronologically first. Our analysis focuses on immigrants from the four largest A8 accession countries, Poland, Hungary, Czech Republic and Slovakia, who enter Germany in the post-EU enlargement period between 2004 and 2012 and are observed in the German labour market data.^{10,11}

1.2.2. *Real exchange rate*

We augment the individual employment data with aggregate yearly data on real exchange rates for each of the origin countries that we consider. We construct the RER according to (1), where P^*/P , commonly referred to as the ‘purchasing power parity conversion factor’ and e , the nominal exchange rate, are both obtained from the World Bank’s World Development Indicator (WDI) database.¹² Panel (a) of Figure 1 illustrates the evolution of the real exchange rate between Germany and Poland, Hungary, Czech Republic and Slovakia between 2004 and 2012.¹³ If these countries and Germany were at purchasing power parity, the RER should be equal to unity. In reality, however, the prevailing RER is always greater than 1 (mean RER = 1.67), meaning that the real price levels in these countries are lower than that in Germany. The figure also illustrates that the RERs exhibit considerable changes over time (SD of RER = 0.16) with substantial differences between origin countries. Panel (b) of Figure 1 shows data on each country’s real GDP per capita relative to that in Germany (again obtained from the World Development Indicators).

⁹ Version 7514 has subsequently been updated and the latest version available is SIAB 7521 (see Graf *et al.*, 2023 and Schmucker *et al.*, 2023).

¹⁰ We only use country-cohort cells that include at least 20 individuals in the 2% sample. This requirement is not met for other (smaller) A8 countries.

¹¹ The SIAB data run until 2014. Therefore, we focus on 2004 to 2012 arrival cohorts to enable us to follow every cohort for three years after arrival.

¹² The database can be accessed at <https://data.worldbank.org/indicator>. For European countries (including those used in our analysis), OECD-Eurostat (<https://ec.europa.eu/eurostat/web/purchasing-power-parities/overview>) collects their own data and produces the PPP conversion factors for each year, which are then provided to the World Bank.

¹³ Slovakia adopted the euro in 2009 and hence the nominal exchange rate between Slovakia and Germany is unity from 2009 onwards. However, a common currency does not preclude variations in the RER since the relative prices of Slovakia and Germany still vary over time.

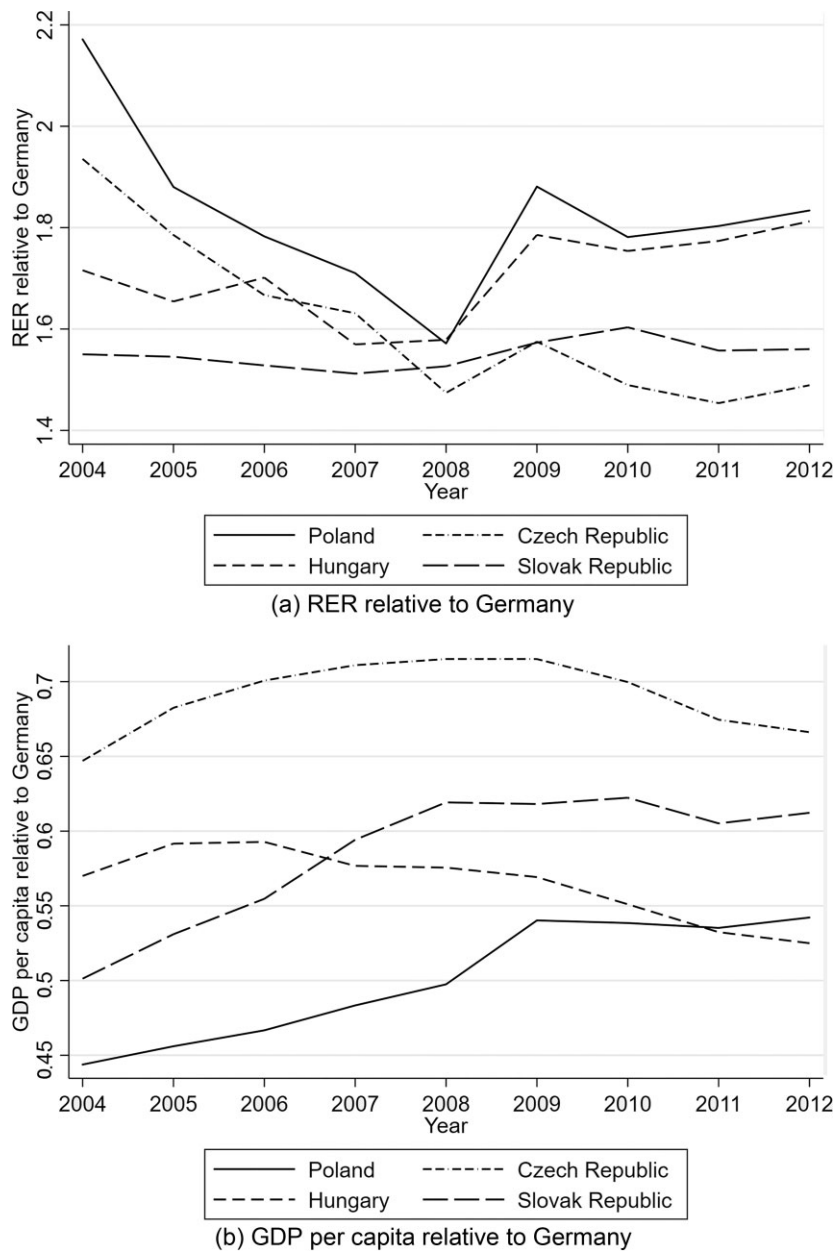


Fig. 1. *RERs and GDP per Capita Relative to Germany.*

Notes: (a) RERs between Germany and the origin country and (b) real GDP per capita of each country relative to Germany.

Source: The World Bank International Comparison Program (ICP) 2011 round.

1.2.3. *Data for US analysis*

To investigate whether our findings for Germany carry over to other settings, in particular the United States, we supplement our analysis of immigrants in Germany with that in the United States, using the 2005 to 2017 waves of the ACS obtained from IPUMS (Ruggles *et al.*, 2017).¹⁴ We restrict our sample to individuals aged 16 to 65 in full-time employment, who arrived in the United States between 2004 and 2014 and are in their initial three years since migration. We exclude individuals in self-employment and those in the armed forces. We also drop migrants from small countries with country-cohort cells containing fewer than 20 observed immigrants, leaving 53 different countries of origin in our sample. [Online Appendix Table A1](#) provides the descriptive statistics for the US sample.

1.2.4. *Data for analysis of immigrant cohort effects*

In the parts of our analysis where we revisit the examination of immigrant cohort effects in the United States by Borjas (1985; 1995; 2015) (see Section 4), we draw on data from the US census for the years 1970, 1980, 1990 and 2000, as well as the 2009–11 waves of the ACS—which, for simplicity and following Borjas (2015), we denote as the 2010 census—provided by IPUMS (Ruggles *et al.*, 2017).¹⁵ Following Borjas (2015), we restrict our sample to employed men aged 25 to 64, excluding those in self-employment or in the armed forces. We focus on natives and *recent* immigrants who arrived in the United States during the five years prior to the census, excluding naturalised US citizens.¹⁶ The sample size is 7,969,464, of which 149,398 are immigrants. The description of the sample of natives and immigrants is provided in [Online Appendix Table A2](#).

1.3 *Sample and Descriptive Statistics*

For our main analysis, we restrict attention to the 2004 to 2012 entry cohorts who enter the German labour market as full-time employees (which is the case for 85% of workers) and who are between 16 and 65 years old at the start of their first employment spell.¹⁷ We follow these cohorts for up to three years post-entry. Our main sample consists of 16,361 full-time employment spells covering 8,085 unique individuals. For part of the analysis, we restrict our attention to ‘stayers’, i.e., individuals who stay in Germany for at least three years after their entry to the German labour market, to keep the composition constant across spells. The stayers’ sample includes 4,323 unique individuals covering 11,491 employment spells.¹⁸

Table 1 presents some descriptive statistics for our sample. Column (1) reports characteristics of the full sample whereas column (2) focuses on stayers. Because of the nature of the data (i.e., employment records reported to the social security administration by employers) and the fact

¹⁴ The ACS contains information about income and employment, but the income data refer to individual wage and salary income in the year prior to the survey; therefore, the information in the 2005 to 2017 waves of the survey corresponds to the years 2004 to 2016. Furthermore, because the respondents’ wage income refers to the wages in the previous year, we exclude those who arrived in the year of the survey.

¹⁵ For this part of the analysis, we require data on the real exchange rate that goes back to the 1960s and 1970s, which is not available from the World Development Indicators. We therefore use data from the Penn World Table (Feenstra *et al.*, 2015).

¹⁶ For census waves up until 2000, arrival cohorts are reported in five-year intervals (i.e., whether a respondent arrived within the five years prior to the year of census). Hence, census year 1970 includes 1965–70 arrival cohorts, census year 1980 includes 1975–80 arrival cohorts, etc.

¹⁷ The SIAB data report daily wages and these are not reliable for part-time employees; hence, we focus on full-time employees here.

¹⁸ We can also employ an alternative definition of stayers where an individual is required to be full-time employed in every year. Our results are robust to the stricter definition of stayers.

Table 1. *Descriptive Statistics.*

	All (1)	Stayers (2)
Log daily wage	3.90 (0.46)	3.96 (0.46)
Age	34.10 (10.34)	34.34 (10.11)
Female	0.33	0.34
Education:		
Low	0.14	0.13
Middle	0.27	0.32
High	0.07	0.09
Missing	0.52	0.45
RER between Germany and origin country	1.77 (0.14)	1.77 (0.14)
Real GDP per capita of origin country relative to Germany	0.53 (0.05)	0.53 (0.05)
Obs.	16,361	11,491
Unique persons	8,085	4,323

Notes: The mean is reported with the SD in parentheses. The sample includes full-time employees aged 16 to 65, entering the German labour market between 2004 and 2012. ‘Stayers’ are individuals with a total migration duration of at least three years. The skill level in the table refers to the maximum educational attainment observed in the data.

Source: Sample of Integrated Labour Market Biographies (SIAB) provided by the German Federal Employment Agency (IAB). Data on real exchange rates and real GDP per capita relative to Germany come from the 2011 round of the World Bank’s WDI database.

that the individuals are not German natives, education data are missing for many workers in our sample. Of those for whom we have information on education, 29% are low skilled (defined as no post-secondary education or apprenticeship), 56% are medium skilled (defined as some training or apprenticeship after secondary education) and 15% have some college education. The sample of stayers, in comparison, has slightly higher educational attainments. The average RER at arrival is 1.77 and it is the same across the two samples. Likewise, the average GDP per capita of the origin country relative to Germany in the year of arrival is identical for the two groups at 0.53.

2. Empirical Strategy

Our key hypothesis is that, as long as immigrants (intend to) spend a non-zero share of their foreign earnings back in the home country, those who arrive at a higher RER should on average be observed accepting lower wages in their first job in the host country. However, over time, the initially low wages of high-RER arrivals should catch up to the wage levels of lower-RER arrivals, as workers encounter new wage offers each period and high-RER arrivals (given their low starting point) should be more likely to accept any new offer than the low-RER arrivals. In contrast, if the initial difference in accepted wages between the high- and low-RER arrivals reflected their *fixed* or *innate* differences, such as productivity, then the initial difference should persist over time. This is a testable hypothesis to which we return later.

In the data, if high-RER arrivals are observed to accept low wages due to their willingness to work for less (i.e., lower reservation wages) then this is precisely what we want to detect. Importantly, this effect should not be confused with the standard selection issue where

high-RER arrivals may receive low wages due to their possibly lower skill or productivity levels. When examining entry wages, we therefore control for the standard determinants of wages such as age, gender and education, as well as country fixed effects (FEs) and year FEs. Moreover, when examining the effect of RER on the wage growth, we also include *individual* FEs, thereby accounting for all (observable and unobservable) differences between high- versus low-RER arrivals in terms of their fixed or innate labour market traits.¹⁹

We start by examining the relationship between immigrants' time-of-arrival (or initial) RER and their first accepted wages. In particular, based on workers in their initial spell of employment, we estimate the equation

$$\ln w_{ijt} = \gamma_1 \ln Q_{jk(i)} + \gamma_2 \ln Y_{jk(i)} + \phi_j + \psi_t + X_{ijt} \beta + e_{ijt}, \quad (2)$$

where $\ln w_{ijt}$ is the log wage that individual i from country j receives in Germany in year t . Denoting by k the year of arrival (cohort), we can assign each individual i to a unique country-by-cohort bin (jk) and thereby to $Q_{jk(i)}$, the *time-of-arrival* RER applicable for migrant i .²⁰ The higher $Q_{jk(i)}$, the greater the purchasing power of one unit of German earnings when it is spent in country j (in year k).

The key parameter of interest in this regression is γ_1 , the effect of the initial or time-of-arrival RER on entry wages in Germany. As (2) controls for country-of-origin FEs (ϕ_j) and calendar year FEs (ψ_t), we exploit variation in RER among individuals from the same countries of origin, but arriving in different years. The year FEs account for labour market conditions in Germany that commonly affect all immigrants regardless of their countries of origin. To address concerns that the effect of fluctuations in the real exchange rate may be confounded with that of fluctuations in the income level of the home country relative to Germany, we also include the log of $Y_{jk(i)}$, the real GDP per capita of country j relative to that of Germany in the year of migrant i 's arrival.²¹ Furthermore, we include a vector of individual characteristics X_{ijt} , which contains gender, a quadratic in age and dummies indicating four different education categories (with 'missing' being one of the categories). For identification, we are thus exploiting the remaining variation in country-cohort real exchange rates, conditional on origin country FEs, year FEs, log GDP differences between Germany and individual-specific labour market characteristics.

The specification in (2) measures the effect of RER on the accepted wages of immigrants in Germany in the year of arrival. However, in subsequent periods we would expect the wages of those who arrive at a high RER to grow faster than that of those who arrive at a lower RER, if the low entry wages of the high-RER cohorts are indeed due to their initial downgrading rather than their innate labour market traits. These dynamics, not only speak directly to the mechanisms through which the time-of-arrival RER impacts immigrants' initial occupational downgrading and subsequent upgrading, but may also provide an explanation as to why data on existing *stocks* of immigrants (as opposed to new immigrants in their initial employment spells) obscure measurable variation in reservation wages related to RER.

¹⁹ We also show that, conditional on country and year FEs, cohorts arriving at different RER levels are balanced in their observed characteristics; see Section 3.2.

²⁰ Since we are currently only looking at wages in the initial employment spell for each cohort, $k = t$ in this context. Later, when we follow the same cohorts over time, $k \neq t$ for years 2 and 3.

²¹ For robustness, we also control for additional macro variables such as the origin country-cohort-specific unemployment rate, employment rate and labour force participation rate, which makes little difference to our main results (see Section 3.3).

To examine the differential dynamics of wage adjustments by immigrants who arrived at different initial RER levels, we include observations of immigrants in the three years after migration (i.e., periods 1, 2 and 3), and estimate the equation

$$\ln w_{ijt} = \sum_{\tau=1}^3 \lambda_1^{\tau} \ln Q_{jk(i)} \times T_{\tau(it)} + \sum_{\tau=1}^3 \lambda_2^{\tau} \ln Y_{jk(i)} \times T_{\tau(it)} + \rho_{\tau(it)} + \xi_{jt} + X_{ijt}\beta + v_{ijt}, \quad (3)$$

where $jk(i)$ again refers to person i 's country of origin and year of arrival (cohort), and $T_{\tau(it)}$ indicates whether an individual i in year t is in the τ th year in her migration history, i.e., $\tau = t - k + 1$. We condition on years-since-migration (YSM) FEs, $\rho_{\tau(it)}$, and interact the dummies indicating YSM ($T_{\tau(it)}$) with both $\ln Q_{jk(i)}$ and $\ln Y_{jk(i)}$, so that λ_1^{τ} captures the τ -specific effect of the time-of-arrival RER and λ_2^{τ} that for time-of-arrival real GDP per capita (relative to Germany). If those who arrived at a high RER (and thus accepted lower-paying jobs) indeed subsequently catch up in wages to those who arrive at a lower RER, we should expect λ_1^1 to be negative, but λ_1^2 and λ_1^3 become less negative and potentially even approach zero.

In addition, we also condition on country-by-year FEs, ξ_{jt} , thereby eliminating all country-of-origin-specific shocks that are also calendar year specific, which have a common effect on immigrants from the same country of origin who may have different migration histories.²² In particular, the effects of *contemporaneous* (as opposed to *time-of-arrival*) RER or GDP per capita are accounted for by ξ_{jt} . Moreover, the country-by-year FEs also absorb possible impacts of the prevailing stock or inflow of immigrants from the same country of origin. Our tight identification strategy therefore relies on within-country and across-cohort variation in the time-of-arrival RER while conditioning on the effects of all common shocks that vary at the country-by-year level (captured in ξ_{jt}).

Finally, in our most demanding specifications, we estimate

$$\ln w_{ijt} = \sum_{\tau=2}^3 \delta_1^{\tau} \ln Q_{jk(i)} \times T_{\tau(it)} + \sum_{\tau=2}^3 \delta_2^{\tau} \ln Y_{jk(i)} \times T_{\tau(it)} + \rho_{\tau(it)} + \alpha_i + \xi_{jt} + X_{ijt}\beta + u_{ijt}, \quad (4)$$

where α_i denotes individual fixed effects. Note that here each worker's time-of-arrival RER and GDP ($Q_{jk(i)}$ and $Y_{jk(i)}$) are absorbed into α_i . In this specification, therefore, we fully account for all possible unobserved differences between immigrants arriving with high versus low RER (as well as the associated GDP levels) and ask whether the within-person wage growth of higher-RER arrivals is indeed faster, such that the initial wage gap between high- and low-RER arrivals (detected in (2) and (3)) becomes narrower in subsequent years after migration. Note that, by conditioning on individual FEs, this specification eliminates any potentially remaining unobserved selectivity of immigrants arriving in different years with different RERs. We estimate these regressions on the full sample, and on the stayers only sample to account for any selective return migration or other attrition.

²² Thanks to the fact that each cohort arriving between 2004 and 2012 is followed for three years, in every calendar year (except for 2004 and 2014), we have at least two cohorts who originate from the same country, but are in different YSM bins, which allows us to identify ξ_{jt} .

Table 2. *Real Exchange Rates and the Entry Wages of Immigrants.*

	Log daily wage				
	(1)	(2)	(3)	(4)	(5)
Log RER: initial	−0.431** (0.187)	−0.301* (0.164)	−0.313* (0.176)	−0.273*** (0.089)	−0.241** (0.091)
Log GDP pc: initial			0.563*** (0.180)	0.449*** (0.123)	0.281 (0.198)
Demographic controls	Y	Y	Y	Y	Y
Country FEs		Y	Y	Y	
Year FEs		Y	Y	Y	
YSM FEs				Y	Y
Country × year FEs					Y
R ²	0.12	0.15	0.16	0.22	0.22
Number of unique individuals	8,085	8,085	8,085	8,085	8,085
Obs.	8,085	8,085	8,085	16,361	16,361

Notes: Sample includes individuals in the first year since migration in columns (1) through (3), and those in year 1, 2 or 3 since migration in column (4). YSM is a year-since-migration indicator variable. Demographic controls include a gender indicator, a quadratic in age and a dummy for each education category, with missing education as one of the categories. SEs clustered by country cohort are given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3. Real Exchange Rate, Entry Wages and Wage Dynamics

3.1. Entry Wages

Estimates of the elasticity of wages in the initial spell with respect to the RER upon arrival (as in (2)) are displayed in the first three columns of Table 2, based on workers in their first year of migration only. While column (1) conditions only on demographic controls, column (2) adds country FEs and year FEs. Column (3) additionally controls for time-of-arrival real GDP per capita relative to Germany. Estimates in column (3) suggest a wage elasticity of -0.3 in the year of arrival, implying that a 10% higher real exchange rate at arrival (about 1 SD of log RER in the sample) leads to a 3.13% lower accepted wage in the first employment spell in the host country. This squares up with the magnitude of wage response we should expect for RER variations of this size, given that the share of net household earnings immigrants expect to consume back in the home country (in terms of savings and remittances) is about 16%–18% (see Online Appendix B for a detailed discussion).²³

In column (4) of Table 2, we also include workers who are in their 2nd or 3rd year after migration, and re-estimate (2), conditioning on country FEs and year FEs as well as year-since-migration FEs. Column (4) thus shows the effect of time-of-arrival RER on the *average* wages during the first three years in the host country. In column (5), we further include country-by-year FEs (like in (3)), using only variation in the *time-of-arrival* RER applicable to different cohorts from the same origin country for identification, while eliminating any country-by-year-specific common shocks such as the *contemporaneous* RER. This addresses potential concerns that a higher contemporaneous RER may induce more migration, leading to competition effects among immigrants from the same country of origin and lowering wages along the lines of Mishra and Spilimbergo (2011) and Albert *et al.* (2020), or that the size of the immigrant community of co-nationals may help in improving wages as in Munshi (2003) and Glitz (2017). Any such variation in inflows is absorbed by the country-by-year FEs, as are variations in the stock of immigrants

²³ We obtain these figures from the German Socio-Economic Panel (GSOEP), focusing on immigrants from the same countries of origin and for the same periods as considered in our main analysis.

from the same country of origin, and movement in the contemporaneous RER. Estimates show that a higher real exchange rate at arrival leads to lower average wages of individuals over their first three years, with an elasticity of -0.24 , smaller than that for the first year only, suggesting some catch up in wages in years 2 and 3 after arrival, which is what we turn to in Section 3.3.

So far, we have used the RER prevailing in year k as the *time-of-arrival* RER for cohorts arriving in year k . For robustness, we also examine the role of lagged RERs, in particular the RER prevailing in years $k - 1$ and $k - 2$, respectively. As shown in [Online Appendix Table A3](#), entry wages of cohorts k indeed respond to the RER of year k , and not the lagged RERs.

3.2. *Comments on Selection and Inflows*

The results above are consistent with the interpretation that immigrants arriving with high RER accept lower wages than others because of their lower reservation wages. However, if those arriving during high-RER periods have worse labour market traits than others then this may bias our estimates. To address this concern, we examine whether immigrants arriving at high versus low RER differ in their labour market characteristics, by regressing the time-of-arrival RER on the individual's observed labour market characteristics such as gender, age and education. As shown in [Online Appendix Table A4](#), once we condition on country FEs and year FEs, cohorts arriving at different RER levels are balanced in their observed characteristics. The coefficients on gender, age and different education categories are very small and not statistically significant. Moreover, the p -values on the test of their joint significance are large, with the smallest p -value being equal to 0.64. Thus, the composition of new immigrants seems unrelated to the RER.

A remaining concern is that the high-RER cohorts may also be different than the low-RER cohorts in unobservable ways. We address this through the inclusion of individual FEs, taking advantage of the fact that our administrative data allow us to follow the same individuals over time (see Section 3.3).

Relatedly, we next examine whether more immigrants arrive during high-RER periods than during low-RER periods. As [Online Appendix Table A5](#) shows, conditional on country FEs and year FEs, there is a negative and significant association between the relative GDP per capita and the size of inflows from a given country of origin, in regressions both unweighted and weighted by each country's population size in the 2001 census. However, the effects of RER on inflows is imprecisely estimated and very small, with an elasticity of inflows with respect to RER between 0.4 and 0.6, far smaller (in absolute terms) than the elasticity of inflows with respect to GDP, which is around 4. The low sensitivity of the migration flow to the RER is not surprising given that the wage (and income) differential between Germany and the source countries is an order of magnitude larger than the variation in RER. For instance, among occupations commonly held by immigrants in Germany, wages paid in 2004 are roughly twice as high as in Poland, which must dwarf any effect of the RER on the decision to migrate ([Online Appendix Table A6](#)). Nonetheless, for inframarginal migrants, the prevailing RER can still influence their reservation and hence accepted wages, which is the focus of the present study.

To account for the potential competition effect, we also directly control for the inflow or stock of co-nationals. In [Online Appendix Table A7](#), column 1 replicates our main coefficient (column (3) from Table 2). In column 2, we include the inflow of immigrants from the same country of origin to Germany. Columns 3 and 4 control for the inflow and stock, respectively, of immigrants from the same country of origin *in the same district* as the individual at hand. All effects of the time-of-arrival RER on wages remain invariant to these additional controls.

Table 3. *Real Exchange Rates and Wage Dynamics over Time.*

	Log daily wage			
	Panel A: all		Panel B: stayers	
	(1)	(2)	(3)	(4)
YSM 1 × log RER: initial	−0.339*** (0.087)		−0.335*** (0.097)	
YSM 2 × log RER: initial	−0.172* (0.101)	0.126* (0.072)	−0.260** (0.100)	0.220*** (0.078)
YSM 3 × log RER: initial	0.082 (0.148)	0.263* (0.143)	−0.022 (0.141)	0.411*** (0.149)
Demographic controls	Y	Y	Y	Y
Country × year FEs	Y	Y	Y	Y
YSM FEs	Y	Y	Y	Y
Log GDP pc: initial × YSM FEs	Y	Y	Y	Y
Individual FEs		Y		Y
R ²	0.22	0.91	0.24	0.89
Number of individuals	8,085	8,085	4,323	4,323
Obs.	16,361	16,361	11,491	11,491

Notes: Sample includes individuals in year 1, 2 or 3 since migration. Columns (3) and (4) restrict the sample to individuals with a migration duration of at least three years. YSM is a year-since-migration indicator variable. Demographic controls include a gender indicator, a quadratic in age and a dummy for each education category, with missing education as one of the categories. SEs clustered by country cohort are given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.3. Wage Adjustments

We next explore wage adjustments over time since migration, based on regressions specified in (3) that condition on country-by-year FEs, ξ_{jt} , thereby eliminating all country-of-origin-specific shocks that are also calendar year specific, including the effects of the contemporaneous (as opposed to time-of-arrival) RER. Panel A of Table 3 reports results for the full sample, while panel B uses only individuals who stay in Germany for at least three years (stayers). Estimates in column (1) show an interesting pattern: while the RER effect for the first year is larger than the three-year average (cf. column (5) in Table 2), it decreases in the second year by nearly 50% and disappears by year three. This suggests that immigrants arriving with a high RER, while initially settling for lower wages, catch up to those arriving with a low RER in subsequent periods. This relationship is further confirmed by estimates of (4) reported in column (2), where we additionally condition on individual FEs and therefore account for (observable and unobservable) differences between high- versus low-RER arrivals. In particular, column (2) focuses on the *within-individual* changes in the effect of the time-of-arrival RER on the wages in the second and third years after arrival, relative to those in the initial year. These changes are very similar to those implied by the regressions in column (1) that do not condition on individual FEs (0.126 versus 0.167 and 0.263 versus 0.257). This adds further evidence that the low entry wages of the high-RER cohorts are not driven by their low innate productivity. Overall, the results in columns (1) and (2) of Table 3 together suggest that those who arrive at high RER initially settle for lower wages (due to their lower reservation wages), but over time their wages catch up to the wages of those who arrive at low RER.²⁴

²⁴ This convergence contrasts with the persistent negative effects on earnings often found in the job loss/displacement literature, following the seminal paper by Jacobson *et al.* (1993). In that literature, the persistence stems mainly from reductions in employment, as transitioning from non-employment to employment is more difficult (especially when combined with adverse local labour market conditions). In our context, we compare two workers who both start off from employment, but with different initial wages (due to differential reservation wages, rather than different productivity). For

To ensure that the results on wage growth are not driven by compositional changes in the sample over time (due to selective return migration), we re-estimate the specifications in panel A, but using only the sample of stayers, i.e., individuals who remain in Germany for at least three years. The estimates are presented in panel B. Despite the smaller sample size, the pattern of parameter estimates is remarkably similar to that in panel A.²⁵

Moreover, our main findings in Table 3 are robust to the inclusion of additional variables at the origin country year of arrival level (beyond GDP per capita relative to Germany) that may covary with RER (Online Appendix Table A8). Column 1 of Online Appendix Table A8 replicates column (1) of Table 3. In columns 2–4, we additionally include the (origin) country-cohort-specific unemployment rate, employment rate and labour force participation rate, respectively. As shown, adding these additional controls make little difference to our main results. Panel B presents the corresponding analysis based on the stayers sample.

Next, we investigate whether the wage responses to RER differs by demographic groups (Table 4). The first two columns in panel A suggest that the wage response to RER is concentrated among men, while being smaller and statistically insignificant among women.²⁶ In terms of age groups, we find the same pattern among younger and older workers. Given the large share of individuals with missing education information, column (5) excludes those for whom this information is not recorded. The estimates in column (6) are based on a sample in which observations with missing education information are retained, but those individuals with college education are excluded. The results in columns (5) and (6) suggested that the RER effect on entry wages is stronger for ‘higher skilled’ (i.e., those with college or non-missing education) immigrants. Very similar patterns are also found for the sample of stayers (panel B).

3.4. Mechanisms of Wage Adjustments

Estimates in Table 3 show that immigrants arriving in Germany at a high RER initially settle for lower wages than those arriving at a low RER, but that their wages converge in subsequent years. We now examine what drives this convergence, by investigating firm and occupational mobility of immigrant workers in the 2nd or 3rd year after migration. To isolate the patterns of mobility without convolution with compositional changes, we focus on the sample of stayers for this analysis. In particular, we estimate a variant of (3), where the dependent variable is a dummy indicating a worker’s mobility status along various dimensions. Estimates are presented in Table 5. Defining ‘job change’ as a change in firm and/or occupation (as compared to the previous year), results in column (1) show that those who arrive at a higher RER (and thus accept on average a lower wage) exhibit overall more job mobility than those who arrive at a lower RER. Breaking these job changes down into their various components, columns (2) and (3)

these workers, subsequent adjustments are likely to be less challenging than for workers starting from non-employment. Moreover, the (high-RER-driven) low reservation wages in our context are specific to certain origin country-arrival cohort cells, while all immigrants are subject to the same labour market conditions in Germany.

²⁵ We also examine whether the selection into the ‘stayer’ status itself may be correlated with the time-of-arrival RER. In particular, when regressing ‘stayer’ on the time-of-arrival RER while conditioning on country FEs and year FEs, we do not find any significant relation.

²⁶ Based on the 2011–16 waves of the GSOEP, we find that among immigrants from Poland, the Czech Republic, Slovakia and Hungary, males have a 6–7-percentage-point higher likelihood of reporting to have a child or spouse abroad than females, in line with the typical migration pattern, where the husband arrives first, and the wife follows (Online Appendix Table A9). This may partly explain the gender difference in the responsiveness of entry wages to the RER in this context. However, this gender difference may not be generalisable to other contexts since in the US analysis (Section 3.5), we do not find strong heterogeneity by gender.

Table 4. *Heterogeneity and Robustness.*

	Log daily wage					
	Male (1)	Female (2)	Age ≤ 35 (3)	Age > 35 (4)	No missing educ. (5)	No college educ. (6)
<i>Panel A: all</i>						
YSM 1 × log RER: initial	−0.526*** (0.090)	−0.048 (0.183)	−0.374*** (0.116)	−0.418* (0.210)	−0.603*** (0.162)	−0.328*** (0.061)
YSM 2 × log RER: initial	−0.218** (0.088)	−0.035 (0.185)	−0.173 (0.134)	−0.251 (0.171)	−0.183 (0.143)	−0.192*** (0.066)
YSM 3 × log RER: initial	0.200 (0.158)	−0.081 (0.224)	0.010 (0.157)	0.160 (0.196)	0.122 (0.188)	0.092 (0.102)
Mean of dep. var.	3.95	3.81	3.90	3.91	3.84	3.86
R ²	0.19	0.24	0.24	0.19	0.12	0.13
Number of individuals	5,417	2,668	5,093	3,217	4,588	7,616
Obs.	10,989	5,372	9,974	6,387	8,536	15,160
<i>Panel B: stayers</i>						
YSM 1 × log RER: initial	−0.512*** (0.106)	−0.074 (0.212)	−0.476*** (0.125)	−0.285 (0.244)	−0.564*** (0.163)	−0.275*** (0.073)
YSM 2 × log RER: initial	−0.277*** (0.084)	−0.153 (0.182)	−0.291* (0.146)	−0.330 (0.208)	−0.256* (0.144)	−0.268*** (0.083)
YSM 3 × log RER: initial	0.174 (0.167)	−0.236 (0.221)	−0.146 (0.200)	0.086 (0.248)	0.016 (0.144)	−0.011 (0.099)
Mean of D.V.	4.01	3.85	3.96	3.95	3.90	3.91
R ²	0.20	0.26	0.26	0.21	0.13	0.14
Number of individuals	2,802	1,521	2,733	1,590	1,949	3,934
Obs.	7,599	3,892	6,934	4,557	5,200	10,422
Log GDP pc: initial × YSM FEs	Y	Y	Y	Y	Y	Y
YSM FEs	Y	Y	Y	Y	Y	Y
Country × year FEs	Y	Y	Y	Y	Y	Y
Demographic controls	Y	Y	Y	Y	Y	Y

Notes: Sample includes individuals in year 1, 2 or 3 since migration. In panel B, the sample is restricted to those with a total migration duration of at least three years. YSM is a year-since-migration indicator variable. Demographic controls include a gender indicator, a quadratic in age and a dummy for each education category, with missing education as one of the categories. SEs clustered by country cohort are given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. *Mechanisms of Wage Adjustments.*

D.V.	Move to a better-paying firm						Occ. upgrading & within firm
	Job change (1)	Firm change (2)	Change occupation (3)	Change occupation (4)	Occ. upgrading (5)	Occ. upgrading & firm change (6)	
YSM 2 × log RER: initial	0.310*** (0.072)	0.227** (0.084)	0.288*** (0.066)	0.143* (0.074)	0.223*** (0.058)	0.139** (0.053)	0.084** (0.037)
YSM 3 × log RER: initial	0.156 (0.098)	0.146 (0.109)	0.281*** (0.096)	0.068 (0.078)	0.194** (0.077)	0.128* (0.070)	0.066 (0.053)
Mean of D.V.	0.25	0.22	0.14	0.16	0.08	0.07	0.01
Number of individuals	3,900	3,900	3,797	3,742	3,742	3,742	3,742
Obs.	7,168	7,168	6,956	6,528	6,528	6,528	6,528
Log GDP pc: initial × YSM FEs	Y	Y	Y	Y	Y	Y	Y
YSM FEs	Y	Y	Y	Y	Y	Y	Y
Country × year FEs	Y	Y	Y	Y	Y	Y	Y

Notes: Sample of stayers includes individuals in year 2 or 3 since arrival in Germany. The sample is restricted to those with a migration duration of at least three years. All regressions include the following demographic controls: gender, quadratic in age and dummy for each education category with missing education as one of the categories. SEs clustered by country cohort are given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

show that high-RER arrivals are, not only more likely to change firms, but are also more likely to move to a better-paying firm than their initial employer. Those arriving with a 10% higher RER (about 1 SD of log RER in the sample) have a 2.8-percentage-point higher probability of moving to a better-paying firm in both year two and three after their arrival, which amounts to 20% (0.028/0.14) of the mean probability for moves of this type. Thus, mobility across firms contributes to explaining the wage catch up we illustrate in Table 3.

We also examine the role of occupational mobility and upgrading in the wage trajectories of immigrants. To this end, we rank three-digit occupations by their average wages (after accounting for calendar year FEs), and then construct an indicator variable that equals one if an individual has changed from a lower- to a higher-paying occupation in the previous year. Estimates in column (4) show that high-RER arrivals are significantly more likely than low-RER arrivals to change occupations in the second year after arrival. Moreover, they are also more likely to move to occupations that pay higher wages than their initial occupation, with those arriving at 10% higher RER having a 2.2-percentage-point (or 28% of the mean) higher probability of changing to a better-paying occupation in year 2 (as shown in column (5)). Results in columns (6) and (7) suggest that most of the occupational upgrading occurs when individuals change firms, although there is some evidence of within-firm occupational upgrading in the second year after arrival. Thus, changing to better-paying firms and occupations seems an important mechanism that explains the catching up of high-RER arrivals to the wages of low-RER arrivals.

3.5. *Evidence for the United States*

Our analysis has thus far focused on Eastern European immigrants in Germany, allowing us to use longitudinal administrative data to precisely determine immigrants' first spells in the German labour market as well as follow individuals over time. To investigate whether the pattern we find in the German data also holds elsewhere, we conduct a similar analysis for the United States, drawing on data from the ACS.²⁷

Results in Table 6 are based on regressions as in (3), where RER and real GDP per capita are all relative to the United States. We first report estimates for the full sample (columns (1) and (2)). After that, to bring this analysis closer to the setting we have in the German analysis, we also report results based on a sub-sample of countries where the average RER (over the period considered in the analysis) is greater than 1 (columns (3) and (4)). The first column reports the average effect of the time-of-arrival RER on log wages during the first three years in the United States, similar to our estimates in column (5) of Table 2, while column (2) allows the effect of (time-of-arrival) RER to vary over time after arrival. The elasticity of wages over the first three years with respect to the time-of-arrival RER is -0.096 , smaller than the corresponding elasticity for Germany. However, the variation in RER relevant for immigrants in the United States is greater than that for immigrants in Germany. In particular, the estimates in column (1) imply that a one-SD increase in the log RER (0.45) leads to a 4.3% reduction in the wage level accepted by immigrants in their first three years after migration to the United States (cf. 2.4% reduction for immigrants in Germany; column (5) of Table 2). Column (2) shows that, when allowing for the

²⁷ Unlike our data on Germany, the ACS data do not allow us to follow the same workers over time. Therefore, when studying the dynamic effect of the time-of-arrival RER on immigrant wages over time, we cannot eliminate composition effects arising due to attrition or selective out migration, or account for unobserved compositional differences in migration cohorts.

Table 6. *Real Exchange Rates and Accepted Wages among Immigrants in the United States.*

	Log hourly wage			
	All countries		Countries with RER > 1	
	(1)	(2)	(3)	(4)
Log RER: initial	−0.096* (0.055)		−0.125** (0.060)	
YSM 1 × log RER: initial		−0.110** (0.055)		−0.167*** (0.057)
YSM 2 × log RER: initial		−0.100* (0.055)		−0.124** (0.058)
YSM 3 × log RER: initial		−0.083 (0.058)		−0.084 (0.062)
Demographic controls	Y	Y	Y	Y
Country × year FEs	Y	Y	Y	Y
YSM FEs	Y	Y	Y	Y
Log GDP pc: initial	Y		Y	
Log GDP pc: initial × YSM FEs		Y		Y
R ²	0.31	0.31	0.27	0.27
Obs.	81,957	81,957	72,326	72,326
SD log RER	0.45	0.45	0.35	0.35
Mean of D.V.	2.31	2.31	2.24	2.24

Notes: Sample consists of immigrants arriving to the United States between 2004 and 2014. We restrict the sample to all immigrants aged 16–65 in full-time employment in year 1, 2 or 3 in the United States. In columns (3)–(4) we focus on those from countries with lower-price levels than the United States. We drop immigrants from small countries with country-cohort cells containing fewer than 20 observed immigrants. Demographic controls include a gender indicator, a quadratic in age and years of education. SEs clustered by country cohort are given in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

effect of the initial RER to vary across the three years, point estimates are slightly larger in the first year after migration, but decline by year 3.

In columns (3) and (4), we focus on the subsample of immigrants from countries with a lower-price level than the United States, which constitutes about 88% of the sample on which estimates in the first two columns are based. For this sample, the effect of RER on initial wages is larger, with an elasticity of wages over the first three years with respect to the time-of-arrival RER being equal to -0.125 , and the elasticity for the first year alone being -0.167 . Moreover, the estimate for year three is only half the size of the year 1 estimate, suggesting a narrowing in the initial wage gap by the third year.

Overall, our findings for the United States are qualitatively in line with those for Germany, suggesting that the time-of-arrival RER matters in determining new immigrants' reservation wages and thereby their observed wages in their first employment spells. Moreover, there is some evidence that these differentials tend to shrink over time in the United States as well, although these results need to be interpreted with care, as we are not able to control for changes in composition and selective outmigration with the ACS data.

4. Interpretation of Immigrant Cohort Effects

One implication of our findings is that immigrants from countries in which the real price is lower (relative to the host country) will on average accept lower entry wages than immigrants from high-price countries. Therefore, if the composition—in terms of countries of origin—of entry cohorts changes over time, with an increasing proportion of new arrivals coming from

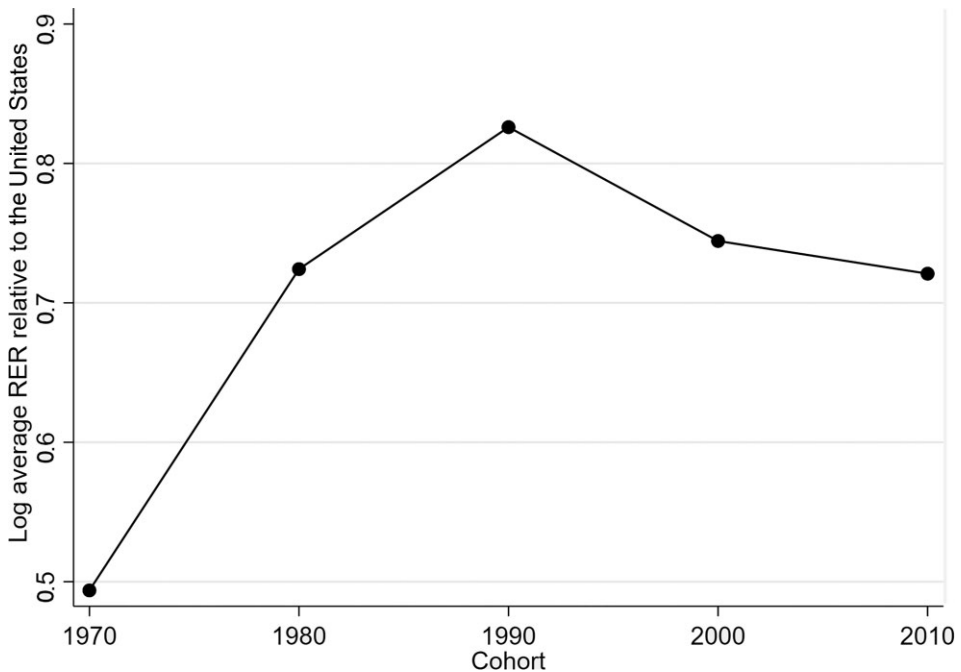


Fig. 2. Average RER for Different Arrival Cohorts of Immigrants in the US Data.

Notes: RER data comes from the Penn World Tables. The weights are computed using 1970 to 2000 waves of the US population census and 2009 to 2011 waves of the American Community Survey. Cohort refers to immigrants arriving in the five years prior to each census year. Average RER is computed by first taking the average over the arrival years for each country of origin and then taking the average across countries of origin for each census year.

countries with relatively low real price levels, then average entry wages of immigrants should decrease over time, which will be picked up as cohort effects when estimating immigrants' wage equations.

Following this line of argument, we add a new perspective to the debate surrounding some of the most influential studies in the literature on immigrant assimilation. In his response to Chiswick's (1978) paper on the assimilation of immigrants, Borjas (1985) showed that the entry wages of immigrants arriving in the United States declined between the 1960s/1970s and the 1980s/1990s (see also Borjas, 1995; 2015). He attributed this to a decline in the 'quality' of immigrant cohorts arriving in the United States following the Immigration and Naturalisation Act of 1965 that abolished the quota system based on national origin, shifting the composition of new arrivals from mainly European countries and Canada to South America and Asia.

However, this compositional change also led to changes in the RER between origin countries and the United States. Figure 2, where we plot the mean RERs applicable for different arrival cohorts, illustrates a sharp increase in the RER from the 1970 to the 1990 censuses, and a small decrease in the subsequent decades. Hence, the decline in immigrants' entry wages for cohorts arriving in the 1980s and 1990s as illustrated in Borjas (1985; 1995) may in part be driven

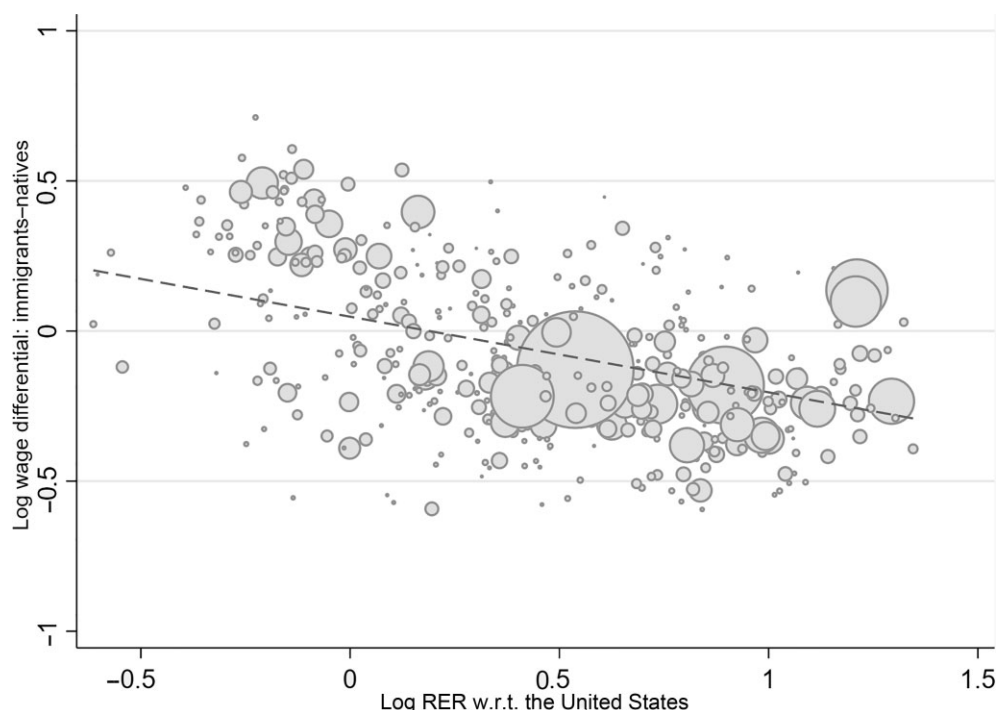


Fig. 3. *Residual Wage and Real Exchange Rate, 1965–2010 Arrival Cohorts.*

Notes: The figure represents 452 country-by-cohort combinations. The underlying sample consists of men aged 25–64, observed in 1970–2000 census years and the 2009–11 waves of the American Community Survey. The wage differential is calculated between immigrants who arrived in the five years prior to each census year and native workers after controlling for a quadratic in labour market experience, education, marital status and disability status, all interacted with an immigrant indicator. The regression coefficient (SE) is -0.251 (0.080).

by the higher purchasing power of the US dollar applicable for these cohorts (who originate predominantly from lower-price countries) and their correspondingly lower reservation wages. To investigate this conjecture, we plot in Figure 3 the residual entry wages (after controlling for demographic characteristics) of immigrants relative to natives in the 1970–2010 censuses against the RER prevailing upon their entry. In line with our analysis above, the figure suggests that immigrants arriving when the RER between the United States and their country of origin is high earn lower entry wages upon their arrival, even after controlling for key socio-demographic characteristics.

Next, we present, in Table 7, estimates of immigrant cohort effects based on the 1970–2010 censuses and simple regression models following Borjas (1985). Specifically, we pool immigrants and natives, and report immigrant cohort effects relative to the 1965–70 arrival cohorts (i.e., those from the 1970 census).²⁸ All regressions include census year FEs (common to both immigrants and natives). Demographic controls include years of schooling (education), a

²⁸ As we explain above, for census waves up until 2000, arrival cohorts are reported in five-year intervals (i.e., whether a respondent arrived within the five years prior to the year of census), so that census year 1970 includes 1965–70 arrival cohorts, census year 1980 includes 1975–80 arrival cohorts, etc.

Table 7. Cohort Effects among Immigrants in US Censuses 1970–2010.

	Log weekly wage			
	(1)	(2)	(3)	(4)
log(RER)			−0.298*** (0.101)	−0.232*** (0.081)
Immigrant × census year 1980	−0.171*** (0.043)	−0.107*** (0.026)	−0.072** (0.033)	−0.065* (0.034)
Immigrant × census year 1990	−0.224*** (0.072)	−0.111*** (0.039)	−0.032 (0.044)	−0.032 (0.045)
Immigrant × census year 2000	−0.163 (0.106)	−0.008 (0.054)	0.056 (0.072)	0.058 (0.073)
Immigrant × census year 2010	−0.172* (0.090)	−0.058 (0.054)	0.004 (0.076)	0.004 (0.073)
Census year FEs	Y	Y	Y	Y
Demographic controls		Y	Y	Y
Log GDP pc				Y
R ²	0.007	0.190	0.191	0.191
Obs.	7,969,464	7,969,464	7,968,719	7,968,719

Notes: Reference category is census year 1970. For each census year, we include immigrants who arrived in the United States in the last five years such that census year 1970 includes 1965–70 arrival cohorts, census year 1980 includes 1975–80 arrival cohorts, etc. We also include US natives from each census. Demographic controls include a quadratic in labour market experience, education, marital status and disability status. Controls are interacted with an immigrant indicator. SEs clustered by country are given in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

quadratic in potential labour market experience (i.e., age – education – 6), a disability indicator and marital status, whose effects are all allowed to differ between immigrants and natives. Columns (1) and (2), measuring the change in cohort effects between the 1970 and subsequent arrival cohorts, illustrate a strong deterioration in entry wages for those arriving in 1980 and 1990. After controlling for demographic characteristics (column (2)), entry wages for the 1980 and 1990 immigrant cohorts are 11% lower than for the 1970 cohort. The difference in cohort effects declines (and nearly disappears) for arrival cohorts 2000 and 2010 after controlling for demographic characteristics. This pattern broadly follows the evolution of the average RER applicable for the different arrival cohorts (Figure 2), which increases sharply for the 1980 and 1990 cohorts in comparison to the 1970 cohort while declining thereafter.

Once we account for the RER (columns (3) and (4)), the decline in immigrant wages of each subsequent cohort with respect to the 1970 cohort is far less pronounced. We visualise these effects in Figure 4, where we plot the cohort effects from both columns (2) (without RER) and (3) (with RER) of Table 7. The graphs illustrate that the increase in the conditional entry wage gaps between natives and immigrants in 1975–80 arrivals (relative to 1965–70 arrivals) becomes more nuanced (−0.107 to −0.072) once we condition on the RER, and similarly for the 1985–90 arrivals.

Overall, this analysis suggests that the observed decline in the entry wages of the 1980 and 1990 cohorts as documented in the influential studies of Borjas (1985; 1995) may at least in part be driven by these cohorts’ behavioural responses (i.e., reservation wages) to the favourable RER applicable for them, and not be entirely due to their lower innate quality (i.e., fixed labour market traits). These findings do not change the fundamental insight of the work of Borjas (1985; 1995), but they provide an additional new angle to the interpretation of the well-known immigrant cohort effects.

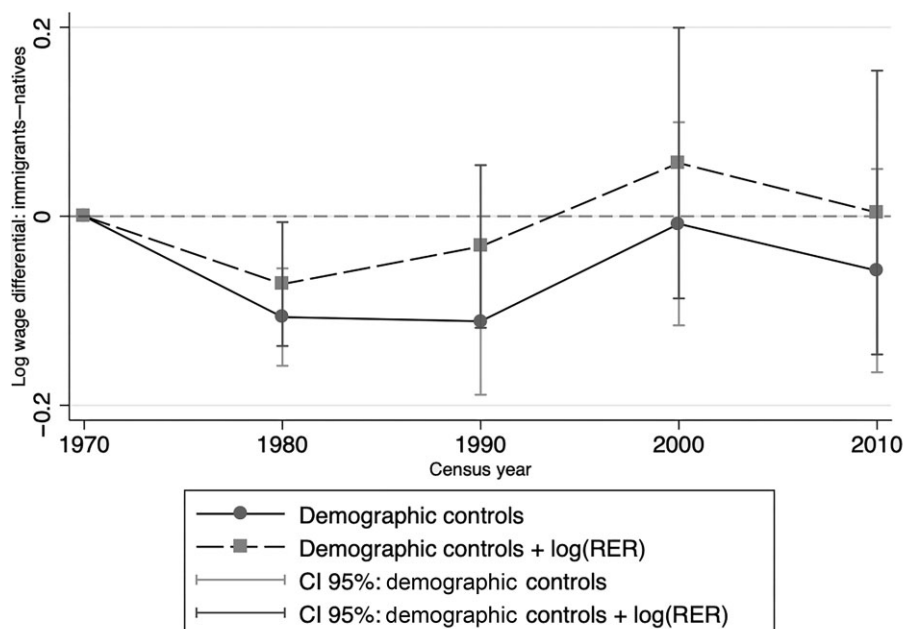


Fig. 4. Cohort Effects among Immigrants in the United States.

Notes: The underlying sample consists of men aged 25–64, observed in 1970–2000 census years and 2009–11 American Community Survey waves. The wage differential is calculated between immigrants who arrived in the five years prior to each census year and native workers after controlling for a quadratic in labour market experience, education, marital status and disability status, all interacted with an immigrant indicator. The dashed line also includes log RER as an additional control.

5. Conclusions

The premise that some immigrants may have lower reservation wages than comparable natives or other immigrants is commonly invoked in analyses of immigration, yet there is scant evidence on that. To fill this gap, we propose the real price differences between the host and source regions as one possible driver of their reservation wages and find evidence consistent with the hypothesis. In particular, exploiting the accession of eight Central and Eastern European countries (A8) to the EU in 2004 together with longitudinal administrative data from Germany, we find an elasticity of entry wages with respect to the RER of about -0.3 in the year of arrival, meaning that a 10% increase in the RER (roughly 1 SD of log RER in the sample) leads to a decrease in the accepted wages of around 3% in the first year in Germany. In subsequent periods, however, wages of high-RER arrivals catch up to that of their low-RER counterparts. Our findings thus suggest an important source of immigrant downgrading (Eckstein and Weiss, 2004; Dustmann *et al.*, 2013), with implications for policy debates over such issues as immigrants' undercutting of native wages (Edo and Rapoport, 2019) and immigration restrictions as active labour market policy for natives (Clemens *et al.*, 2018).

Furthermore, our analysis also adds a new perspective for interpreting immigrant cohort effects. Using US census data, we show that the declining cohort quality documented in the influential

studies of Borjas (1985; 1995) may reflect, at least in part, the *behavioural responses* of later arrival cohorts to the prevailing real price differences between the United States and their home countries, rather than their *innate* labour market characteristics alone. While not affecting the key insights of Borjas, our results add an additional interpretation of the observed decline in entry wages, with further implications for immigrant wage growth in the first years after arrival.

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Additional Supporting Information may be found in the online version of this article:

Online Appendix Replication Package

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