Essays on International Migration and Development

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Abstract

This thesis sheds light on the effects of reducing or escalating international policy barriers on emerging economies, and how these relate to international migration. In the first chapter, I analyze the effect of a protective FDI policy on international migration outflows from Indonesia. I find a substitution effect from FDI to international migration, but also an increase in skilled migrants. In the second chapter, I investigate the effect of a migration ban on the capacity of communities to absorb income shocks from natural disasters. In this case, I also find negative effects on communities in terms of an increase in poverty. Differently from the previous two chapters, the third chapter focuses on a context where barriers to international migration have been suddenly eliminated: I exploit the fall of the Communist regime in Albania in the 1990s at the subsequent mass emigration of Albanians to identify the causal effect of migration on female labour force participation. I find that migration has positive effects on female employment, but this effect is only prevalent among women that reside in areas with high access to preschools. I dig more in-depth into this gender issue by analyzing the effect of fertility on female employment in Albania in Chapter 4. I show that increasing the number of children decreases women's labour supply.

Keywords: International Migration, Development, Emerging countries

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Contents

Introduction

> *Sing in me, Muse, and through me tell the story of that man skilled in all ways of contending, the wanderer, harried for years on end [...]. He saw the townlands and learned the minds of many distant men, and weathered many bitter nights and days in his deep heart at sea.*
>
> – Homer, Odyssey

International migration has the potential to generate enormous gains, estimated to be worth tens of trillions of dollars or 50-150 percent of the world GDP, if the barriers to migration are removed (Clemens, 2011). If rich countries increased their labour force by just 3% from immigrants, this could generate 300 billion dollars, which is four and a half times the amount of foreign aid (Pritchett, 2006). While empirically challenging to estimate because of selection bias,[1] the majority of micro-level studies find massive returns to international migration. For example, McKenzie et al. (2010) exploiting a lottery system in the allocation of visas from Tonga to New Zealand, find a 263% increase in income after migrating.

The positive impacts of migration on economic development are significant not only because of direct workforce mobility, but also because of other secondary development effects (Clemens, 2011). Remittances are a vital source of income for families in developing countries, and they have a positive effect on household welfare and the economy at large (Adams Jr, 2011; Schiff et al., 2005). Migration can also transfer knowledge and skills to the home country, leading to increased entrepreneurship and innovation upon return (Bahar et al., 2018; Dustmann and Kirchkamp, 2002; Gubert and Nordman, 2011; McCormick and Wahba, 2001; Wahba, 2014) as well as enhanced bilateral trade and investment (Burchardi et al., 2019; Felbermayr et al., 2015; Gould, 1994; Javorcik et al., 2011; Kugler and Rapoport, 2007; Mayda et al., 2020; Parsons and Vézina, 2018; Peri and Requena-Silvente, 2010; Rauch, 2001;

[1] For an overview of the latest developments in employing field and natural experiments in the context of migration, see McKenzie and Yang (2022).

Rauch and Casella, 2003). Migrants can transfer social and political ideas to the communities of origin, affecting fertility dynamics (Beine et al., 2013; Bertoli and Marchetta, 2015), gender norms (Lodigiani and Salomone, 2015; Tuccio and Wahba, 2018), or political preferences (Barsbai et al., 2017; Chauvet and Mercier, 2014; Docquier et al., 2016; Mercier, 2016; Spilimbergo, 2009). The large gains from migrating abroad can serve as a catalyst for investing in skills and education, resulting in positive spillover effects known as "brain gain". This phenomenon has been supported by empirical evidence both at the macro level (Beine et al., 2008; Docquier and Rapoport, 2012) and at the micro level (Batista et al., 2012; Chand and Clemens, 2011; Gibson and McKenzie, 2011; Shrestha, 2017). Finally, migration can serve as an adaptation strategy to climate change and natural disasters, contributing to building resilience and reducing vulnerability (Benveniste et al., 2020; Blumenstock et al., 2016; Giannelli and Canessa, 2022; Gröger and Zylberberg, 2016; Kleemans, 2015; Mbaye and Drabo, 2017; Yang and Choi, 2007).

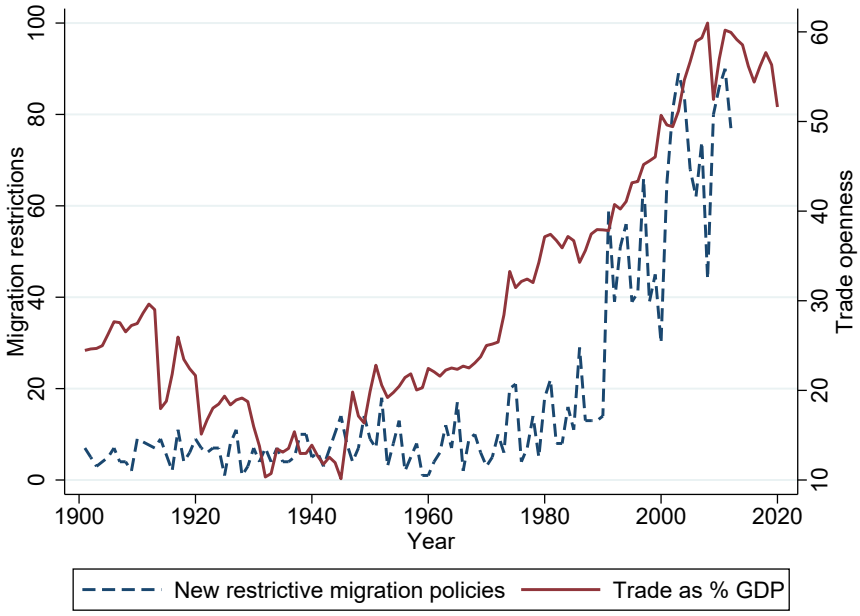
The gains from removing barriers to international migration impressively outweigh the total elimination of trade policy and capital flows barriers, which are estimated to be only around a few percent of global GDP (Anderson and Van Wincoop, 2004). Still, access to global flows has significant positive effects on developing countries. According to the UNCTAD (2021), developing economies attracted 66% of global FDI inflows, which marks a significant increase from previous years. Access to trade and FDI have been associated with increased productivity, technological transfer, job creation, and the establishment of new industries (UNCTAD, 2021), as well as a reduction in poverty (Winters et al., 2004).

While largely beneficial for developing countries, the process of globalization has been slowing in recent decades. Figure 1 shows that trade openness, measured as the percentage of global exports and imports of global GDP, has been stagnating since the 2000s. This trend has almost completely reversed a longstanding secular trend. Large powers like the US and China have increased trade protectionist measures such as anti-dumping measures and import tariffs, and some argue that there is a shift in the paradigm of global integration towards domestic production (European Central Bank, 2019). At the same time, many developing countries have implemented protectionist measures to regulate FDI inflows, such as screening procedures and performance requirements (Sauvant, 2009). These measures are often justified on the basis of national security and public interest concerns, but they can also limit the ability of foreign firms to access local markets and lead to reduced competitiveness for domestic firms (Blomström and Kokko, 1996).

On the side of migration, Figure 1 also shows that international migration poli-

cies have been becoming increasingly restrictive since the 1990s. Despite the potential benefits that migration can bring, many countries have implemented restrictive policies to limit migration flows. These policies can range from visa restrictions, quotas, to point-based systems and can have a significant impact on the ability of individuals to move freely and seek better opportunities. A large increase in policy barriers did not coincide with a reduction in international migrant flows in the last decades (Clemens, 2022). It rather reshaped the selectivity of migrants, restricting access to low-skilled and vulnerable individuals (Beine et al., 2016b; de Haas et al., 2018).

Figure (1) Migration restrictions and trade openness



Notes: Trade openness is defined as % of global trade of the world GDP. Sources of trade data: years 1900-1950 (Maddison); years 1950-1970 (Penn World Table); years 1970-2020 (World Bank). Source of migration restriction data: DEMIG Policy Database.

This thesis sheds light on the effects of reducing or escalating international policy barriers on emerging economies, and how these relate to international migration. In the first chapter, I analyze the effect of a protective FDI policy on international migration outflows from Indonesia. I find a substitution effect from FDI to international migration, but also an increase in skilled migrants. In the second chapter, I investigate the effect of a migration ban on the capacity of communities to absorb income shocks from natural disasters. In this case, I also find negative effects on communities in terms of an increase in poverty. Differently from the previous two chapters, the third chapter focuses on a context where barriers to international migration have been suddenly eliminated: I exploit the fall of the Communist regime

in Albania in the 1990s and the subsequent mass emigration of Albanians to identify the causal effect of migration on female labour force participation. I find that migration has positive effects on female employment, but this effect is only prevalent among women that reside in areas with high access to preschools. I dig more in-depth into this gender issue by analyzing the effect of fertility on female employment in Albania in Chapter 4. I show that an increase in the number of children decreases women's labour supply.

This thesis employs the latest empirical methods in the migration literature that do not involve field randomized experiments (McKenzie and Yang, 2022). The first chapter relies on a shift-share design (Bartik, 1991), widely used in the migration literature (see Jaeger et al. (2018) for a review of the literature). The second chapter relies on the intersection of two natural experiments. The first is a policy shock which unilaterally affects one important destination country but leaves others unaffected, thereby creating a natural control group. The second is natural disasters, a source of quasi-random variation, conditional on village-fixed effects. The third chapter relies on the classic migration network instrument. The majority of studies focus on contexts with a long history of migration, so it is difficult to isolate the causal link of persistent networks. In chapter 3, I exploit the fact that borders were suddenly opened in 1991, and that first emigrants could establish migration networks that could facilitate subsequent migration waves. Finally, the fourth chapter exploits the offspring's quasi-random sex at birth and the strong preferences for boys, in the spirit of Angrist and Evans (1998).

The findings of this thesis have significant implications for policy-making at the international level. It suggests that imposing limitations on international flows could have unintended consequences, such as the exacerbation of brain drain, as highlighted in Chapter 1. Additionally, the results indicate that migration restrictions could make communities more vulnerable to climate shocks, as discussed in Chapter 2. Therefore, policymakers need to consider the long-term impacts of limiting international flows. On the other hand, relaxing migration barriers could lead to numerous benefits. Chapter 3 highlights the positive impact of such relaxation on female labour force participation, which is crucial for economic growth and development. However, it should be noted that women's participation in the workforce is dependent on favourable gender norms and access to childcare services, as discussed in Chapter 4. Without these factors, I show that women could be more likely to reduce their labour supply.

1 Chapter 1: Are FDI Restrictions Inducing International Migration? Evidence from Indonesia

This chapter is among the first to causally identify the effect of an FDI protectionist measure on international migration within a dyadic framework. Using disaggregated dyadic panel data on international migration out-flows from Indonesian districts, this chapter provides causal evidence for Foreign Direct Investment (FDI) and international migration being substitutes.

Numerous studies have explored the influence of diaspora networks on FDI flows, revealing that FDI is frequently viewed as a complement to these networks, with skilled migrants playing a particularly important role (Javorcik et al., 2011; Kugler and Rapoport, 2007; Tong, 2005). Our research delves into an area that has been comparatively underexamined: how FDI affects migration decisions, akin to the body of literature investigating the relationship between aid and migration (e.g., Berthélemy et al. (2009); Dreher et al. (2019b); Parsons and Winters (2014)).

This chapter tries to fill this gap by establishing the causal effect of changing FDI inflows on international outmigration from regions affected by FDI regulation in Indonesia, a case study that reflects well the global trends in FDI flows and that is a primary source country of migrants in the ASEAN region.

We use regionally representative survey data, building a dyadic panel recording labour and capital flows between Indonesian districts and partner countries and regress international migration outflows in the years 2005, 2006 and 2010 to 2015 on FDI inflows within the previous year within dyadic fixed effects. For our identification, we exploit the unique feature of the Indonesian case study: regulatory policy changes that only affected FDI inflows, implemented in a so-called Negative Investment List (NIL) during the years 2007 to 2014. The product-specific FDI policy restricted investment flows to specific sectors at a highly granular, 5-digit level, a de facto protectionist FDI policy. We rely on this measure as an instrument for dyadic FDI flows, since FDI inflows are endogenously linked to migration. Using a shift-share approach (Bartik, 1991; Dreher et al., 2019a; Nunn and Qian, 2014) based both on the initial sectoral composition of each district and on the attractiveness of each district to receive FDI flows from a specific source country of investment, we measure the district-country-pair-level exposure to this sector-specific tightening of FDI. In this way, we effectively analyse the effect of exogenous changes in capital flows from each source country on changes in international emigration to the very same country as a destination choice.

Our findings show that relative reductions in dyadic FDI inflows after the reform were causing an increase in dyadic emigration, thereby pointing to a substitution relationship between FDI and migration that had already been suggested by standard trade theory. In districts where bilateral FDI flows have been effectively reduced after the regulatory reforms of the NIL, migration outflows to the same partner countries have increased. We also find that the effect is particularly strong among households with tertiary education. Given the high policy interest in the link between capital and labour flows, our results suggest that FDI protectionism can not only have direct consequences on capital flows but also causes a rise in high-skilled emigration (brain drain) to the country of origin from which investments stemmed in the past.

2 Chapter 2: Confined to stay: Natural Disasters and Indonesia's Migration Ban

We investigate whether international migration is a mitigation strategy for foregone income in the aftermath of natural disasters. We are able to causally establish the link between natural disasters and international migration as a mitigation strategy by exploiting a natural experiment: an international migration ban to all female Indonesians willing to migrate to Saudi Arabia. While natural disasters increase out-migration, the restriction to migrate to Saudi Arabia curbs the effect towards zero in villages with a high ex-ante propensity to migrate to Saudi Arabia. Consequently, poverty increases in the face of natural disasters after 2011, further aggravating the already severe consequences of the natural shock.

To test this hypothesis, we construct a panel of almost 70,000 Indonesian villages from Village Potential Statistics (PODES), a census of Indonesian villages collected every three years. We use the 2005, 2008, 2011, and 2014 waves, which contain, among others, information on natural disasters, type of disaster, international migration and the number of issued poverty cards. We use this information to causally estimate the smoothing effect of migration in a triple difference-in-difference (DDD) setting. We compare poverty levels of villages whose majority of migrants went to Saudi Arabia in 2005 against the rest of the sample, compared to villages that were hit by natural disasters, before and after the moratorium date (2011).

Results show that villages that were more affected by the ban saw a drastic reduction in migration. Not being able to mitigate the impact of natural disasters through migration, these villages experience a rise in poverty, measured by the

number of issued poverty cards. We further find this effect to be driven by a specific type of disaster: floods. This effect is particularly stronger in villages that cultivate paddy rice in rainfed areas, more vulnerable to floods. To our knowledge, this is the first study that examines the effect of migration restrictions in the context of extreme weather events and this is particularly relevant in light of the current political debates to increase barriers to migration. We show that suppressing international migration reduces one of the few mitigation strategies to natural disasters, with climate change only exacerbating the problem by raising the frequency of extreme weather events in the next decades.

3 Chapter 3: Migration, Childcare and Female Employment: Evidence from Albania

This chapter analyzes the effect of international migration of a household member on mothers' employment and how this differs based on different levels of childcare availability in the context of Albania. With one-third of the population estimated to have migrated abroad after the fall of the Communist regime in 1990, Albania is one of the countries with the largest emigration rate in the world (Barjaba and Barjaba, 2015). At the same time, the country has a strong gender disparity (Miluka, 2013) and one the lowest attendance rate of preschools in the Balkans (World Bank, 2015).

In order to instrument the presence of a migrant member abroad, we exploit the collapse of the communist regime and the mass emigration of Albanians at the beginning of the 1990s as a natural experiment for migration networks. We use the Albanian DHS survey 2018 for our main analysis. Its geo-referenced clusters are also combined with the universe of kindergartens in Albania and their geo-location to construct spatial preschool availability. Our results show that women with young children largely increase their employment probability if a member of the household is abroad. However, this effect only arises from mothers having access to childcare (access to kindergartens).

This chapter reconciles two strains of the literature. We first contribute to studies on the effect of migration on households left behind, particularly on female labour force participation (Amuedo-Dorantes and Pozo, 2006; Binzel and Assaad, 2011; Mendola and Carletto, 2012; Miluka, 2013). At the same time, our results are in line with studies showing the positive effect of preschool access on female employment in emerging countries (Calderón, 2014; Dang et al., 2019; Martínez A. and Perticará, 2017). Close to our chapter, Mendola and Carletto (2012) focus on

the link between male migration and female employment in Albania. They find that a migrant abroad decreases female paid labour supply and increases unpaid work. In this sense, they argue that migration of the male household member increases women's responsibilities, but childcare prevents them to join paid occupations. We reconcile their findings by showing heterogeneous effects with respect to access to formal childcare: fathers that leave young children behind increase the probability of paid employment for those women living in areas with larger access to preschools. We thus argue that male migration induces women to find better, paid jobs as long as they have access to childcare services.

4 Chapter 4: How does fertility affect female labour force participation in Albania?

This chapter is a natural continuation of Chapter 3 as it inspects the relationship between fertility and female employment in Albania. We use both a quantitative and qualitative approach to gauge their nexus for rural and urban areas over time. The literature on the relationship between female labour supply and fertility has found a negative correlation between the two in developed contexts, but studies in low and middle-income countries have yielded mixed results (Aaronson et al., 2021; Agüero and Marks, 2008, 2011; Priebe, 2010; Trako, 2019). This may be due to the unique challenges faced by women in emerging economies, such as income inequality, gender norms, and informal labour markets. Albania is an interesting case study because its conservative societal norms and patriarchal values may play a key role in women's decision-making regarding child-rearing and employment decisions.

To establish a causal link between the number of children a woman has and her employment probability, we rely on an instrumental variable approach. We thus exploit the randomness of the gender of the first two-born children and the preference for boys in Albania to examine the effect of the number of children on female labour force participation. We then show that rural women are particularly dependent on their fertility decision if they have low levels of education. This effect is not particularly relevant to specific types of rural employment, but it is reinforced by demographic traits of the household, such as if there are seniors in the household or if the partner is working.

On top of the quantitative analysis, we conduct a mixed-methods analysis using qualitative data from focus group discussions with women and employers in three rural municipalities of Albania.

The study's findings suggest that there is a negative relationship between fertility and employment probability in Albania. The analysis also reveals structural gaps perceived by women, including social norms and the flexibility of labour markets, that promote the conciliation of work and family. The mixed-methods analysis sheds light on the challenges faced by women in balancing work and family responsibilities and the strategies used by employers to attract and retain female workers.

This chapter makes two key contributions to the literature on the employment-fertility relationship. First, it uses the latest two waves of DHS data, which is the most robust and recent dataset on household dynamics and women's fertility available in the context of Albania, to examine the evolution of fertility among rural and urban areas in an emerging context. Second, the mixed-methods analysis also provides insight into the structural gaps perceived by women, including social norms and the flexibility of labour markets, which are found in the literature to promote the conciliation of work and family. Overall, the chapter sheds light on the complex interplay between fertility, child-rearing, and female labour force participation in emerging economies, and provides insights into the challenges faced by women in traditionalist societies such as Albania.

Chapter 1

Are FDI restrictions inducing international migration? Evidence from Indonesia

Abstract

Using disaggregated dyadic panel data on international migration flows from Indonesian districts, this paper provides causal evidence for Foreign Direct Investment (FDI) and international migration being substitutes. Our empirical analysis exploits regulatory changes in the Negative Investment List, a product-specific FDI policy, that have been implemented by the Indonesian government from 2007 to 2014. Using a shift-share approach to measure the district-country-pair-level exposure to the sector-specific tightening of FDI regulation, we analyze the impact of changes in bilateral FDI inflows on international migratory movements of the population living in FDI-receiving areas. We document that relative reductions in dyadic FDI inflows in the aftermath of the reform triggered an increase in emigration to the investor countries, especially among those with tertiary education.

Keywords: Migration, FDI, Indonesia

This chapter is co-authored with Anna Gasten (University of Göttingen) and Krisztina Kis-Katos (University of Göttingen, IZA and RWI research networks).

1 Introduction

Enabled by liberal regulatory frameworks, global Foreign Direct Investment (FDI) flows have increased considerably over the last decades, from a yearly average of $50 billion during the early 1980s to more than $1.9 trillion in 2007 (Sauvant, 2009). This steep trend decelerated after 2007 due to the negative and long-lasting effects of the financial crisis, but still yielded $1.4 trillion of FDI flows in 2019 (UNCTAD, 2020). Further expansions of international production networks were complicated by a tightening of national investment regimes that was typically implemented under the guise of protecting "national interests" and was focused on strategically important sectors, or national champions (Sauvant et al., 2010). At the same time, international migration has experienced moderate growth, with the stock of global migrants increasing from 153 million in 1990 to 272 million in 2019 (United Nations, 2019). This poses the question whether the most recent rise of barriers towards FDI has also acted as a limiting factor on the growth of international migration, or whether it may have induced even larger emigration flows. Our paper helps to shed light on this issue.

From a policy perspective, this question is highly relevant to both FDI-receiving and FDI-sending economies. While receiving countries view FDI inflows as a way to prevent migration-induced "brain drain", investor countries consider FDI flows as a development strategy that may hinder "people from developing countries [...] to increasingly seek to migrate into the developed countries of the West"(UNCTAD, 1996). FDI is expected to "reduce migration pressure through the development benefits it generates by enhancing economic growth and supporting employment creation"(UNCTAD, 2009). Through a wide range of forward and backward linkages, FDI inflows indeed were found to result in the adoption of skill-intensive technologies as well as the development of technical and managerial human capital (Blomstrom and Kokko, 2003). The question remains however whether the migration-reducing effect of FDI flows that is typically stressed by the media and bodies of the international development cooperation is indeed empirically founded.

According to standard trade theory, international goods and factor flows on the one hand, and movements of capital and labour on the other hand can be considered substitutes (Mundell, 1957). If factor movements are globally allowed for, initial imbalances in relative factor endowments and prices will trigger international movements of capital and labour. In the presence of FDI and international labour mobility, countries with a relatively high endowment of labour will either attract additional inflows of capital, or will see a rise in emigration, with workers moving

to countries where capital as a factor of production is abundant and thereby wages are high. Consequently, capital and labour are expected to move in the opposite directions, suggesting that inward FDI and emigration can substitute for each other (Jayet and Marchal, 2016; Wong, 2006).

This stands in contrast with the growing evidence that migrant networks complement FDI flows in the longer run by helping to overcome information barriers and establishing business links between investors and partners in their home country (Docquier and Lodigiani, 2010; Kugler and Rapoport, 2007; Tomohara, 2017). Migrant networks can also improve the enforcement of contracts abroad (Greif, 1993), but as the complementarity between FDI and migration persists in settings with strong institutions, their main role is most likely to reduce information asymmetries (Burchardi et al., 2019; Tong, 2005). While low-skilled immigrants may provide insights about the characteristics of the workforce in their home country (Kugler and Rapoport, 2011), the complementarity between both flows seems to be mainly driven by migrants with tertiary education who are instrumental for the establishment of business links and provide access to market information (Cuadros et al., 2019; Javorcik et al., 2011).

Despite this well-established literature on the effect of migrant networks on FDI, the reverse impact of FDI on international migration has received much less scientific attention. This is surprising in light of the global trend of re-assessing globalization's benefits through increasing economic protectionism. Only few studies have empirically tested the effect of FDI on migration so far. Relying on the FDI-inducing effect of the North American Free Trade Agreement (NAFTA), Aroca and Maloney (2005) show that both trade and FDI flows lead to a drop of internal migration flows in Mexico. A further set of studies shows in a cross-country panel data setting that emigration increases with investments to the primary sector, and decreases with those to the manufacturing sector (Sanderson and Kentor, 2009), that the migration-reducing (substitution) effect persists only for individuals with secondary and tertiary education (Wang et al., 2013), and that the effect also depends on the development state of the country of investment (Phyo et al., 2019). Despite using lagged FDI inflows to identify future out-migration, this approach cannot fully deal with the reverse causality discussed above as well as other unobserved factors potentially directing FDI to sectors and regions that are particularly prone to growth.

This paper tries to fill this gap by establishing the causal effect of changing FDI inflows on international outmigration from regions affected by FDI regulation in Indonesia. Relying on a policy intervention, we investigate to which extent

protectionist investment measures that have direct effects on the global flows of capital affect international flows of people. We exploit a series of policy reforms (also studied by **?**), aimed at restricting FDI into Indonesia in order to protect selected national industries. By taking a local labour market perspective, we construct a dyadic exposure measure to FDI regulation as an instrument for actual FDI inflows into Indonesian regions. Starting in 2000, the Indonesian government published the so-called Negative Investment List (NIL) that defined sectors to be fully or partially closed to FDI, or subject to further regulatory requirements at the detailed five-digit product level. While the overall extent of regulation was low in 2000, the first revision of the list, implemented in 2007, expanded the number of regulated sectors considerably. A further tightening followed in 2010, whereas minor revisions in 2008, 2014 and 2016 eased the restrictions somewhat. Our analysis exploits this regulatory variation to build an instrument for dyadic FDI inflows in a shift-share fashion (Bartik, 1991).

Using regionally representative survey data, we build a dyadic panel recording labour and capital flows between Indonesian districts and partner countries and regress international migration outflows in the years 2005, 2006 and 2010 to 2015 on FDI inflows within the previous year in a dyadic fixed effects setting. Since FDI inflows are endogenously linked to migration (Javorcik et al., 2011; Kugler and Rapoport, 2007), we use the dyadic exposure of foreign investment within each region to the NIL as an instrument for FDI inflows. Our analysis extends the empirical strategy by **?** that exploits region-specific changes in exposure to FDI regulation using a local labour market approach. Based on this, we generate a dyadic country-district specific measure of the local exposure of foreign investors from certain countries to FDI regulation. Our regulatory exposure index combines the regulated share of pre-reform employment in each district with a dyadic measure of pre-reform bilateral inward FDI-linkages between each district and a set of potential partner countries.

Although reforms of the NIL were targeting selected sectors and firm types due to political economy reasons, they did not precisely target district-country pairs. Conditional on district-year fixed effects and destination country-year fixed effects, dyadic exposure to regulatory changes can be considered as predetermined. This allows us to build a difference-in-difference strategy that relies on a Bartik (1991)-style instrument and uses features of the approach by Nunn and Qian (2014). Tests of parallel trends before the regulatory reform confirm the validity of our identification approach.

Our results provide evidence for a substitution relationship between FDI and mi-

gration. In districts where bilateral FDI linkages have been effectively reduced due to the regulatory reforms, migration outflows to the same partner countries have increased. Increases have been largest among migrants with tertiary education. Since our results identify changes at the dyadic level of migration, they underline the relevance of district-country pair specific links: emigrants appear to go to places where historically existing networks or the previous acquisition of destination-specific human capital (e.g., language skills, cultural knowledge) lower migration costs. When comparing the results of our instrumental variable strategy to results based on a conditional correlation between FDI and migration, we find that the inherent endogeneity problem biases the FDI coefficient upwards, with the effects becoming insignificant. This points to a considerable bias in studies that correlate investment flows and migration.

To the best of our knowledge, this paper is the first to investigate the effect of restricting FDI inflows on international emigration in a causally identified, dyadic case study. Given the high policy interest in the link between capital and labour flows, our results suggest that FDI protectionism, leading to a spatially heterogeneous decrease in FDI inflows, causes a rise in emigration to the country of origin of the investment. From the protectionist country's perspective, investment regulation may thus have an accelerating effect on brain drain, but may also lead to a development push due to skill acquisition by migrants and remittances sent from abroad.

2 The Indonesian context

2.1 Indonesia as a source country of international migrants

With 268 million inhabitants and an archipelago that comprises more than 17.000 islands, Indonesia has always been a primary source country for international migration and recently found itself also in the position of a destination and transit country (Missbach and Palmer, 2018). During the past decades, the stunning economic growth of the Asian Tigers with its resulting labour shortages in certain sectors, led to strong income disparities across neighboring states and has been one of the main causes for massive flows of international labour migration (Tsai and Tsay, 2004).

International migration is facilitated not only by geographic proximity, but also by cultural similarities. The spatial variation in destination countries reflects Indonesia's large ethnic and religious diversity (see Figure 1.D.3 in the Appendix

for the main destination country for each Indonesian district). Between 2005 and 2015, the main destination countries of Indonesian migrants were Malaysia, Saudi Arabia, Singapore and Hong Kong (see Table 1.C.1). Villages with a high share of Christians were more likely to send migrants to Malaysia and Singapore, with a high share of ethnic Arabs to the Middle East, and with a high fraction of ethnic Chinese to Hong Kong and Taiwan (Bazzi, 2012). Besides the considerable heterogeneity in destination choices, Indonesia also shows a high spatial variation in the intensity of emigration, with the islands of Java and the southern part of Sulawesi accounting for the highest international migration rates. During the time period 2005 to 2015, however, the spatial polarization in emigration rates was decreasing substantially as emigration became much more widely spread (see Figure 1.D.4 in the Appendix).

According to estimates of the World Bank (2017), around 9 million individuals, corresponding to almost 7% of the country's labour force, have been employed abroad in 2016. Around half of them have left the country as documented migrants, whereas the other half migrated without the documentation required by the Indonesian government. Most legal migrants left through formal migration intermediaries and stayed abroad for around 2 to 3 years (Bazzi, 2017). The structure of labour emigration from Indonesia is characterized by a large number of state and non-state actors that facilitate and assist international migrants by recruiting migrants directly or providing information, financing options, and skill training (Spaan and van Naerssen, 2018). The average placement fee required by official agencies amounts to about 60% to 90% of the average Indonesian yearly per capita income (Bazzi, 2017). At the same time, formal administrative and legal procedures are highly complex. For these reasons, the rate of international migrants who seek alternatives to the documented migration trajectory is high.

During the past decade, the Indonesian government has shifted its migration management from a non-interference approach to a stricter regulatory system (Spaan and van Naerssen, 2018). Repeated cases of abuse of female domestic workers have led to migration moratoria to Malaysia (2008-2011), Saudi Arabia (2011, still in place) as well as an array of Middle Eastern and African countries (2015, still in place). These interventions caused a strong decline in documented migration during the years 2010 to 2015 (see official placement statistics of *BNP2TKI* in Figure 1.D.1).

Migrants from Indonesia tend to come from the middle of the wealth distribution: households without land possessions lack the financial possibilities to migrate, while large landowners lack the incentives to do so (Bazzi, 2017). Nevertheless,

migrant profiles differ substantially. Three main groups of migrants account for around two thirds of all Indonesian emigrants: Female domestic workers who leave mainly for the Middle East, male workers in the construction and agricultural sector who migrate to Malaysia, and more educated emigrants who leave for the developed East Asian countries Taiwan, Hong Kong, and Singapore (World Bank, 2017). In terms of educational attainment, about 20% of all migrants completed high school or more (World Bank, 2017).

2.2 FDI in Indonesia

Similarly to migration, the Indonesian policy towards foreign investors has always been ambivalent and regimes that implemented liberal FDI policies alternated with more restrictive regimes. After Indonesia's independence from the Netherlands in 1945, the Sukarno regime's socialist rhetoric and weak ownership rights kept FDI inflows to the country at a very low level. With reforms implemented since the 1970s under Suharto, foreign investment was allowed in most industries, but was still highly regulated with respect to minimum levels of national ownership in each firm (Blalock and Gertler, 2008). This protectionist approach had to be abandoned in the period following the oil glut during the mid-1980s. The Indonesian government was successful at attracting foreign investment to the labour and natural-resource abundant country, so that Indonesia became the largest FDI recipient among all ASEAN countries after Singapore by the end of the century (Tsai and Tsay, 2004). After the Asian Financial Crisis of 1997 that had brought the increasing FDI flows to a halt and destroyed much of the investors' confidence, the government aimed at restoring Indonesia's attractiveness for FDI by providing fiscal incentives, establishing anti-discrimination rules for foreign investors and harmonizing application procedures (WTO, 2013). Based on data collected by the Investment Coordinating Board of the Republic of Indonesia (*BKPM*), FDI inflows to the manufacturing sector started to increase again after 2006 (see Figure 1.D.1 in the appendix). By 2015, Indonesia had become one of the top 20 FDI receiving economies of the World (UNCTAD, 2015). The substantial increase of investment flows also resulted in an ongoing spatial spread of foreign investment across the archipelago. While FDI flows were mainly clustered in the densely populated urban districts around Jakarta, Surabaya, and Medan in the years 2000 to 2005, the spatial dispersion of FDI became considerably more equal by 2015 (see Figure 1.D.5).

During the time period of 2000 to 2015, the largest investments into the man-

ufacturing sector came from Singapore, Japan, the Netherlands and South Korea.[1] However, the spatial nature of FDI flows to the different districts was very heterogeneous in terms of the regionally dominant investor country (see Figure 1.D.2).

The overall policy dynamics during the past 20 years were marked by packages of deregulation, increased economic stability and structural reforms that raised incentives of foreign enterprises to invest in Indonesia. Since the early 2000s, the Indonesian government started to use the policy tool of a Negative Investment List (NIL) to selectively regulate the product coverage of FDI limitations. This full or partial ban of foreign investment to specific manufacturing sectors did not undermine the overall increase of investments flowing into the Indonesian economy (see Figure 1.D.1), but induced differential regional deviations from the national trend that are exploited for identification in this study.

The NIL was first introduced by presidential decree in 2000 (Decree 96/2000), increasing the transparency of FDI regulation (WTO, 2013; **?**). In the course of a protectionist policy reform, the list was substantially expanded in 2007 (by the Presidential Decree 77/2007), including a whole range of further products. In three subsequent revisions, the list was first slightly relaxed in 2008, then the number of regulated sectors increased strongly in 2010, and finally, in 2014, minor changes to adjust the list were implemented.

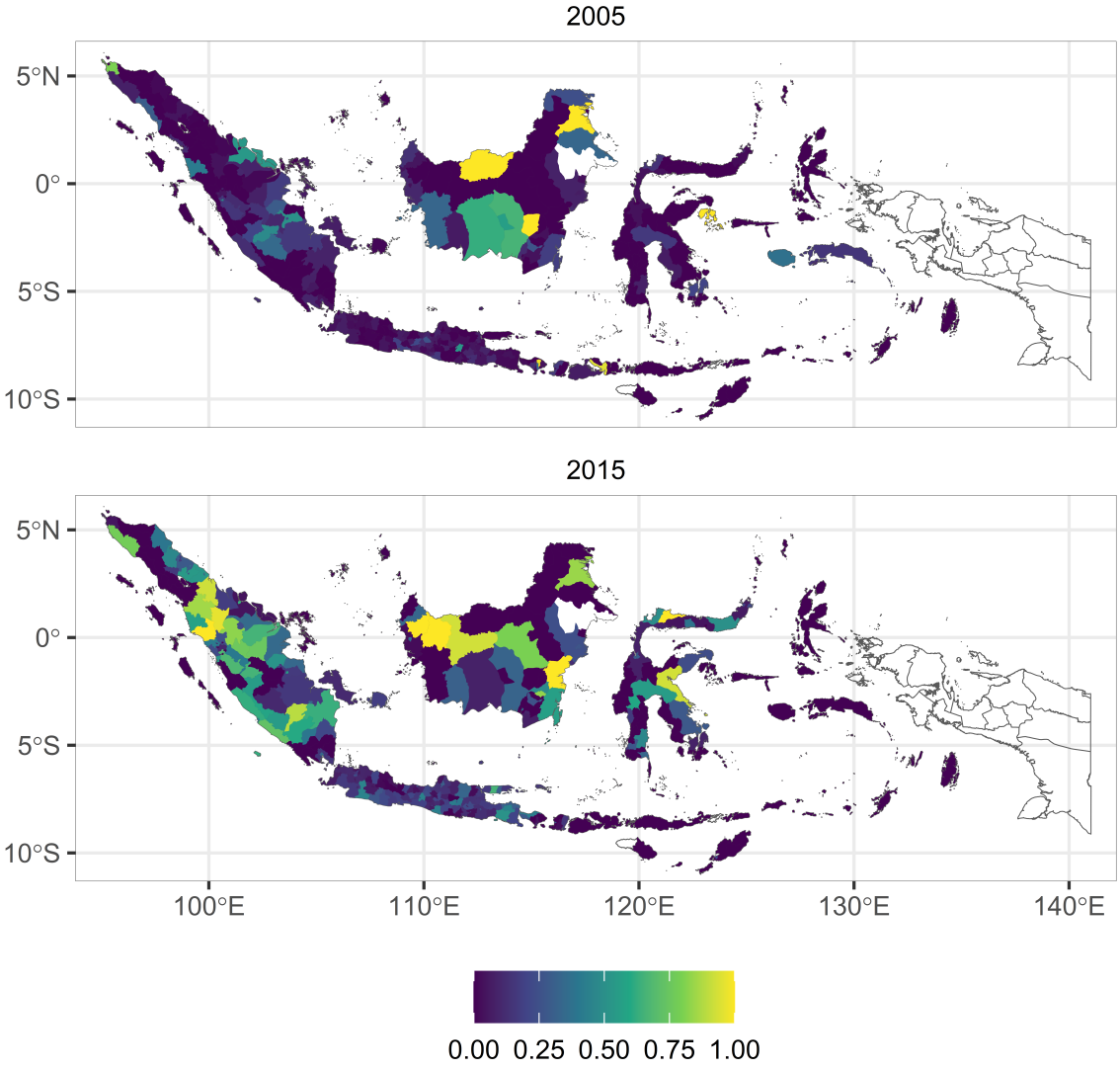
According to the NIL, sectors could either be completely closed to FDI, or be closed conditional on firm-level characteristics, or require licensing procedures. Firm-level characteristics relevant for regulation referred either to firm size or required legal partnership status. In many cases, big firms above a certain minimum threshold of employees were regulated whereas small and medium enterprises (SMEs) remained unregulated. Geographical conditions were a very rare exception within the NIL, with only a handful of products being restricted in selected regions only. In some cases, investment was allowed up to a certain maximum threshold of foreign ownership or conditional on a licensing permission, issued by the responsible ministry. With the stated goal to give more clarity to foreign investors, the NIL was *de facto* closing sectors to foreign investors, with a peak of 18% of manufacturing firms in the economy being subject to restrictions in 2007 (see Figure 1.2a in the Appendix).

Although these policy reforms were centrally planned, they had diverse effects in time and space (Figure 1.1). We find that regulation by the NIL indeed decreased

[1] In the case of Singapore and the Netherlands, not all the investments are originating directly from domestic firms. A large fraction consists of investments that foreign MNEs (e.g., from South Korea, US, or European countries) spend via Singaporian or Dutch holdings.

FDI inflows to regulated manufacturing sectors and exploit this unique feature in order to identify how the differential FDI inflows affect international migration.

Figure (1.1) Regulation Intensity per district



Notes: Regulation intensity per district as in equation (1.1). Districts in white have missing data.

3 Data and Measurement

3.1 Bilateral emigration flows

To construct district-level information on international migrant flows, we combine three different national surveys collected in 2005, 2006 and 2015. We derive yearly bilateral migration flows for the years 2010 to 2015 from the intercensal survey *Supas*

2015 (*Survei Penduduk Antar Sensus*). *Supas* samples 2% of the Indonesian population and is representative at the level of Indonesian districts (regencies/*kabupaten* and cities/*kota*). In 2015, it contains a recall question on whether any household member has migrated since 2010, their year of migration as well as their destination country. It includes current but also return migrants. Based on this information, we can reconstruct retrospective emigration flows for each district-destination country pair for the period from 2010 to 2015. We expect these estimates to give relatively precise measures of bilateral migrant flows, although potentially subject to a recall bias.

We lack a similarly direct measure for prior years but use the combination of two further surveys to approximate bilateral migrant flows between 2000 and 2006. For this, we combine the 2005 and 2006 waves of the yearly national socioeconomic survey (*Survei Sosial Ekonomi Nasional*, *Susenas*) with the 2005 round of a village census (*Village Potential Statistics*, *Podes*). *Susenas* is representative at the level of Indonesian districts, and included a question in 2005 about the current number of international labour migrants in each household as well as their year of emigration over the last five years. These estimates exclude short-term migrants who have already returned from their country of destination by 2005, which will result in underestimated flows for the earlier years. We expect the results for the latest years to measure flows more precisely and include them in the main analysis. We rely on the earlier years (2000 to 2004) for our checks of pre-trends in migration only.

As *Susenas* does not provide the country of destination of migrants, we impute a constant distribution of destination countries for the whole time period by utilizing the 2005 wave of the village census *Podes*. *Podes* provides information about the stock of international labour migrants per village and also records the main country of destination for each village by listing 11 main destination countries and the remainder category "Others" [2]. Relying on common village identifiers, we assign the main country of destination for each village derived from *Podes* to the *Susenas* household data. By that we assume that all households within the same village send their household members to the same destination. Since labour migration is often organized through local intermediaries that specialize on main destination countries and since past migration networks provide valuable assistance to non-formal migrants, it is reasonable to assume that migration within the village is highly po-

[2]Villages or *desa* are the fourth and the lowest administrative units in Indonesia. In 2005 there were 69,957 villages.

larized to few destination countries.[3] This imputation procedure will over-estimate migration flows to the most frequently named destination countries but as not all villages within the same district name the same destination countries, the aggregate results still provide quite substantial within-district variation in destinations.

As migration figures collected before the main regulatory tightening (which was taking place in 2007 and to a smaller extent in 2010) are differently measured from post-reform migration, we will make sure that changes in measurement are not driving our estimation results. Destination country shares per district vary yearly in *Supas* whereas for the period before the reform we can only rely on constant shares imputed from *Podes*. To take this into account, our main estimates will only include the last two pre-reform years and use the earlier years only in pre-trend checks. In addition, our empirical strategy will control for overall changes in the measurement over time, as long as they affect all the dyadic links symmetrically. Further robustness checks provide alternative measurement approaches for migration flows, keeping either the shares of destination countries constant throughout time, or relying on migrant stocks throughout time from *Podes* with destination shares imputed from *Supas* for the newer years.

3.2 FDI inflows and regulatory exposure

We measure the volume of yearly FDI inflows to Indonesian districts based on data provided by the Indonesia Investment Coordinating Board (*Badan Koordinasi Penanaman Modal, BKPM*). As a government agency, BKPM is responsible for the coordination and promotion of domestic and foreign investment (BKPM, 2020). The publicly available aggregated data contain information about the volume of investment by district, dis-aggregated by the year of investment, source country and a 2-digit industry code.

In order to measure local exposure to FDI regulation, we combine regulatory information from the NIL with data from a firm manufacturing census. The NIL encodes publicly available presidential decrees at the five-digit product level, and enforces regulation depending on the firm's sector of activity. While some sectors are fully closed by the NIL, other sectors are regulated conditional on firm size, legal status and previous foreign ownership share (Genthner and Kis-Katos, 2022). Firm-level data stems from the Survey of Industrial Firms, (*Survei Industri*, SI), which is a yearly census of the universe of Indonesian manufacturing firms with at

[3] The share of migrant workers moving to the different destination countries constructed under this assumption by using 2005 *Susenas* and *Podes* data is highly correlated with the official destination-specific shares of the 2006 *BNP2TKI* data.

least 20 employees. We match changes in the regulatory environment to the firm census in order to calculate each district's yearly exposure to FDI regulation.

To capture the district-level exposure to FDI regulation, we apply a shift-share approach that identifies the initial share of manufacturing workers employed in sectors that will be subject to future regulation:

$$Reg_{dt} = \sum_{i} \frac{L_{igd0}}{L_{d0}} Reg_{gdt} \tag{1.1}$$

We first identify whether manufacturing firms of group type g and operating in district d were subject to FDI restrictions within a year t. This indicator variable Reg_{gdt} is determined at the firm-group level g and takes the value of one in the years in which these types of firms were regulated and zero otherwise. We divide firms into types by their size, legal status and whether they were above a specified FDI ownership ceiling, all of which have been used as conditions for some of the regulations. To capture the relative importance of regulated firms within the local labour market, we normalize the size of the initial labour force employed by each firm, L_{igd0}, by the initial number of manufacturing workers in the district, L_{d0}. Initial conditions are calculated as averages over the years 2000 to 2005, during which no regulatory changes occurred. Our sample thus only includes firms that existed already by 2005 and hence our labour market weights are not affected by endogenous adjustments of the sectoral composition at the district level that may have happened in later years as a consequence of the regulation. The time variation in the district-level exposure to regulation Reg_{dt} stems from the revisions of the NIL in 2007, 2008, 2010 and 2014 that either extended or shortened the list of restricted sectors by adding new sectors or removing old ones.[4]

The above regulatory measure, Reg_{dt}, only takes into consideration how strongly certain sectors are exposed to regulation and how prevalent these sectors are in a specific district d, but not how likely this district is to attract FDI in general over time. Moreover, it does not account for variation in the strength of bilateral linkages between districts and partner countries. For instance, some peripheral districts are composed of sectors that are highly regulated, but also generally less attractive to investors. Figure 1.D.2 in the Appendix maps the largest investor for each district between the years 2000 and 2005 and shows substantial spatial variation in the regionally dominant investor country. Peripheral districts that have received only marginal FDI between 2000 and 2005 are denoted in white.

[4]Our results are robust to weighting regulation by initial capital instead of employment (see the robustness section for more details and Table (1.C.4) for the results).

In order to take those country-district pair specific economic geography factors into account, we extend this measure into a bilateral regulatory exposure index, REI_{dct}:

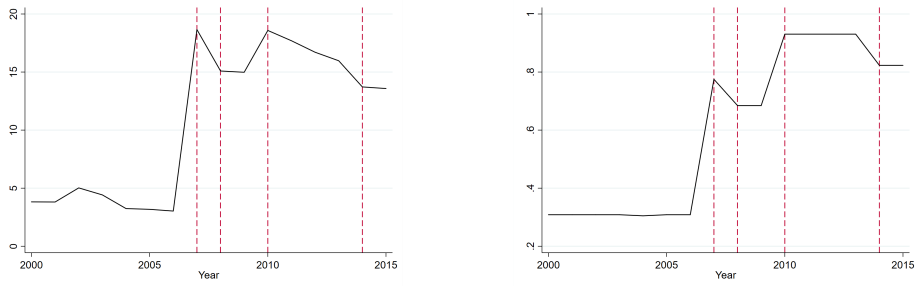
$$REI_{dct} = Reg_{dt} \times \overline{P}_{dc}, \tag{1.2}$$

where $\overline{P}_{dc}$ denotes the average time-invariant propensity of a district d to receive FDI from country c, based on FDI inflow data. The propensity is calculated as the mean of yearly indicator variables, which take the value of one if a district received FDI from a given country in the given year. As for the regulatory measure, Reg_{dt}, we base this index on an initial pre-reform period from 2000 to 2005 in order to disregard all changes in FDI inflows that were endogenously driven by the regulatory tightening itself.

Figure 1.2b displays the average REI across all districts over time, whereby the time variation reflects revisions in the NIL, similarly as in 1.2a, with the largest regulation wave in 2007, a second wave in 2010 small de-regulations in 2008 and 2014.

Figure (1.2) Regulation dynamics over time

(a) Share of regulated firms (b) Average REI



Notes: The left panel displays the share of regulated manufacturing firms multiplied by 100 over time in Indonesia (based on SI data). The right panel shows the average value of the REI (Regulatory Exposure Index) multiplied by 100, calculated over all districts. Vertical lines denote the years with adjustments in the NIL.

The final dataset contains 29,760 observations on district-destination country pairs over eight non-consecutive years (2005, 2006 and 2010 to 2015). As these observations measure migration both before and after the major waves of regulatory adjustments in the NIL (in 2007 and 2010), this allows us to capture the effects of changes in FDI regulation on international migration over the short-to-medium run.

4 Empirical Strategy

We investigate the effect of FDI on migration relying on a structural gravity model in the bilateral setting of Indonesian regions and selected partner countries. We estimate the following equation:

$$Mig_{dct} = \delta_0 + \delta_1 FDI_{dct-1} + \mu_{dt} + \theta_{ct} + \phi_{dc} + \varepsilon_{dct}, \tag{1.3}$$

where Mig_{dct} measures the dyadic outflow of international migrants from district d to destination country c in any given year t, and FDI_{dct-1} records FDI inflows in district d, from country c to the district one year before. We lag FDI by one year in order to capture the delayed effect of FDI on emigration decisions and transform both FDI and migration flow figures by the inverse hyperbolic sine transformation in order to include district-destination country pairs with zero bilateral flows (see e.g., Burbidge et al., 1988; Mayda et al., 2020). Alternatively, we also report PPML (Pseudo-Poisson Maximum Likelihood) specifications on non-transformed variables, which however suffer from the incidental parameter problem when highly saturated fixed effects are combined with an instrumental variables strategy. Standard errors are clustered at the district level (of 310 districts). We do not carry out a two-way clustering at the dyadic origin district-destination country level in our main regressions because of the low number of destination countries (12). Cameron and Miller (2014) show that the finite-cluster problem is even greater in a two-way cluster setting than one-way clustering. We however still report our baseline results using dyadic two-way clusters in Table 1.C.9 in the Appendix.

All regressions include a full set of monadic-year and dyadic-pair fixed effects. District-year fixed effects, μ_{dt}, allow us to control for all district-specific time-variant push factors of migration which may also affect FDI inflows into the region in general. They capture all local variation in economic, social, and population dynamics, leading to variations in local labour demand as well as supply. Country-year fixed effects, θ_{ct} capture a range of time-variant factors, such as trade and investment agreements, labour market dynamics in destination countries, migration flows between Indonesia and the destination country as well as all other changes in bilateral factors between Indonesia and the destination country. The dyadic ϕ_{dc} district-country pair fixed effects control for time-invariant components affecting the strength of bilateral relationships such as geographical proximity and historical and cultural links between a district and a destination country. The inclusion of the three possible combinations of fixed effects allows us to fully capture the effect

of "multilateral resistance" (Beine et al., 2016a; Olivero and Yotov, 2012; Ortega and Peri, 2009, 2014).

However, this large set of fixed effects does not fully control for potential biases which vary at the district-country-year level. The estimates are most likely affected by direct reverse causality as migrants facilitate investment from their host country into their district of origin (see e.g., Docquier and Lodigiani, 2010; Javorcik et al., 2011; Kugler and Rapoport, 2007). Serial correlation in migration due to the role of migrant networks will lead to an upward-biased FDI coefficient despite our use of lagged FDI values. Moreover, a series of further omitted variables could bias the estimated FDI coefficient. For instance, bilateral trade flows are likely to be correlated both with FDI and migration at the district-country-year level but cannot be controlled for due to the lack of regional dyadic trade data.

We deal with the remaining endogeneity of FDI flows by using the dyadic district-country-pair exposure to changes in product-specific FDI regulation as an instrumental variable. We expect FDI flows to decline in response to a regulatory tightening not only at the firm level (Genthner and Kis-Katos, 2022), but also at the level of district-country pairs. In the framework of a two-stage least squares regression, we estimate the following two stages:

$$FDI_{dct} = \beta_0 + \beta_1 REI_{dct} + \beta_2\, t \times \overline{REI}_{dc0} + \mu_{dt} + \theta_{ct} + \phi_{dc} + \upsilon_{dct}, \tag{1.4}$$

$$Mig_{dct} = \alpha_0 + \alpha_1\, \widehat{FDI}_{dct-1} + \alpha_2\, t \times \overline{REI}_{dc0} + \mu_{dt} + \theta_{ct} + \phi_{dc} + \varepsilon_{dct}, \tag{1.5}$$

where FDI_{dct} refers again to the inflow of foreign direct investment in district d, from country c in year t. The regulatory exposure index REI_{dct} is a Bartik (1991)-style shift-share instrument, expanded by a dyadic component, the construction of which is described in equation (1.2). We include all possible combinations of fixed effects in the first stage similarly to equation (1.3). On the top of that, in our full specification, we include a measure of the initial average regulatory exposure index during the time period 2000 to 2005, $\overline{REI}_{dc0}$, interacted with the time trend t.

This approach allows us to exploit changes in the observed bilateral FDI flows that have resulted from changes in the sector-specific regulation of the NIL. The combination of the shift-share approach with the set of fixed effects provides a valid instrumental variables strategy. It is difficult to imagine a scenario in which product-specific FDI regulation would directly target migration from district d to destination country c. More likely, a host of other political economy factors will affect each district-destination country pair's exposure to regulation. On the one

hand, regulations may aim at protecting selected domestic industries. **?** show that the strengthening of the NIL in 2007 targeted more strongly products with a presence of large "national champions" as well as recently privatized sectors. On the other hand, investment policies could also be affected by political (mis-)alignment between Indonesia and its partner countries, so that the NIL may be framed to (de-)regulate sectors in which one partner country invests more than others. The presence of district-year and country-year fixed effects should capture any intention of policy-makers to protect specific Indonesian firms or regions or to target specific countries. We control for the possibility that districts with high or low exposure to FDI regulation might follow differential time trends by including the interaction between initial regulation and time trend. By that, we make sure that our results are not driven by differential trends across district-country pairs that are spuriously correlated with the initial location of dyadic FDI. In the robustness section, we plan to present further evidence in favour of our identification approach and discuss remaining identification issues.

The large number of fixed effects does not permit us to use the instrumental variable version of the PPML estimator due to the incidental parameter problem. For the sake of comparison though, we report partial model results also in the PPML setting. We run the first stage equation (1.4) using the PPML estimator with high-dimensional fixed effects (Correia et al., 2019), and also provide second-stage estimates that rely on a control function approach (see the robustness section).

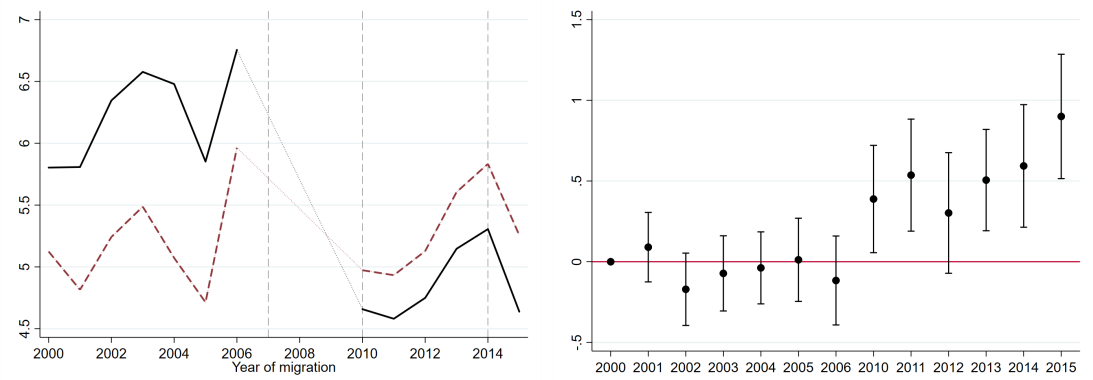
5 Results

5.1 Baseline results

We start the analysis with a reduced form estimation to provide evidence of the direct effect of changes in the dyadic exposure to FDI regulation on international migration. Figure 1.3a displays average emigration flows within dyadic origin district-destination country pairs that were relatively more and less exposed to increases in the FDI regulation. We split all dyadic pairs in the sample into those with low and high regulatory exposure (above/below median), based on their average REI between 2000 and 2015. The graph shows that the two groups follow similar trends before the first wave of regulatory tightening in 2007, with district-destination pairs with low regulatory exposure experiencing higher emigration than high-REI pairs. In the aftermath of the two waves of regulatory tightening, 2007 and 2010, the trend is reversed, with high-REI dyadic pairs experiencing larger out-migration

flows than low-REI pairs. Figure 1.3b shows the estimated conditional difference between the two average lines. Following our regression specifications (eq. 1.3), it controls for origin district-time fixed effects, country of destination-time fixed effects and dyadic (district-country pair) fixed effects. This test shows that the difference between high-REI and low-REI dyadic pairs is not statistically significant in the years before 2007, while turning positive and statistically significant after 2010. Thus, dyadic pairs with high regulatory exposure experience substantially larger emigration after the protectionist FDI policy reforms.

Figure (1.3) Average migration flows among low and high REI pairs



(a) Average migration flows (b) Estimated differences

Notes: Panel (a) displays average migration flows for district-destination country pairs that were less vs. more exposed to FDI regulation in the aftermath of the 2007 reform, with low REI (black solid line) and high REI (red dashed line). The split is based on the median of average REI per district calculated over the years 2000 to 2015. REI refers to the regulatory exposure index, constructed as in equation (1.2). Panel (b) shows the estimated differences in the migration flows between high REI and low REI districts, conditional on origin district-year, destination country-year and dyadic (district-country pair) fixed effects. Standard errors are clustered at the district level. Yearly migration flows in both panels are transformed with the inverse hyperbolic sine. Years in the sample are from 2000 to 2006 and from 2010 to 2015.

Table 1.C.3 confirms the visual evidence from Figure 1.3a and 1.3b by regressing dyadic migration flows on a continuous measure of REI on bilateral migration flows. Column (1) and (2) rely on the entire sample, including 2005, 2006 and the years from 2010 to 2015, whereas column (3) includes only the long-difference results from 2006 to 2015. All columns display a positive and significant link between the regulatory effectiveness index and emigration. The full sample and most conservative estimation is presented in column (2), which, in addition to the fixed effects, controls for time trends multiplied with initial REI. In column (2), one standard deviation increase in the REI increases migration flows by about 14 percent, which is of substantial economic magnitude.

The reduced form estimation, however, does not provide the full picture of the

direct link between FDI flows and emigration. To focus on this effect, we implement a two-stage least squares estimation (2SLS) with a Bartik (1991)-type of shift-share instrument as described in equations (1.4) and (1.5). Table 1 displays the results for all years and long differences just as Table 1.C.3. Columns (1) and (2) show the dyadic correlation coefficients estimated with an OLS model from equation (1.3).

Table (1.1) Dyadic effects of FDI on migration flows

Dependent	*asinh* Migration flows (t)				
	OLS		IV		
	(1)	(2)	(3)	(4)	(5)
asinh FDI flows ($t-1$)	0.005	0.005	-0.410***	-0.403***	-0.226**
	(0.004)	(0.009)	(0.154)	(0.141)	(0.089)
			First stage		
REI ($t-1$)			-0.110***	-0.122***	-0.271***
			(0.033)	(0.033)	(0.060)
KP F-statistic			11.13	13.51	20.26
Sample years	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	No	No	Yes	Yes
Observations	29760	7440	29760	29760	7440

Notes: Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. The full sample includes the years 2005, 2006 and all years between 2010 and 2015, further samples include only the long difference results from 2006 to 2015. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Columns (3) to (5) show the results of the IV model, which fully captures the remaining endogeneity resulting from the time-varying reverse causality at the dyadic level. Column (4) and (5) control for initial REI time trends.[5] First, in line with **?**, we show that tightening investment regulation reduces foreign direct investment significantly. The coefficients from the first stage regression in equation (1.4) in column (4) imply that an increase in REI by one standard deviation leads to a decline in FDI by about 36% (-0.12×2.98). The second stage results show that migration is inversely related to inflowing FDI, with an elasticity between -0.23 and -0.41.

[5]Coefficients of the initial REI time trends in the first and second stage are reported in Table 1.C.10 in the Appendix.

Within the most conservative estimation in column (4), this means that a 10% decrease in FDI from country c to district d due to stricter FDI regulation implies an increase of around 5 migrants per district going to country c. This magnitude is considerable compared to the literature on the effect of migration on FDI, which estimates positive elasticities whenever migrants are found to be complementary to FDI in the range of 0.054 (Mayda et al., 2020) to 0.42 (Javorcik et al., 2011), and negative elasticities of -0.14 (Glennon, 2020) to -0.24 (Ottaviano et al., 2018), when migration and FDI are found to be substitutes.

5.2 Identification and robustness issues

In equation (1.1), we proxy the magnitude of local regulatory penetration by weighting it by initial employment. In this way, we are able to capture the relative importance of regulated firms within the district-level manufacturing labour market. However, one could argue for alternative proxies of local market conditions. We thus construct an alternative index, similar to equation (1.1), based on the initial capital stock:

$$Reg_{dt} = \sum_{i} \frac{K_{igd0}}{K_{d0}} Reg_{gdt}, \tag{1.6}$$

where Reg_{gdt} is again determined at the firm-group level g and takes the value of one in the years in which firms of group g were regulated and zero otherwise. K_{igd0} is the initial capital stock by each firm i belonging to group g in the district d, normalized by the initial total capital stock of manufacturing firms in the district, K_{d0}. As in equation (1.1), initial values (t=*0*) refer to the years 2000-2005. Table 1.C.9 shows that the first stage coefficients are similar to Table 1. At the same time, the full-sample second stage estimation presents a slightly smaller elasticity, although negative and still statistically significant at 5%.

The baseline results in Table 1 transform migration and FDI flows using the inverse hyperbolic sine transformation, which allows for the inclusion of district-country pairs with zero FDI or migration and provides elasticity estimates by a linear estimator. Table 1.C.5 presents alternative results using a PPML model, which accounts for the large number of zeros in dyadic values more directly. While the PPML estimator is widely used in the gravity setting, the extensive fixed effects do not allow for consistent estimation of the PPML in a 2SLS-model due to the incidental parameter problem.[6] In order to check at least partially whether our

[6] Jochmans and Verardi (2022) show that it is possible to use two-way fixed effects with instrumental variables in a cross-sectional setting without suffering from incidental parameters issues. Similarly, Weidner and Zylkin (2021) provide evidence that PPML with three-way fixed effects

results are robust to estimation by PPML, we present two further sets of results. Panel A reports only the first stage results, regressing FDI flows on the regulatory exposure index by PPML instead of a linear model. Despite the large drop in the number of observations, the PPML coefficients in the first stage remain negative and significant at the 1% level. The magnitude of the PPML estimators is always higher than that of the linear ones in Table 1. Under the assumption that PPML estimations are closer to true elasticities than OLS (Silva and Tenreyro, 2006), this would make our linear first-stage results more conservative than those relying on PPML. Panel B presents further suggestive evidence in the 2SLS setting, ignoring the incidental parameter problem. Our alternative instrumental variables strategy estimates the first stage in a linear model, regressing the inverse hyperbolic sine of FDI flows on REI, whereas the second stage runs a PPML with a basic control function method, introducing the residuals from the linear first stage as a further control (Cameron and Trivedi, 2013). The resulting elasticities are similar in sign and magnitude as with the linear model, but are not statistically significant. As we do not expect these estimations to be fully consistent, we provide these results only for illustrative purposes.

A third group of robustness checks is related to the measurement of dyadic migration flows by the use of several micro-sources of migration data. As dyadic migration flows before the regulatory revisions in 2007 (*Susenas* and *Podes*) are differently imputed than migration flows after the revisions (*Supas*), we ensure that changes in the measurement do not drive our results. Since *Susenas* and *Supas* are both similarly fielded household surveys that are representative at the district level, we do not expect to see major structural differences in the sampling of migrants. However, as *Supas* asks for destination countries directly whereas for *Susenas* we impute the relative shares of destination countries by combining it with village data on the primary destination from *Podes*, this could still result in structural differences in how we measure dyadic migration flows. Our fixed effects strategy largely absorbs biases that are due to time-variant measurement errors that affect whole districts or destination countries. District-year fixed effects control for under or over-sampling of migrants in the various micro data sources as well as recall biases in the constructed panel data in any specific district d over time. Country-year fixed effects account for country-specific variations in sampling. In our data, this for instance applies for the group of "other" destination countries, which is

provides consistent estimations. However, in a setting with PPML, the use of an instrumental variable and three-way fixed effects still suffer from the incidental parameters problem (Santos Silva and Tenreyro, 2022).

more likely to be under-sampled in 2005 and 2006 in *Podes* (see the data Appendix for a more detailed explanation). As long as this bias is common to all districts, this will be accounted for with the use of country-year fixed effects.

We provide two additional tests that show that our results are robust on how migration is constructed. First, we combine *Podes*-derived stocks of total migrants per district with *Supas* destination shares in order to obtain dyadic migration flows for the years after 2005.[7] Table 1.C.6 displays the estimation results relying on dyadic stocks imputed from *Podes* and *Supas* data. As stocks of migrants in *Podes* are collected only every three years, in these models we lag FDI and REI by taking their average over three previous years. This makes the estimation more precise and better captures the different time dynamic of three-year periods rather than years. The results show negative and statistically significant coefficients both at the first and the second stage. To make the two different migration outcomes comparable, in Table 1.C.11 we also restrict our baseline regression on migrant flows to the same sampled years as in Table 1.C.6 (2005, 2008 and 2011) and we apply the same lagging procedure to FDI and REI. With the exception of column (6), the second stage results in the two tables present similar coefficients.

In a second test, we construct alternative migration flows by keeping the composition of migrant flows by destination country at the district level constant between the two time periods. For this purpose, we exchange our migration flow estimates by migration flow data that we impute by assigning constant migration shares derived from one survey to the other survey using the following approach:

$$MIG_{dct}^{Supas} = MIG_{dt}^{Supas} \times \sum_{s=2005}^{2006} \frac{MIG_{dcs}^{Susenas}}{MIG_{ds}^{Susenas}}, \tag{1.7}$$

where MIG_{dct}^{Supas} denotes the estimated flow of international migrants in year t (from 2010 to 2015), who are originally from district d and moved to destination country c. In equation (1.7), we derive emigration shares to each country within a district from *Susenas* in 2005 and 2006, and convert total district emigration flows measured in later years (2010 to 2015) in *Supas* into district-destination country flows using constant past country shares within each district.

Columns 1 to 3 apply constant shares of migrants to destination country c, calculated as the average share from *Susenas* in 2005 and 2006, combined with the respective yearly total emigration flows from Indonesia. Column 4 to 6 apply constant shares of migrants to destination country c from *Supas* (mean over the

[7] The linking procedure between *Podes* and *Supas* is described in detail in the Appendix.

years 2010 to 2015) to the respective yearly total emigration flows. All coefficients in Table 1.C.7 are negative and significant, though lower in magnitude.

Finally, we further check that our results are not driven by any single country. Table 1.C.8 iteratively excludes each destination/investor country. Across all columns, the effect of FDI on migration is negative and significant at least at the 5% level, generally with the same magnitude as the baseline result, although two out of twelve models result in weaker first stages. Column (1) and column (2) are the only two estimations where elasticities deviate somewhat more from those estimated at the baseline.

5.3 Heterogeneity and discussion

The micro nature of our migration data allows us to differentiate migration flows according to diverse socio-economic factors such as differences in educational attainment or urban or rural village of origin. Table 1.2 shows the heterogeneous effects of FDI on migration. Column 1 repeats the baseline results relying on all migrants. Columns 2 to 4 restrict the sample separately to migrants with primary, secondary and tertiary education. We proxy migrants' education by assigning them their households' maximum attained education level. Columns 5 and 6 restrict the sample to migrants from rural villages and urban precincts. Results in table 1.2 suggest that individuals with higher educational attainments and, to some degree, from cities, are more reactive to a decrease in FDI.

There are a number of potential reasons for these findings. First, employees in management positions in multinational enterprises (MNEs) can be more easily moved across subsidiaries and parent companies. This is a likely event when multinationals are forced to reduce their planned investments under NIL restrictions and maybe even close some of their branches. This is in line with the substitution effect being strongest in the dyadic setting for migrants with tertiary education.

A second possible hypothesis is that after protectionist FDI measures, MNEs could increase the demand for local skilled workers in their source country to keep skill-specific ties such as local business culture and language skills, with the aim of maintaining access to local Indonesian markets. Since emigration from Indonesia is partly organized through local recruitment agencies fulfilling recruitment commissions of foreign firms on demand, one would expect MNEs to rely on the local recruitment infrastructure within their district of activity when hiring migrant workers from Indonesia.

Third, individuals acquire information, knowledge and technical expertise from

Table (1.2) Heterogeneities: Splitting migration by household type

Dependent	*asinh* Migration flows (t)					
	All	By education			By rural/urban	
	(1) Total	(2) Primary	(3) Second.	(4) Tertiary	(5) Rural	(6) Urban
asinh FDI flows ($t-1$)	-0.403***	-0.168*	-0.144*	-0.323***	-0.191*	-0.274***
	(0.141)	(0.099)	(0.082)	(0.113)	(0.097)	(0.102)
District-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Initial REI trend	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All columns have 29,760 observations and are estimated by a 2SLS model. The first-stage KP F-statistic is of 13.51. Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. Column 1 shows the effect of FDI on all type of migration flows. Column 2 restricts the dependent variable to migrants from a household in which the highest education achievement is primary or less, secondary (column 3) or tertiary (column 4), from a rural village (column 5) and from an urban precinct (column 6). The explanatory variable is the inverse hyperbolic sine of bilateral FDI, its first stage instrument is the Regulatory Exposure Index, defined in the text. Years in the sample are 2005, 2006 and 2010-2015. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

MNEs that they can utilize in foreign labour markets, which in turn reduces their bilateral costs of migration. Studies on the effect of FDI on technological and knowledge spillovers in Indonesia find that it is positive towards upstream industries (vertical backward spillover) (Blalock and Gertler, 2008; Genther, 2020), from R&D performing foreign-owned firms (Todo and Miyamoto, 2006), and within intra-sectoral firms (Genther, 2020). In districts with large multinational manufacturing firms, individuals may thus react to the loss in economic opportunities by migrating to the MNEs' headquarters' countries. In our setting, reduced FDI flows due to NIL regulations amount to shocks within the local supply-chain as there is a relative reduction in the economic influence of the MNEs. This in turn decreases the local within-industry trade and business opportunities with MNEs. The combination of a reduced technological gap from MNEs and the shock from a drop in FDI will raise the likelihood of bilateral migration especially for high-skilled individuals.

Although we cannot always directly measure these potential channels, we can infer their likelihood based on our setting. Measuring the first hypothesis of a transfer of employees across enterprises would require an Indonesian dataset with detailed information about MNE employees' transfers, whose existence we are unfortunately

not aware of. However, it is difficult to imagine this channel to play a major role in our estimations as only a handful of top managers move freely across countries and most managerial positions of MNEs are not occupied by locals, which cannot explain the average dyadic migration flow of 24 individuals with tertiary education (see Table 1.C.2).

The second hypothesis on firms' increased demand for local workers may apply more easily to our multi-country setting, in which variation arises from comparing dyadic pairs with different levels of regulatory penetration.

Finally the third hypothesis can be partially tested by further dis-aggregating our regulatory effectiveness index (REI) by distinguishing between sectors of different technology intensity, based on firms' global research and development activity. Similarly to **?**, we expect FDI to drop more heavily in reaction to regulation targeting firms in high-tech sectors. Following this first stage, the technological and innovation heterogeneity of a decrease in FDI be can have different impacts on the mobility of workers with tertiary education. If the third hypothesis is true, skilled migrants would be more reactive to a drop in high-tech FDI than an investment drop in low-tech sectors.

6 Conclusion

Despite a global rise in absolute FDI flows, there has been an increasing trend of national protectionist measures that restricted FDI inflows during the past decades. These policies had the main objective to protect strategically important sectors from further foreign investment flows. However, according to standard trade theory, the consequential changes in bilateral flows of capital are also expected to have unintended, direct impacts on bilateral flows of people.

This paper is among the first to causally identify the effect of exogenous changes in FDI flows on international migration within a dyadic framework. By focusing on the dyadic nature of capital and migration flows, we are able to disentangle linkage and information channels from general development effects of foreign investments.

Focusing on Indonesia as a case study that reflects well the global trends in FDI flows and that is a primary source country of migrants in the ASEAN region, the analysis of this paper relies on regulatory policy changes implemented in a so-called Negative Investment List issued by the Indonesian government during the years 2007 to 2014. The product-specific FDI policy restricted investment flows to specific sectors at a highly granular, 5-digit level. Using a shift-share approach that is based both on the initial sectoral composition of each district and on the

attractiveness of each district to receive FDI flows from a specific source country of investment, we measure the district-country-pair-level exposure to this sector-specific tightening of FDI. By relying on this measure as an instrument for dyadic FDI flows, we analyze the effect of exogenous changes in capital flows from each source country on changes in international emigration to the very same country as a destination choice.

We document that relative reductions in dyadic FDI inflows after the reform were causing an increase in dyadic emigration, thereby pointing to a substitution relationship between FDI and migration that had already been suggested by standard trade theory. In districts where bilateral FDI flows have been effectively reduced after the regulatory reforms of the NIL, migration outflows to the same partner countries have increased. This observation suggests that previously established linkage effects between a source country and destination district play a major role in the transmission of information or destination-specific skills (e.g. language skills, cultural knowledge), thereby lowering the costs of emigration within this particular dyadic link. The effect is particularly strong among households with tertiary education.

Given the high policy interest in the link between capital and labour flows, our results suggest that FDI protectionism can not only have direct consequences on capital flows, but also causes a rise in high-skilled emigration to the country of origin from which investments stemmed in the past.

Appendices

1.A Data sources

Supas (*Survei Penduduk Antar Sensus*, National Intercensal Survey) is a survey collected in-between the decadal census rounds. It is sampling 2% of the Indonesian population, and is representative at the level of Indonesian districts. In 2015, the survey records if any household member has migrated internationally since 2010, their year of migration as well as country of destination. We use this information to construct a dyadic panel of total migration flows, consisting of district-destination country pairs for the years 2010 to 2015.

Susenas (National Socioeconomic Survey) is a yearly socioeconomic survey representative at the level of Indonesian districts, surveying nearly 10,000 households in 670 villages. We use the waves collected in 2005 and 2006. The precise question related to migration is "Is there a household member/former household member who is working/ever worked abroad (as *TKI)*? If yes, since which year?

Podes (*Potensi Desa*, Village Potential Statistics) is a census of Indonesian villages—the fourth and lowest administrative unit—collected at 2 to 4 year intervals. Our main analysis relies on the census round from 2005. In 2005 the were 12,274 urban precincts and 57,560 rural villages in Indonesia.

Podes contains information about the number of international labour migrants disaggregated by gender, and rural/urban status. For the 2005 wave, it also names the main country of destination per village, which we use to construct a measure of past migrant linkages.

SI (*Survei Industri*, the Indonesian Manufacturing Survey) is a yearly census of all manufacturing plants that have at least 20 employees. Among others, the census records the main product of each plant as well as general balance sheet data. It reports the value of assets and sales, which determine whether the firm can be considered as large, foreign ownership shares and partnership status, all of which we use to define firm types for measuring regional regulatory exposure. It also reports employment numbers (divided into white and blue collar employees). To generate our regulatory exposure index, we use all yearly waves between 2000 and 2015 of SI.

BKPM We measure the volume of yearly FDI inflows to Indonesian districts in the manufacturing sector based on data provided by the Indonesia Investment Coordinating Board (*Badan Koordinasi Penanaman Modal, BKPM*), a government agency responsible for the coordination and promotion of domestic and foreign investment. Among its mandates, BPKM is in charge of "Providing licensing services and investment facilities [...] archiving, data and information processing (BKPM, 2020). BPKM thus collects data on all foreign companies that invest in Indonesia. The publicly available aggregated data contain information about the volume of investment by district name, dis-aggregated by the year of investment, source country and a 2-digit industry code.

Source: BKPM, *National Single Window for Investment (NSWI)*, available at https://nswi.bkpm.go.id/data_statistik.

NIL (Negative Investment List, *Daftar Investasi Negatif*)

1.B Merging and data manipulation procedures

Geo-coding BKPM data BKPM data do not provide district codes as other official Indonesian data sources, but only their most recent names. This is problematic because of frequent district splits and changes in names over time. For this reason, in absence of district codes, we geocoded district names with Google API, took their centroid, merged to the 2000 district shapefiles and assign unique codes to them. A further manual check confirmed that districts names have been correctly assigned given their code in 2000.

Cleaning BKPM data The analysis relies on official yearly FDI flows to the Indonesian manufacturing sector. Additionally, due to the dyadic nature of our analysis, we drop FDI flows from unknown source countries and from tax havens according to the OECD2000 list.

Linking Susenas and Podes We merge the 2005 and 2006 waves of Susenas with Podes from 2005 at the village level, relying on common village identifiers. From Podes, we use the main destination country for each village, which we impute as the main country of destination for each household in that village that reported having an international migrant who left the household in the given year.

Linking Supas and Podes We merge *Podes* and *Supas* at the district level. For the years after 2005, we impute migration flows for each district-destination country pair MIG_{dct} as the following:

$$MIG_{dct} = MIG_{dt}^{Podes} \times \frac{MIG_{dct}^{Supas}}{MIG_{dt}^{Supas}} \tag{1.8}$$

where MIG_{dct} denotes the estimated stock of international migrants in year t who are originally from district d and moved to destination country c.

We rely on the census years t = 2011 and 2014, c stands for the destination country, and d for the district. For 2011 and 2014, we use the shares of migrants to destination country c from *Supas* (the right-hand side term) interacted with the total stocks of migrants per district from *Podes*. For 2005 we simply use the dyadic stocks from *Podes*.

1.C Tables

Table (1.C.1) Estimated number of migrant flows by country of destination

Destination	Year 2005	2010	2015
Malaysia	294,451	106,055	119,363
Singapore	34,923	11,955	19,156
Taiwan	11,551	11,740	22,474
Hong Kong	68,204	10,512	9,479
South Korea	4,106	3,829	6,814
Japan	424	3,372	5,542
Saudi Arabia	193,296	45,450	19,940
United Arab Emirates	5,542	2,819	3,753
Kuwait	1,638	2,391	629
Jordan	0	1,834	0
United States	3,344	2,357	4,473
Others	5,718*	22,805	26,062
Totals	623,197	225,119	237,685

Note: Total migration outflows by destination country, in 2005, 2010 and 2015. Estimates for 2010 and 2015 are based on Supas, for 2005 on Podes and Susenas. * Data from 2004.

Table (1.C.2) Summary statistics

	Mean	St. Dev.	Min.	Max.
Migration outflows	125.985	1210.981	0	60561
asinh Migration outflows	0.895	2.231	0	11.705
Migration outflows: Primary	40.963	510.292	0	38942
asinh Migration outflows: Primary	0.367	1.478	0	11.263
Migration outflows: Secondary	61.186	546.257	0	27812
asinh Migration outflows: Secondary	0.611	1.861	0	10.926
Migration outflows: Tertiary	23.837	345.922	0	23157
asinh Migration outflows: Tertiary	0.309	1.319	0	10.743
Migration outflows: Rural areas	77.439	891.335	0	44756
asinh Migration outflows: Rural areas	0.520	1.759	0	11.402
Migration outflows: Urban areas	38.306	433.086	0	27280
asinh Migration outflows: Urban areas	0.437	1.575	0	10.907
FDI inflows (in 1,000 $)	3306.272	4.24E+04	0	2.68E+06
asinh FDI inflows	1.801	5.005	0	22.403
Regulatory Effectiveness Index (REI)	0.760	2.975	0	32.387

Notes: $N = 29,760$ for all variables.

Table (1.C.3) Reduced form effects of regulation on migration flows

Dependent	*asinh* Migration flows (t)		
	(1)	(2)	(3)
REI($t-1$)	0.045***	0.049***	0.061***
	(0.012)	(0.011)	(0.019)
Sample years	All	All	06/15
District-Time FE	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes
Initial REI trend	No	Yes	Yes
Observations	29760	29760	7440

Notes: Migration and is transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index", the construction of which is described in the text. The full sample includes the years 2005, 2006 and all years between 2010 and 2015 (column 1), further samples include only the long difference results from 2006 to 2011 (column 2) or 2006 to 2015 (column 3). All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.4) Robustness: REI weighted by capital shares

Dependent	*asinh* Migration flows (t)				
	OLS		IV		
	(1)	(2)	(3)	(4)	(5)
asinh FDI flows ($t-1$)	0.005	0.006	-0.265**	-0.269**	-0.195**
	(0.004)	(0.009)	(0.105)	(0.104)	(0.080)
			First stage		
REI ($t-1$)			-0.093***	-0.095***	-0.203***
			(0.026)	(0.026)	(0.042)
KP F-statistic			12.95	13.12	23.63
Sample years	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	No	No	Yes	Yes
Observations	27624	6888	27624	27624	6888

Notes: Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. Here we replace capital to labour in the contruction of REI. The full sample includes the years 2005, 2006 and all years between 2010 and 2015, further samples include only the long difference results from 2006 to 2011 or 2015. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.5) Robustness: PPML and IV approaches

(a) Panel A: First Stage with PPML

Dependent	FDI flows $(t-1)$		
	(1)	(2)	(3)
REI $(t-1)$	-0.163***	-0.157***	-0.385***
	(0.044)	(0.034)	(0.107)
Sample years	All	All	06/15
District-Time FE	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes
Observations	6,965	6,965	710
Wald $\tilde{\chi}^2$	13.98	22.99	21.31

(b) Panel B: 2SLS Control function with linear first stage and PPML second stage

Dependent	*asinh* FDI flows $(t-1)$			Migration flows		
	First Stage			2nd Stage		
	(1)	(2)	(3)	(4)	(5)	(6)
REI $(t-1)$	-0.110***	-0.122***	-0.271***			
	(0.033)	(0.033)	(0.060)			
asinh FDI $(t-1)$				-0.445	-0.358	-0.267
				(0.292)	(0.223)	(0.261)
Residuals				0.465	0.378*	0.319
				(0.291)	(0.223)	(0.258)
Sample years	All	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	Yes	Yes	No	Yes	Yes
Observations	29760	29760	7440	9530	9530	1118

Notes: Panel A displays the coefficient of a PPML estimator, with FDI $(t-1)$ in levels. Panel B displays a 2SLS model with a basic control function approach. The first stage in column 1 to 3 rely on a linear estimator FDI transformed with hyperbolic sine. The residuals are plugged into the second stage (column 4 to 6). The second stage is estimated with a PPML model, with migration flows in levels. REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. The full sample includes the years 2005, 2006 and all years between 2010 and 2015, further samples include only the long difference results from 2006 to 2011 or 2015. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.6) Dyadic effects of FDI on migration stocks

Dependent	*asinh* Migration stocks (t)				
	OLS		IV		
	(1)	(2)	(3)	(4)	(5)
asinh FDI flows ($t-1$)	-0.004	-0.017*	-0.266**	-0.250***	-0.227**
	(0.007)	(0.010)	(0.106)	(0.095)	(0.097)
			First stage		
REI ($t-1$)			0.202***	-0.224***	-0.227***
			(0.048)	(0.047)	(0.053)
KP F-statistic			17.36	22.46	18.28
Sample years	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	No	No	Yes	Yes
Observations	29760	7440	29760	29760	7440

Notes: Dyadic migration stocks are based entirely on *Podes* in 2005, and combine total migrant stocks from *Podes* in 2011 and 2014 with district-destination shares from 2011 and 2014 *Supas*. Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. FDI and REI are lagged by taking their average of the three previous years. The full sample includes the years 2005, 2011 and 2014. Further samples include only the long difference results from 2005 to 2011 or 2014. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.7) Robustness: different migration shares

Dependent	*asinh* Migration flows (t)					
	Susenas shares			Supas shares		
	(1)	(2)	(3)	(4)	(5)	(6)
asinh FDI flows ($t-1$)	-0.097**	-0.085*	-0.072**	-0.354***	-0.353***	-0.174**
	(0.049)	(0.044)	(0.035)	(0.136)	(0.125)	(0.078)
Sample years	All	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	Yes	Yes	No	Yes	Yes
Observations	29760	29760	7440	29760	29760	7440
1st stage KP F-stat	11.14	13.51	20.26	11.14	13.51	20.26

Notes: Migration and FDI are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index", the construction of which is described in the text. The full sample includes the years 2005, 2006 and all years between 2010 and 2015 (column 1), further samples include only the long difference results from 2006 to 2011 (column 2) or 2006 to 2015 (column 3).
Column 1 to 3 apply the mean of shares of migrants to destination country c from Susenas 2005 and 2006 interacted with the total stocks of migrants per district from Supas for the years 2010-2015. Column 4 to 6 apply the mean of shares of migrants to destination country c from Supas (2010-2015) interacted with the total stocks of migrants per district from Susenas for the years 2005 and 2006. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.8) Robustness: IV baseline regression iteratively excluding destination/investor countries

Dependent	*asinh* Migration flows (t)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
asinh FDI ($t-1$)	-0.286***	-0.520**	-0.405**	-0.453***	-0.457***	-0.446***	-0.410***	-0.371***	-0.341***	-0.354***	-0.470***	-0.411**
	(0.0964)	(0.225)	(0.167)	(0.170)	(0.155)	(0.150)	(0.134)	(0.136)	(0.123)	(0.129)	(0.177)	(0.193)
District-Time FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country-Time FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
District-Country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Initial REI trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Excluded country	MWI	SGP	TWN	HKG	KOR	JPN	SAU	UAE	KWT	JOR	USA	Others
Observations	27280	27280	27280	27280	27280	27280	27280	27280	27280	27280	27280	27280
First-stage KP F-stat	22.12	6.929	10.03	11.12	13.83	12.98	14.11	13.56	14.51	14.27	10.67	8.194

Notes: All columns report the second stage of a 2SLS model. Each column excludes one destination/investor country. Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.9) Dyadic effects of FDI on migration: Two-way clustering

Dependent	*asinh* Migration flows (t)				
	OLS		IV		
	(1)	(2)	(3)	(4)	(5)
asinh FDI flows ($t-1$)	0.004	0.004	-0.354*	-0.353*	-0.174**
	(0.003)	(0.009)	(0.193)	(0.179)	(0.074)
			First stage		
REI ($t-1$)			-0.110***	-0.122***	-0.271***
			(0.043)	(0.047)	(0.070)
KP F-statistic			6.66	6.81	15.03
Sample years	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	No	No	Yes	Yes
Observations	29760	7440	29760	29760	7440

Notes: Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. The full sample includes the years 2005, 2006 and all years between 2010 and 2015, further samples include only the long difference results from 2006 to 2011 or 2015. Standard errors are clustered using two-way clustering at the district-country level (displayed in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.10) Baseline with initial REI's time trends

Dependent	*asinh* FDI flows $(t-1)$ First Stage			*asinh* Migration flows 2nd Stage		
	(1)	(2)	(3)	(4)	(5)	(6)
REI$(t-1)$	-0.110***	-0.122***	-0.271***			
	(0.033)	(0.033)	(0.060)			
$t \times \overline{REI}_{dc0}$		-0.019***	-0.042***		-0.001	-0.001
		(0.006)	(0.010)		(0.004)	(0.004)
asinh FDI flows $(t-1)$				-0.410***	-0.403***	-0.226**
				(0.154)	(0.141)	(0.089)
District-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Initial REI trend	No	Yes	Yes	No	Yes	Yes
Observations	29760	29760	7440	29760	29760	7440
KP F-statistic	11.35	13.51	20.26			

Notes: Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. $t \times \overline{REI}_{dc0}$ interacts initial REI values, taken as average REI between 2000 and 2005 for each dyadic origin district-destination country, with time trends. The full sample includes the years 2005, 2006 and all years between 2010 and 2015, further samples include only the long difference results from 2006 to 2011 or 2015. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table (1.C.11) Susenas + Supas using sample years from PODES

Dependent	*asinh* Migration flows (t)				
	OLS		IV		
	(1)	(2)	(3)	(4)	(5)
asinh FDI flows ($t-1$)	0.006	0.011	-0.314***	-0.289***	-0.313***
	(0.006)	(0.009)	(0.115)	(0.096)	(0.106)
			First stage		
REI ($t-1$)			-0.199***	-0.230***	-0.231***
			(0.046)	(0.044)	(0.049)
KP F-statistic			18.57	27.81	22.10
Sample years	All	06/15	All	All	06/15
District-Time FE	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	Yes	Yes	Yes	Yes
District-Country FE	Yes	Yes	Yes	Yes	Yes
$\gamma_t \overline{REI}_{dc0}$	No	No	No	Yes	Yes
Observations	11160	7440	11160	11160	7440

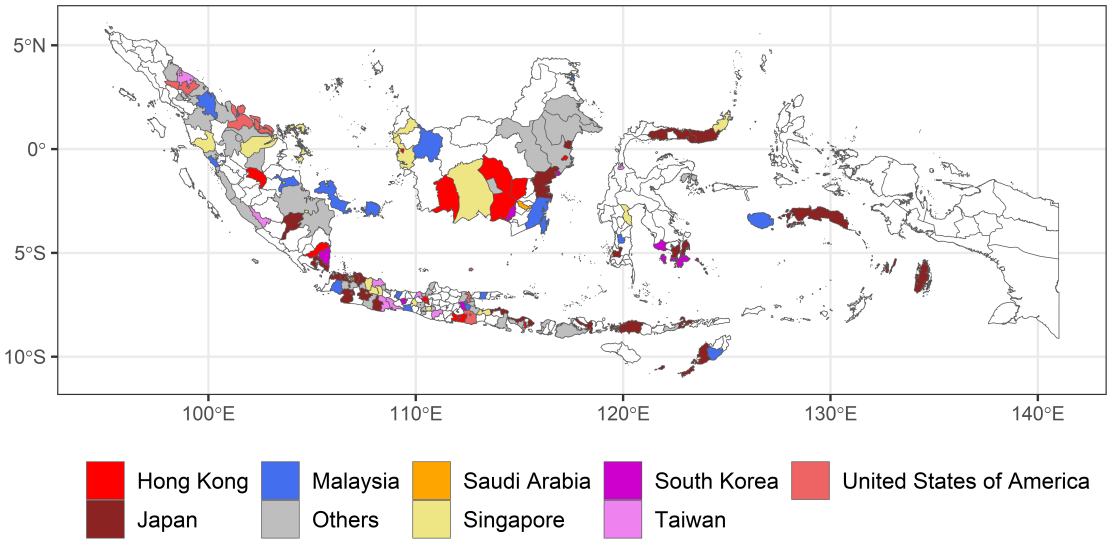
Notes Table to be compared with Table 1.C.6. Migration and FDI variables are transformed using the inverse hyperbolic sine transformation. "REI" stands for the "Regulatory Effectiveness Index" and its construction is described in the text. FDI and REI are lagged by taking their average of the three previous years. The full sample includes the years 2005, 2011 and 2014. Further samples include only the long difference results from 2005 to 2011 or 2014. All standard errors are clustered at the district level (in parentheses), significance levels are displayed as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

1.D Figures

Figure (1.D.1) Official statistics: Yearly FDI inflows and emigration flows

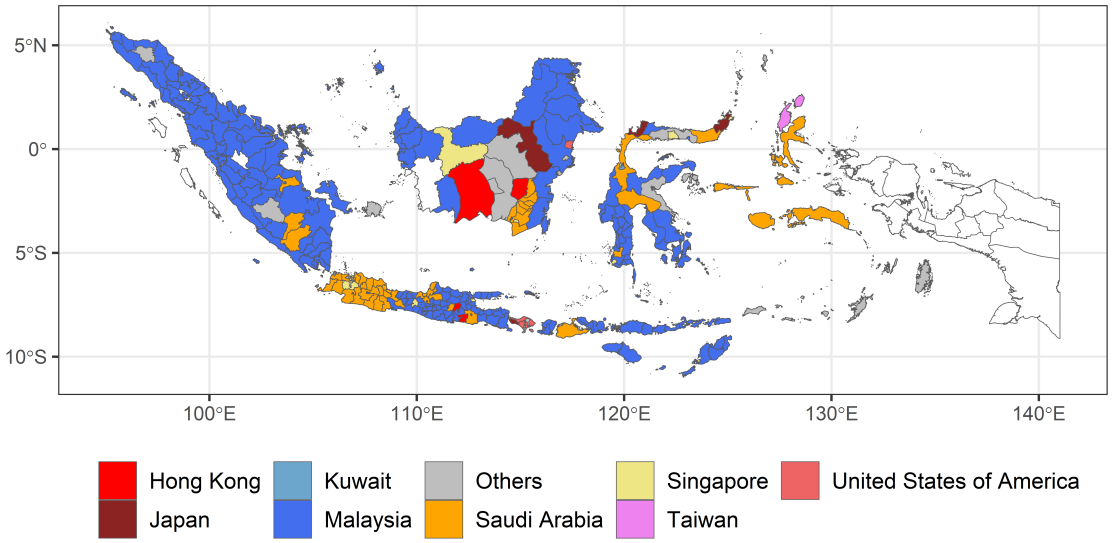
Notes: Yearly registered FDI flows to the manufacturing sector (black solid line) in billion US $ (source: BKPM) contrasted to yearly emigration flows according to the National Board for the Placement and Protection of Indonesian Oversaes Workers (BNP2TKI) (red dashed line) in thousand migrants.

Figure (1.D.2) Main country of investment per district in 2000-2005



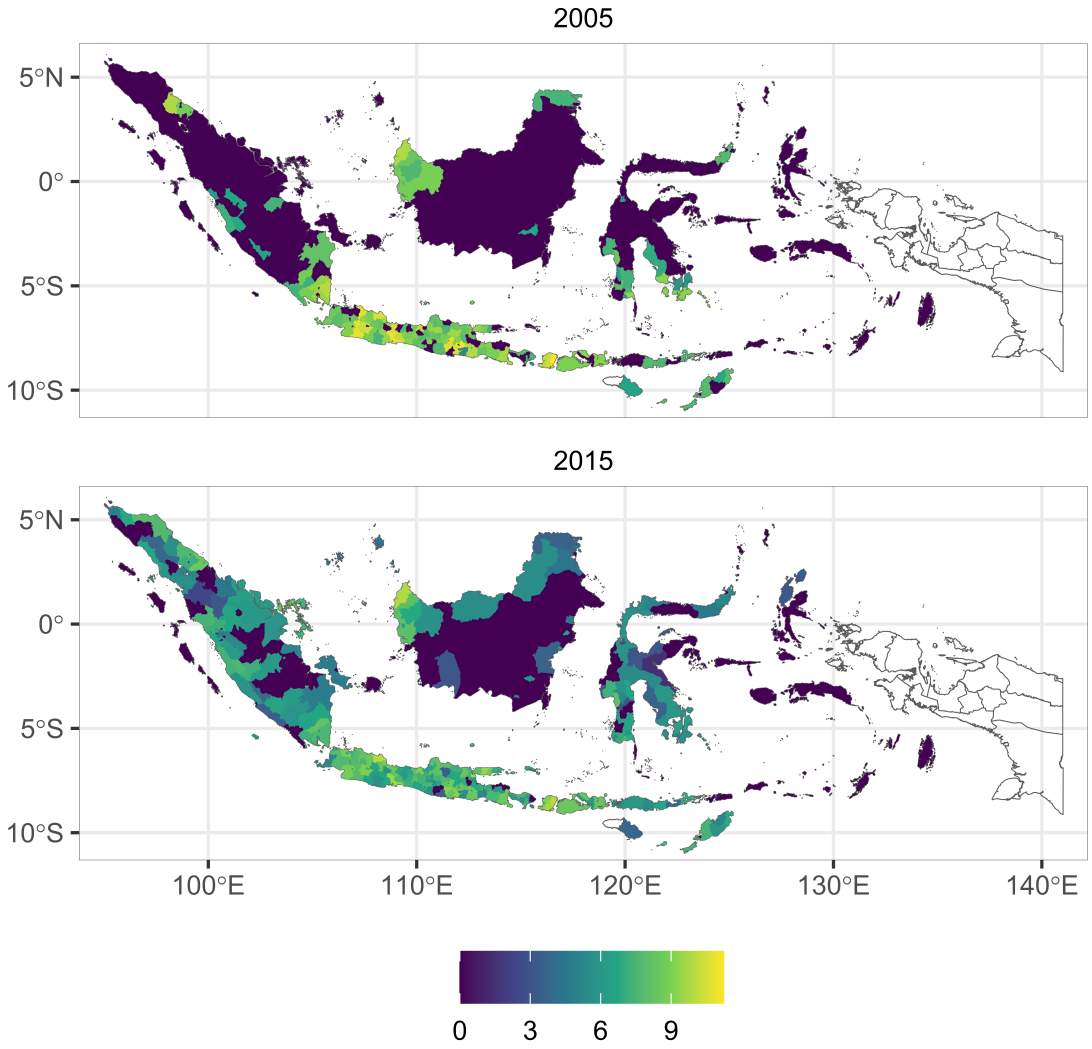
Notes: The map denotes the top investor country in each district, based on average FDI values over the years 2000 to 2005. White-coloured districts received null or negligible FDI in this period. The island of Papua has missing data.

Figure (1.D.3) Main destination country per district in 2000-2005



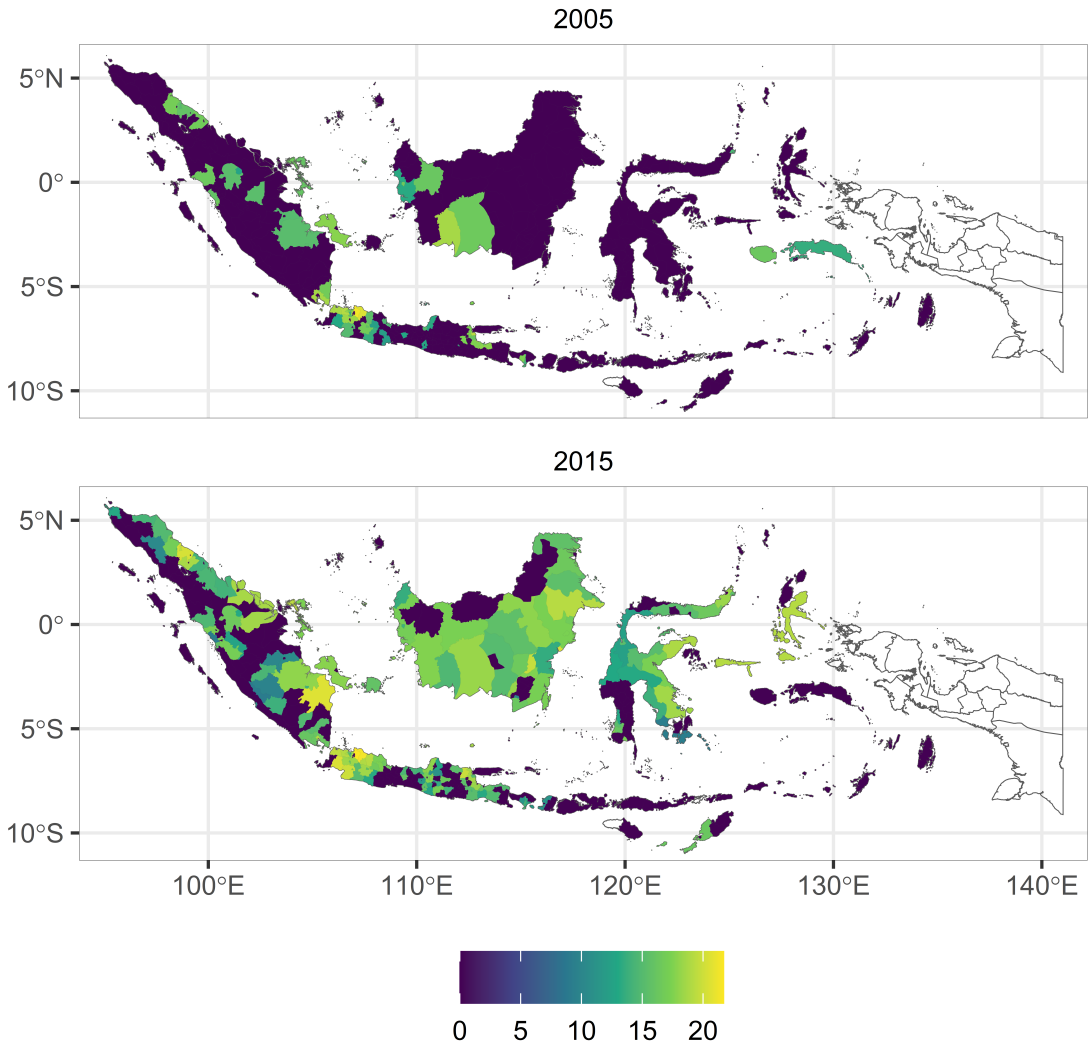
Notes: Top destination countries of for Indonesian migrants in 2005. White-coloured districts districts experienced null or negligible international emigration in this period. The island of Papua has missing data.

Figure (1.D.4) Migrants' outflow per district



Notes: Migration outflows in 2005 and 2015 are transformed using the inverse hyperbolic sine. Districts in white have missing data.

Figure (1.D.5) FDI inflow per district



Notes: The top panel displays average FDI inflows between 2000 and 2005, the bottom one FDI in 2015. FDI is transformed using the inverse hyperbolic sine. Districts in white have missing data.

Chapter 2

Confined to Stay: Natural Disasters and Indonesia's Migration Ban

Abstract

This paper investigates the effects of international migration restrictions on communities' capacity to absorb income shocks in the aftermath of natural disasters. We exploit the implementation of an emigration ban on Indonesian women as a natural experiment. After a series of violent assaults against female servants in Saudi Arabia, the Indonesian government issued a moratorium in 2011, thus preventing millions of women to migrate there as domestic workers. Relying on the exogenous timing of the ban and that of natural disasters, we estimate the causal effect of the absence of international migration as an adaptive strategy. We use a panel of the universe of Indonesian villages in a triple difference strategy to compare poverty levels in the aftermath of natural disasters in villages whose main destination is Saudi Arabia as opposed to others, before and after the policy shock. We find that in villages with strong ex-ante propensity to migrate to Saudi Arabia, poverty increases by 13% after the ban in face of natural disasters, further aggravating the already severe consequences induced by those events.

Keywords: Migration, natural disasters, Indonesia, migration ban

This chapter is co-authored with Lennart Reiners (University of Göttingen and KfW).

1 Introduction

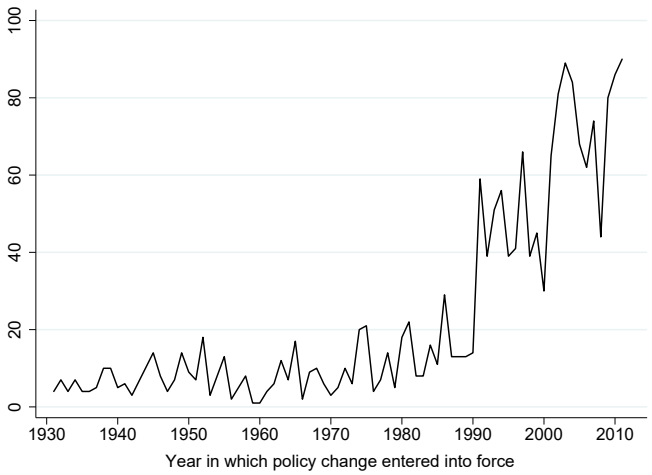
In the coming decades, climate change will exacerbate the frequency of extreme weather events such as floods, droughts and heat waves, affecting livelihoods in manifold ways (FAO, 2018; IPCC, 2021; Jones and O'Neill, 2016). The role of international migration as a coping strategy is becoming increasingly important: by 2050, the predicted number of *climate refugees* is estimated to reach hundreds of millions (Kumari Rigaud et al., 2018). These developments are major challenges for governments in both sending and receiving countries around the world. Historically, climate-induced migration has been little restricted because it mainly consisted of a within-border phenomenon (Cattaneo et al., 2019) or legal hurdles to move across countries were loose (Spitzer et al., 2020). However, recently countries have been putting more emphasis on selective migration, resulting in more complex and restrictive regulations (Beine et al., 2016b; de Haas et al., 2018). As shown in Figure 1, this trend suggests future scenarios where international migration will be further constrained, potentially undermining its role as a major coping strategy to climate change.

This paper examines how natural disasters affect poverty in a scenario where international emigration is heavily restricted. We exploit a unique natural experiment: the sudden implementation of an emigration ban in a country where 7% of the workforce was employed abroad (World Bank, 2017). After repeated cases of abuse and a death sentence of female domestic workers in Saudi Arabia, the Indonesian government entirely banned emigration for women wanting to work there as housemaids. This ban affected Indonesian villages to very different degrees due to heterogeneous destination-specific migration networks. We investigate whether restricting emigration deprived villages of their capacity to absorb income shocks induced by natural disasters, a widespread phenomenon in the country. The moratorium eliminated the possibility for Indonesians to emigrate to what was the second top destination country. In turn, we show this inhibited an important adaptation strategy to natural disasters.

This paper is among the first to provide causal evidence of the effect of migration restrictions in the context of extreme climatic events.[1] We conduct our analysis in a highly localized setting for the universe of around 70,000 Indonesian villages for the period 2005–2014. Our disaggregated data allow us to exploit: (i) spatial vari-

[1]Existing studies approach the relationship between tighter border restrictions and communities' climate-resilience either descriptively (McLeman, 2019) or theoretically (Benveniste et al., 2020; Burzyński et al., 2021).

Figure (1) Number of new restrictive immigration policies implemented worldwide



Notes Source: Own computation based on DEMIG Policy Database (De Haas et al., 2015).

ation in the main destination country of international emigrants across Indonesian villages, (ii) the exogeneity of natural disaster events, conditional on village fixed effects and (iii) the implementation of an unexpected national emigration ban that affected emigration to one top destination country, but not others. Taken together, this allows us to causally estimate the effect of the moratorium in a triple difference (DDD) setting. We therefore compare poverty levels of villages with migration links to Saudi Arabia—i.e. villages where the majority of emigrants went to in 2005—against the remaining villages, this depending on whether they were hit by natural disasters, before and after the moratorium was introduced in 2011.

This triple difference strategy overcomes several potential biases by fully saturating the estimation with all possible interaction terms. It allows controlling for time-varying changes in villages with migration links to Saudi Arabia, group-specific historical propensity to disasters and changes in resilience to natural disasters common to all villages. This way, we isolate the causal effect of natural disasters on villages more vulnerable to the introduction of the ban, i.e. those with migration links to Saudi Arabia. As a prerequisite for identification, we follow Olden and Møen (2022) in showing that the parallel trend assumption holds in the context of a triple difference.

In our findings, we first demonstrate that villages with ex-ante migration ties to Saudi Arabia experienced a drastic reduction in international emigration. After the moratorium, the stock of overseas workers decreased by more than 30% compared to villages whose migratory networks were not affected, highlighting the importance of persistent migration networks (McKenzie and Rapoport, 2010). After the ban

was implemented, these villages experienced a 13% increase in poverty once hit by natural disasters. Distinguishing between disaster types, we find that floods have the most devastating effect on poverty. Restrictions on emigration therefore further amplify the already significant implications for livelihoods induced by these catastrophic events. Estimates hold under manifold robustness checks, including alternative measurements of poverty and disasters, subsample adjustments, placebo regressions and falsification tests.

Internal migration is known to be an important response to climate-induced income shocks (Dallmann and Millock, 2017; Gröger and Zylberberg, 2016; Hornbeck, 2012; Kleemans et al., 2018; Kubik and Maurel, 2016; Marchiori et al., 2012). We find that substitution to internal migration only partially overcomes the effect of a lack of international migration: poverty rises despite domestic out-migration increases in affected villages in the aftermath of natural disasters. One potential explanation lies in villages' heterogeneous dependency on international emigration. We show that villages that rely ex-ante most heavily on workers abroad are those who suffer the most from the combined effect of the ban and natural disasters. Splitting the sample into terciles of ex-ante dependency on international migration, we find that communities least dependent are the most resilient while those in the middle manage to overcome these shocks by substituting for domestic migration.

We identify two mechanisms underlying our results. First, as the emigration ban caused an unexpected availability of female unskilled individuals, this might have had potential repercussions on local labour markets. These extra workers were however absorbed by the large demand of workforce in rice fields (Makovec et al., 2018). Exploring this channel, we show that poverty still increases drastically in villages with economies geared towards rainfed rice production: these villages lose the capacity to absorb workers once struck by natural disasters, in particular extreme floods. Second, we identify remittances to play a crucial role as an adjustment strategy. Indonesian workers in Saudi Arabia tended to remit more than those living in other countries before the ban was introduced. A simple back-of-the-envelope calculation suggests an increase of 8–10% of households in poverty due to the lack of remittances.

Our results are in line with studies showing that migration and remittances reduce disaster-induced income shocks. In a scenario where international migration is regulated but still viable, affected individuals can decide to move abroad to cope with natural disasters. Households can diversify their climate-induced income shock risks through ex-ante migration decisions (Kleemans, 2015; Stark, 1991) or ex-post by means of remittances (Blumenstock et al., 2016; Giannelli and Canessa,

2022; Gröger and Zylberberg, 2016; Yang and Choi, 2007). Related to our paper, Mbaye and Drabo (2017) show that migration and remittances reduce poverty rates, particularly in disaster-affected countries. Our study contributes to this literature by analyzing the role of international migration in a setting where it is heavily restricted. We reach similar conclusions, but from the opposite and therefore novel perspective: the drastic reduction of migration and remittances makes communities more vulnerable to natural disasters.

This paper expands the literature on the nexus between climatic events and international migration. Existing evidence is mixed: some studies show a positive link (Backhaus et al., 2015; Coniglio and Pesce, 2015; Drabo and Mbaye, 2015; Giannelli and Canessa, 2022; Gray and Mueller, 2012; Mahajan and Yang, 2020), others find there is no association or heterogeneous mobility responses (Bazzi, 2017; Beine and Parsons, 2015; Bertoli et al., 2022; Cai et al., 2016; Cattaneo and Peri, 2016; Gröschl and Steinwachs, 2017; Martínez Flores et al., 2021). In some contexts, migration even diminishes because of climatic shocks at the origin (Halliday, 2006; Yang and Choi, 2007). One challenge in addressing this question is to empirically establish a causal link: although extreme climatic events are exogenous, omitted biased responses could be correlated with both migration and natural disasters. We overcome these concerns by exploiting a national policy shock affecting only international migration, introduced with the purpose of protecting Indonesian domestic workers abroad and thus plausibly uncorrelated with local village characteristics. In addition, the ban unilaterally affects one important destination country but leaves others unaffected, thereby creating a natural control group.

Finally, this paper relates to the few studies on the effect of restrictive migration policies on development outcomes at origin.[2] Theoharides (2020) exploits an immigration ban from Japan on Filipino migrants, finding that the policy decreased income in sending communities. More closely to our paper, Makovec et al. (2018) study the effect of the Saudi Arabia ban on labour market outcomes in Indonesia. The authors find no effect on unemployment, but rather a shift towards the agricultural and informal sector. While we exploit the same policy shock, our study combines it with natural disasters—an additional source of natural experiment—it uses more granular data and focuses on a notably different outcome. Yet, we reconcile their findings as one of the mechanisms behind the observed poverty increases.

The chapter is organized as follows: Section 2 outlines the context of our study,

[2]Some studies focus on the effects of selective migration restrictions on human capital formation at origin (Batista et al., 2012; Beine et al., 2008; Chand and Clemens, 2011; Gibson and McKenzie, 2011; Shrestha, 2017).

followed by a description of data and empirical strategy in Sections 3 and 4. Results and extensive robustness checks are in Section 5. Section 6 concludes.

2 The Indonesian context

2.1 Natural disasters

Indonesia is extremely prone to climate change-induced disasters and nature-borne risks across its entire territory. It ranks 38th worldwide in terms of natural disasters susceptibility in the World Risk Report (Aleksandrova et al., 2021). According to global disaster database EM-DAT, the most common mass disasters in Indonesia since 1999 have been floods, earthquakes, landslides and volcanic activity (Guha-Sapir et al., 2021). Climate change-induced disaster such as prolonged periods of drought or rain-induced inundations have been on the rise since 2000 (BNBP, 2020). The 2014 Indonesian village-census *Podes* indicates that more than 40% of villages were affected by at least one disaster event over the previous three years, illustrated in the Appendix Figure 2.C.1.

Climate change-related disasters such as floods, droughts and heat waves can adversely affect crop yields. In a recent overview, the IPCC outlines that large swaths of crop lands may become barren over the next decades (IPCC, 2019). Indonesia is no exception: the costs incurred by climate change already amounted to 1.4% of GDP in 2016, the majority of which resulted from agricultural productivity losses (Hecht, 2016).

Indonesians from rural areas are therefore increasingly looking for other income opportunities to cope with these challenges. One common coping strategy involves migrating away from rural areas. Studies show that one of the major migratory push factors can be climate change, either directly or indirectly through the loss of livelihood.[3] For example, it is estimated that the 2004 Indian ocean tsunami alone left 500 thousand Indonesians internally displaced (Gray et al., 2014).

2.2 International migration

Migration both within and outside Indonesia's borders has always played a vital role in shaping the country's development. According to estimates of the World Bank (2017), around 9 million individuals, corresponding to nearly 7% of the country's

[3]See for example Flavell et al. (2020) for a recent literature review or Thiede and Gray (2017) and Bohra-Mishra et al. (2014) for an analysis in the Indonesian context.

labour force, were employed abroad in 2016. Most legal migrants leave through formal migration intermediaries and stay abroad for two to three years (Bazzi et al., 2021). Historically, the main destination countries of Indonesian migrants have been Malaysia, Saudi Arabia, Singapore and Hong Kong as depicted in the Appendix Figure 2.C.2.

A key characteristic in Indonesia's emigration patterns is the strong heterogeneity in villages' migration networks with certain countries. These ties are deeply rooted in villages' ethnic composition and hence tend to be sticky over time (Bazzi, 2012). For example, overseas workers from villages with a greater share of households of ethnic Arab origin have a higher propensity to emigrate to Arab countries as compared to destinations in South-East Asia. Migration agencies provide region-specific information, skill training and financing for migrants, further strengthening migration ties (Spaan and van Naerssen, 2018). For an individual's choice among migratory destination countries, these networks are known to play a major role.

Indonesia is one of the few countries in the world that exhibits a higher international migration rate of women as opposed to men as displayed in the Appendix Figure 2.C.2. The share of documented female emigrants increased from 56% in 1996 to 78% in 2004, a phenomenon generally attributed to a rapid increase in the demand for foreign female unskilled workers in the Middle East (IOM, 2010). In Saudi Arabia, for example, 84% of Indonesian emigrants were women in 2005. In these countries, immigrants are mainly employed as domestic workers and therefore educational requirements are low (World Bank, 2017).

Around 72% of Indonesian emigrants come from rural areas (World Bank, 2017). These areas are also more vulnerable to agriculture-related income shocks that affect migration decisions. Many low-skilled and informal workers see international migration as an essential element of their livelihood strategy and an entry point to formal work: emigration increases their probability of having a formal work contract upon return (World Bank, 2017). In addition, Indonesian women working abroad earn five times more on average than those who stay (Bazzi et al., 2021).

Migration can also positively affect the income of household members at home through remittances. Cuecuecha and Adams (2016) find that Indonesian households receiving remittances exhibit lower levels of poverty compared to those without. The number of remittances sent differ significantly in volume depending on the destination country: migrants living in Saudi Arabia tend to remit more than migrants in other destination, despite earning on less on average (Bank Indonesia, 2009).

2.3 The moratorium: Indonesia's emigration ban

With increasing numbers of domestic workers in the Middle East, the number of reported abuses and harassment of Indonesian women rose too. In June 2011, Ruyati Binti Sapubi, an Indonesian maid in Saudi Arabia killed her employer's wife after suffering from repeated abuse. For this reason, she was sentenced to death by beheading.[4] The event caused a public outcry in Indonesia and provoked the government to step in and issue a moratorium. Enacted in August 2011 and still in place today, the moratorium bans all women from emigrating to Saudi Arabia as domestic workers.[5] Appendix Figure 2.C.3 displays how the ban is reflected in Indonesia's emigration flows, comparing Saudi Arabia to other countries. While Saudi Arabia was the most important destination in 2005 accounting for 43% of all emigrants, its share decreased to 11% after the ban in 2014.

Issued at the national level, the moratorium affected all Indonesian women wanting to emigrate to Saudi Arabia. However, given village level heterogeneities in ethnic composition and migration networks, villages were affected to highly varying degrees. These structural relationships also implied that immediate substitution to other countries as a response was unlikely, especially given the fact that the ban was gradually extended to similar destination countries. No other destination experienced a large increase in Indonesian immigrants after the ban as depicted in the Appendix Figure 2.C.3. Switching to illegal emigration to Saudi Arabia was not an option either. The ban was strictly enforced and the sheer geographical distance between Indonesia and the Saudi peninsula prevents the vast majority of workers to emigrate undocumented (Friebel et al., 2018; World Bank, 2017).

3 Data

3.1 Indonesian village census

We compile a highly granular dataset of Indonesian villages including all urban and rural precincts from four waves of the administrative census *Podes* (*Potensi Desa*). It is collected every three to four years and includes information on village

[4]See: Higgins, Andrew. 2011. "Saudi beheading fuels backlash in Indonesia." The Washington Post, August 8. https://www.washingtonpost.com/world/asia-pacific/saudi-beheading-fuels-backlash-in-indonesia/2011/07/17/gIQAc7OU3I_story.html.

[5]Similar restrictions have been gradually introduced to other countries: to the United Arab Emirates and Qatar in 2013, and to 21 countries mainly across the Middle East and North Africa in 2015; to Kuwait and Jordan already in 2009–10, yet both only play a minor role in Indonesia's emigration as shown in the Appendix Figure 2.C.2.

characteristics of the entire country provided by their heads and administrators. We use the *Podes* waves of 2005, 2008, 2011 and 2014.[6] *Podes* contains, among others, detailed information on the stock of international out-migrants disaggregated by gender, natural disasters and aggregate socio-economic variables.[7] Across all waves, 2005 was the first census-year that collected information on the stock of international emigrants per village. Furthermore, it is the only wave to provide information on the main migratory destination country by village, which we use to identify villages with strong migration networks to Saudi Arabia.[8]

We also extract information on the occurrence of natural disasters, categorized by disaster type and exact timing over the course of the three previous years.[9] Further variables taken from *Podes* include village population, the incidence of social conflict, rural status and agricultural activities.

Our main outcome of interest is poverty. The village census reports the number of issued poverty letters (*Surat Keterangan Tidak Mampu* (SKTM)) in the previous year, a measure used by literature in the Indonesian context (Krishna and Kubitza, 2021; Morgans et al., 2018). *SKTM* are letters issued at the village level, stating that the individual is poor and therefore eligible for social assistance including access to free medical treatment, preference in scholarship requests and basic food assistance, among others (Fiarni et al., 2013). These cards have a validity of 6 months, but can be renewed upon request (City of Bandung, 2018). Eligibility criteria are based on the absolute poverty definition of individuals falling behind the poverty line as established by the Indonesian Statistical Office (BPS), outlined in the Appendix 2.A.2. Given that cards are issued by the village administrators, the criteria are potentially porous due to different interpretations (Fiarni et al., 2013). Besides addressing this potential issue in our identification strategy, we provide direct evidence that poverty cards are a good measure of poverty. Using representative household-level data, we show in the Appendix 2.A.4 that poverty cards are well targeted to the poorest households: the probability of receiving poverty cards is greater among households at bottom quintiles of consumption expenditure as well as among those that are below the poverty line. In addition, we use two alternative

[6]The year a given round is published includes data corresponding to the previous year. *Podes* 2005, 2008 and 2011 therefore constitute pre-ban periods.

[7]The primary sources for the data were key informants within the village administration, with additional information and validation provided by officials at the sub-district and district levels (Bazzi, 2017). Appendix 2.A.1 lists definitions and the precise wording of key variables used.

[8]A limitation is that *Podes* does not provide a clear definition for "main" destination. Our empirical specification will target potential endogenous misreporting or measurement errors.

[9]Cameron and Shah (2015) show that *Podes* correlates well with disaster records from other sources. We also validate our results using alternative measures of natural disasters in our robustness checks section.

poverty measurements derived from the census rounds: the number of households living in slums as well as people receiving assistance for public health services.

3.2 Additional sources

We use weather station data from the Indonesian Meteorological, Climatological and Geophysical agency (BMKG) as an alternative measure on villages' past disaster experience. It provides information on stations' precise coordinates and the date of extreme weather events in terms of temperatures, precipitation and wind speeds recorded.

Alternative sources to *Podes* for nationwide, time-variant village level poverty data are scarce. One exception are poverty maps compiled by the SMERU Research Institute. Their approach combines administrative statistics and household survey data from different sources to obtain poverty estimates at the village level for 2010 and 2015 (Suhayo et al., 2005). We can thereby verify our results with a further poverty measurement, the village-share of households below the poverty line.

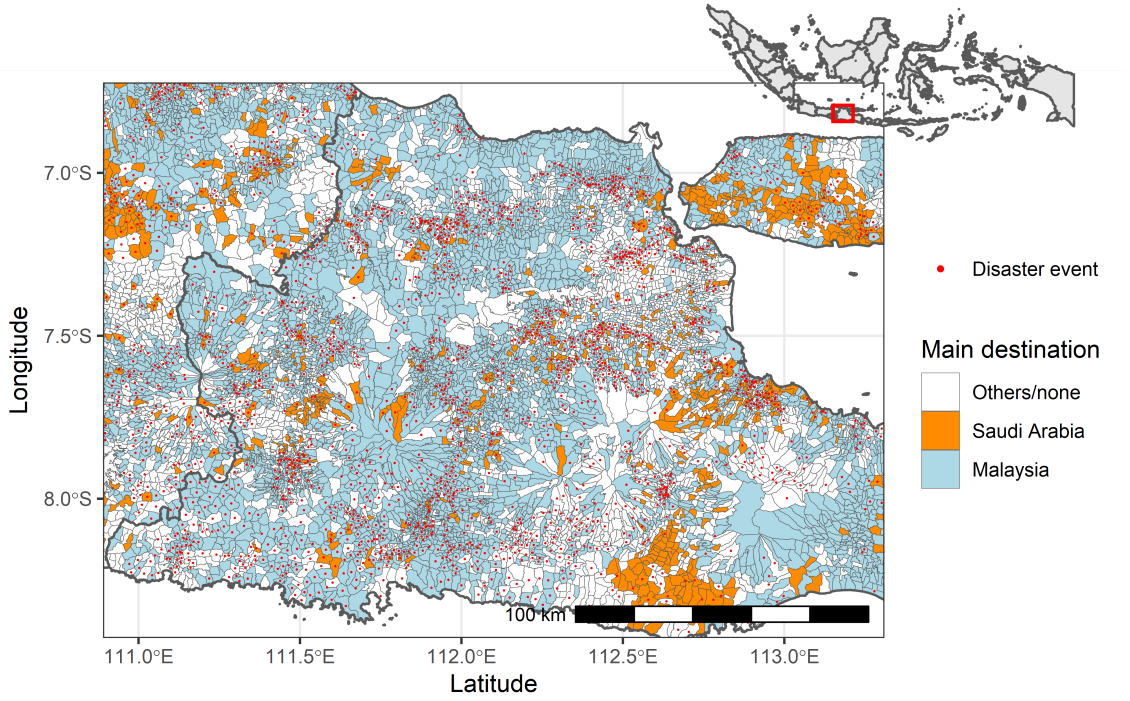
3.3 Village panel

We combine all data sources at the village level, Indonesia's lowest administrative unit. To account for changing boundaries across time caused by administrative splits, we link different census years by means of a village crosswalk.[10] This allows us to aggregate all data to villages' 2005 boundaries, our unit of observation. The resulting dataset hence contains $N = 67,987$ villages over the years 2005, 2008, 2011 and 2014. Appendix Table 2.B.1 provides basic summary statistics for all variables used in our analyses.

Figure 2 maps villages in the province of West Java to illustrate the variation in our key variables. The majority of villages had migration networks with Malaysia, followed by Saudi Arabia. At the same, many villages in this region experienced natural disasters in the displayed period. We explore the spatial variation of natural disasters and migration links to different destination countries for our identification.

[10]For a detailed explanation of the crosswalk construction, see the Appendix 2.A.3.

Figure (2) Main destination country and natural disasters in East Javanese villages



Notes: Red dots represent centroids of villages that experienced at least one natural disaster between 2003 and 2005. Main destination refers to the country where most emigrants from a given village worked as of 2005. Source: Own computation based on *Podes* 2005.

4 Empirical strategy

4.1 Natural experiment: the emigration ban

We investigate the effect of an international emigration restriction on communities' capacity to mitigate disaster-induced income shocks. To exploit the emigration ban as a natural experiment, we first analyse whether the ban significantly reduced the stock of international migrants in villages with migration ties to Saudi Arabia. Therefore we estimate an intention-to-treat (ITT) effect according to initial migration networks in 2005. The rationale is that villages with migration networks to Saudi Arabia in 2005 are more likely to experience a stronger reduction in the number of out-migrants after the ban was introduced in 2011. Therefore we estimate the following event-study model:

$$M_{vt} = \beta_1(T^{2005} \times SA_v) + \beta_2(T^{2008} \times SA_v) + \beta_3(T^{2014} \times SA_v) + \lambda X_{vt} + \delta_t + \gamma_v + \eta_p t + \epsilon_{vt} \tag{2.1}$$

M_{vt} measures the stock of emigrants from village v in year t. SA_v is a binary variable indicating whether Saudi Arabia is a village's main migratory destination country in 2005. T are year dummies. Coefficient β_1 to β_3 capture the yearly change of migration stocks in villages that had Saudi Arabia as the main destination country in 2005 against all other villages. Compared to 2011, we expect a decrease in migration stocks in 2014 for villages with migration ties to Saudi Arabia, i.e. a negative β_3.

X_{vt} controls for time-variant variables: log of population and a binary variable for conflict in the previous year. Time fixed effects δ_t capture shocks common to the entire country. Village fixed effects γ_v control for time-invariant observable and unobservable characteristics such as soil suitability, propensity to be subject to natural disasters, cultural proximity with specific destination countries and established migration networks. Lastly, $\eta_p t$ absorbs province-specific linear time trends. Standard errors are clustered at the village level.

4.2 Identification: the triple difference

An effective migration restriction policy implies that villages with Saudi Arabian migration networks experienced a larger reduction of out-migrants. These villages could therefore be more vulnerable to natural disaster-induced income shocks. To test this hypothesis, we run the following triple difference regression, our main specification of interest:

$$\begin{aligned} Poverty_{vt} = {} & \beta_1 D_{vt} + \beta_2 SA_v + \beta_3 Post2011_t + \\ & \beta_4 (D_{vt} \times SA_v) + \beta_5 (D_{vt} \times Post2011_t) + \beta_6 (SA_v \times Post2011_t) + \\ & \beta_7 (D_{vt} \times SA_v \times Post2011_t) + \lambda X_{vt} + \delta_t + \gamma_v + \eta_p t + \epsilon_{vt} \end{aligned} \tag{2.2}$$

$Poverty_{vt}$ stands for the number of new poverty cards issued in village v in year $t = \{2005, 2008, 2011, 2014\}$. D_{vt} is a binary variable for villages' disaster experience in the three years preceding t. $Post2011_t$ takes the value one if $t = 2014$ and zero otherwise. As time-variant controls, X_{vt} includes the inverse hyperbolic sine of the male emigrants stock, log of population and a binary variable for conflict events. Again, we add fixed effects for year (δ_t) and village (γ_v) on top of province linear-time trends ($\eta_p t$). Robust standard errors are clustered at the village level.

We include interactions of all three binary variables analogous to standard double difference models. $D_{vt} \times SA_v$ controls for time-invariant heterogeneous responses to disasters in villages with Saudi Arabia as the main migratory destination coun-

try. $D_{vt} \times Post2011_t$ captures natural disaster trends that could spuriously affect the dependent variable after the ban. The interaction $SA_v \times Post2011_t$ is essential to control for all observable and unobservable factors influenced by the moratorium that could affect poverty, other than being exposed to disasters. For example, it includes direct wealth shocks due to foregone remittances and expected income from migrating as well as common changes in population compositions due to altered migration patterns. The interaction also captures differential labour market responses as identified by Makovec et al. (2018): the increase in local labour supply by those no longer able to migrate could push wages down and potentially increase poverty.

Finally, including the stock of international male migrants as control variable is crucial. Some villages could substitute the outflow of female domestic workers to Saudi Arabia with male emigration.

4.3 Causal interpretation

Our identification derives from the triple interaction $D_{vt} \times SA_v \times Post2011_t$. This term allows us to causally estimate the effect of natural disasters on poverty in villages that could no longer rely on international migration to Saudi Arabia as an adaptation strategy.

One potential threat to the identification stems from any potential anticipation effect of the ban. Would-be migrants could either anticipate the departure to Saudi Arabia or simply refrain from emigrating. At the same time, village heads could issue ex-ante issue more poverty letters to cope with the foregone income from diminishing remittances. These scenarios assume that village heads and individuals possessed prior information on the national government's move to implement a ban. Even if this was true, the interaction term $SA_v \times Post2011_t$ controls for this bias that would be common to all villages with ties to Saudi Arabia. The only residual variation in the dependent variable derives from natural disasters, quasi-random events once geographic factors are controlled for by village fixed effects.

Village authorities could still over-report disaster events and issue more poverty cards to receive higher government transfers. To upward bias our results, this would need to systematically happen in villages with links to Saudi Arabia hit by disasters after 2011. To rule out this hypothetical scenario, we adopt three strategies. First, we show that the main effect is robust to controlling for the inflow of different transfer types from local and central governments as well as foreign and private citizen aid. Secondly, we use two alternative *Podes*-based variables to proxy poverty: the number of social health insurance cards (*Askeskin*) issued

in year *t-1*, which Sparrow et al. (2013) find to be well targeted to the poorest and most vulnerable individuals; and the number of households living in slums.[11] Lastly, we use poverty data external to *Podes* from SMERU, measuring the village-share of individuals below the poverty-line. Self-reporting can analogously affect our measurement of natural disasters, hence we also use alternative data provided by BMKG. Results for all alternative data sources discussed above are shown in Section 5.4.

Although we argue that the moratorium date is unexpected, villages with migration links to Saudi Arabia could follow different pre-trends in poverty rates. While in theory this should not be an issue for villages hit by exogenous disasters, it could potentially violate the parallel trend assumptions for villages vulnerable to the ban. We provide full evidence on pre-treatment parallel trends in a triple difference context in section 5.3.

5 Results

5.1 Migration flows after the ban

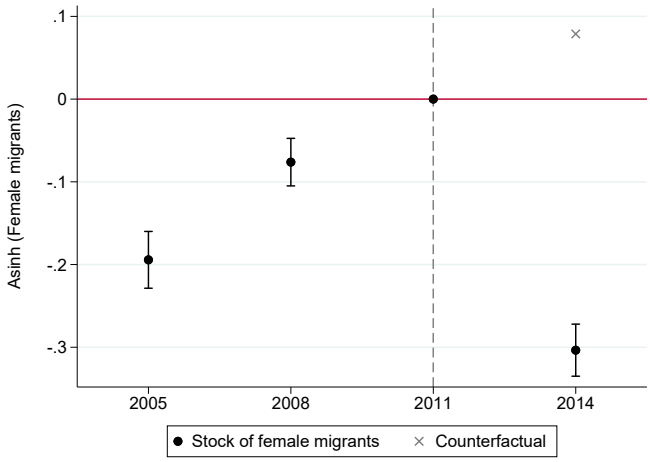
We exploit the emigration ban on Saudi Arabia to causally estimate how villages are able to cope with disaster-induced income shocks in a scenario where international migration opportunities are curtailed. Our analysis relies on the assumption that the ban was effective, therefore we first quantify its impact on migrant stocks. Figure 3 plots the coefficients from the event-study in Equation 2.1, indicating that the ban's impact on mobility is considerable. With respect to 2011, the emigrant stock drops by 30% in villages that had Saudi Arabia as main migratory destination in 2005. Figure 3 also shows that the female migrant stock in these villages catches up over time until 2011. In a counterfactual scenario, the stock of female migrants in Saudi Arabia would have increased further had it followed the same linear growth rate of the period 2005–2011. This scenario suggests that the stock of female migrants would have been larger than that of the comparison group in 2014. However, estimates display a sharp u-turn: the drop in female migrant stocks even amounts to 38% with respect to this scenario indicated by the grey symbol x in 2014. The negative estimates for the years leading up to 2011 reflect the growing importance of Saudi Arabia as destination country, which, we argue, would have

[11] In 2016, 29 millions Indonesians lived in slums with limited access to basic services like sanitation and safe water (See World Bank 2016. "Indonesia: Improving Infrastructure for Millions of Urban Poor." World Bank, July 12. https://www.worldbank.org/en/news/press-release/2016/07/12/indonesia-improving-infrastructure-for-millions-of-urban-poor).

further intensified had the ban not been implemented. These results comfort our premise that using Saudi Arabian migration ties in 2005 successfully singles out villages most affected by the moratorium.

While the coefficients in Figure 3 do not follow parallel trends, there are two reasons why this does not threaten our identification. First, a bias would arise if the stock of female migrants was already decreasing before 2011, not increasing as in this context. And secondly, the non-parallel trend does not affect the causal interpretation of our results: the DDD estimator does not require two but only one parallel trend assumption. We will show that the only parallel trends assumption required holds in our baseline model.

Figure (3) The impact of the moratorium: change in female migrant stocks in villages with Saudi Arabia as main destination country against others



Notes: Displayed coefficients capture the event-study in Equation 2.1, i.e. the relative decrease in the inverse hyperbolic sine of female migrants' stocks for villages with Saudi Arabia as main destination country in 2005 vs. others, with 95% confidence intervals. The vertical dotted line indicates the implementation of the ban in 2011, which is also the baseline period. "x" indicates the value of female stocks in a counterfactual scenario where it follows the linear trend from 2005–2011. The sample is restricted to villages that indicate they have at least one Indonesian domestic worker abroad in 2005. Control variables include log(population), a conflict event dummy, village and year fixed effects and province time trends are included. Standard errors are clustered at the village level. Number of observations: 141,107.

5.2 Disasters and migration under the ban

A strong negative effect of the moratorium on migrant stocks could leave villages dependent on migration to Saudi Arabia more vulnerable to climatic shocks. This is where we introduce our main specification with Table 1 presenting the baseline results. Columns (1) to (3) display the estimations of simple difference-in-difference

(DD) models, where each double interaction is shown in a separate regression. Out of the three two-way interactions, only the double difference coefficient $SA_v \times Post2011_t$ in column (1) is statistically significant. This means that villages with migration ties to Saudi Arabia experience higher levels of poverty than all others after 2011. Potential explanations are a deterioration in labour markets or an overall decrease in remittances. Across all columns, the coefficient on disasters is statistically significant, implying that the number of poverty cards increased by around 9% in villages hit by natural disasters.

Table (1) Average effect of being subject to disasters on poverty

Dependent	Poverty cards			
	DD			DDD
	(1)	(2)	(3)	(4)
Disaster		0.085***	0.086***	0.093***
		(0.008)	(0.008)	(0.009)
SA × Post2011	0.062***			0.015
	(0.020)			(0.027)
Post2011 × Disaster		-0.011		-0.028*
		(0.014)		(0.015)
SA × Disaster			-0.025	-0.055**
			(0.020)	(0.023)
SA × Post2011 × Disaster				0.118***
				(0.039)
Village FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	268,194	268,194	268,194	268,194

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include asinh(male migrants), log(population) and a conflict event dummy. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Column (4) shows results of the DDD model. The interaction term $SA_v \times Disaster_{vt}$ is significant and negative. It implies that villages with Saudi Arabian migration networks tend to cope better with natural disasters. Potentially, this is due to the fact that migrants in Saudi Arabia remit more on average than those working in other destination countries (Bank Indonesia, 2009). Estimates of the interaction $Post2011_t \times Disaster_{vt}$ suggest that all villages tend to cope better with disasters in 2014 than before. One conceivable explanation is that disaster prevention systems have improved over time. Lastly, the interaction $SA_v \times Post2011_t$ is no longer significant, hence the triple interaction almost entirely explains its coef-

ficient from column (1). The triple interaction is positive and significant, with a coefficient of 0.118.[12] To interpret this effect, we compute marginal effects: villages with migration links to Saudi Arabia hit by natural disasters experience a poverty increase by 13% after the ban was introduced in 2011. Results are also qualitatively similar when we consider the number of natural disasters experienced by villages as reported in the Appendix Table 2.B.3.[13]

5.3 Parallel trends

As a prerequisite for the causal interpretation of our findings, we show that the pre-ban parallel trend assumption holds. The DDD estimator does not require two but only one parallel trend assumption, because common biases between the treatment and control group are partialled out by a first difference (Olden and Møen, 2022). In our context, the treatment group consists of villages with migration ties to Saudi Arabia and the control group of villages with migration ties to other countries or those without migrants in 2005.

To demonstrate that the pre-ban parallel trend assumption holds, we follow three steps: (i) within the treatment group, we subtract poverty levels of villages struck by disasters from those without disasters, before 2011; (ii) we perform the same step for villages in the control group; (iii) we show that the two differences obtained follow the same trend before the ban. Panel (a) in Figure 4 shows that villages in the treatment and control group trended similarly in the time leading up to the ban in 2011. After 2011, both groups experienced an increase in the average number of newly issued poverty cards. However, this rise is larger for the treated group, in line with our baseline results. In panel (b), we present our baseline estimations in an event-study, highlighting the absence of pre-treatment trends before the ban was implemented in 2011.

5.4 Robustness checks

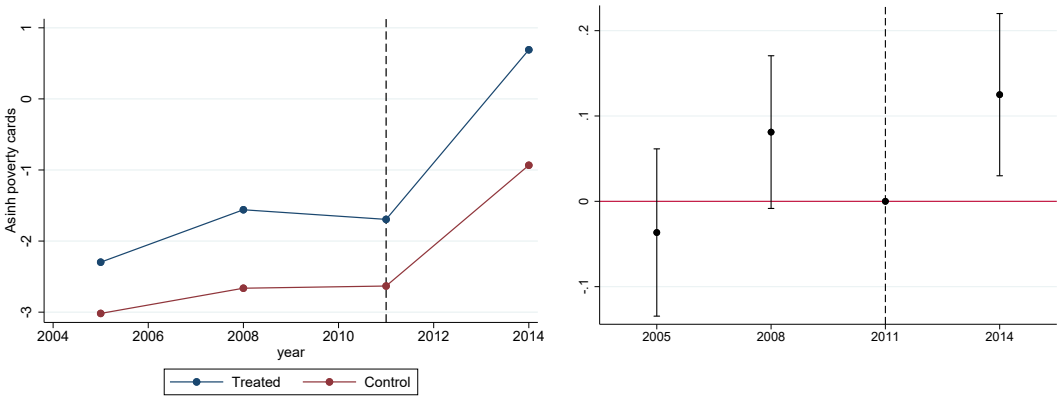
Alternative measurements

Poverty estimates can be porous, particularly when self-reported. We demonstrate that our results are not measurement-specific and the observed increases show in

[12] This coefficient is robust to the choice of different control variables as displayed in the Appendix Table 2.B.2.

[13] This sample does not contain the census wave 2005 for lack of data on the number of disasters per village. Results for the extensive margin are still robust to restricting the sample to 2008–2014 census waves.

Figure (4) Triple difference: parallel trends



(a) Unconditional parallel trends

(b) Conditional parallel trends: event study

Notes: Panel (a) displays evidence on the unconditional parallel trend assumption. The treated group contains villages with Saudi Arabia as the main destination country, subtracted by the effect of being hit by natural disasters. The control group consists of villages that do not have Saudi Arabia as the main destination, subtracted by the effect of being hit by natural disasters. Panel (b) shows an event study, plotting the triple difference coefficient of Equation 2.2 with time dummies and 2011 as the baseline year at 95% confidence interval. Control variables include asinh(male migrants), log(population) and a conflict event dummy. Village and time fixed effects as well as province time trends are included. Standard errors are clustered at the village level. Number of observations: 268,194.

different poverty dimensions in the Appendix Table 2.B.4. Columns (1) and (2) present results for our main model, using the number of issued social health cards and households living in slums as dependent variables. Albeit qualitatively different to SKTM letters, both measurements reflect dimensions of poverty experienced in villages. Coefficients of the triple interaction are positive and significant for both, indicating that our results are not measurement-specific.

This is further confirmed in column (3), where poverty is measured as the the share of individuals falling below the poverty line according to the international convention of 2$ PPP.[14] Villages with Saudi Arabian migration links experience a 1.19 percentage point poverty increase after the migration ban once hit by natural disasters. Compared to pre-ban poverty levels, this amounts to a 6% increase. In terms of magnitude, the different estimate as compared to the main specification can be explained by measurement: poverty cards measure absolute increments, whereas poverty shares reflect relative poverty rates.[15]

[14]Given data availability described in Section 3, this measurement is only available for 2010 and 2015. We match these waves to *Podes* 2011 and *Podes* 2014.

[15]A direct comparison is not viable given the lack of village poverty card stock data in *Podes*.

Subsamples, placebos and falsification tests

Our identification relies on the exogenous timing of natural disasters and that of the migration ban. The former are quasi-random events, conditional on village fixed effects. We confirm this by performing a falsification test in the Appendix Table 2.B.5, where we regress the lagged natural disaster dummy taken from the previous period on poverty in year t. Results show that natural disasters which occurred three to six years earlier do not have a significant effect on poverty in the following period.

To show that results are not driven by sample choice or outliers, we present our main estimates for different subsamples in the Appendix Table 2.B.6. In column (1), we exclude all villages on Java island as the most disaster-prone, populated and emigration-intensive region. In turn, column (2) contains only villages on Java. For either analysis, the magnitude of the triple interaction is larger than our main effect and statistically significant. Next, we exclude villages without migrants in 2005 in column (3). This way, the binary variable SA_v compares villages with Saudi Arabia as main destination only to those with positive number of emigrants in 2005. In column (4) we investigate the possibility that although the moratorium was only progressively extended to other important Middle Eastern destination countries, they were already indirectly affected after 2011. This could be due to a more general negative sentiment towards Arab states provoked by the 2011 ban or the events leading up to it. For either specification, results are virtually unchanged as compared to our main estimates. In column (5) we show that the results are robust to excluding population outliers, trimming the sample at the 1^{st} and 99^{th} percentile of village population (population bounded between 126 and 21,991 individuals). Lastly, in column (6) we weight the estimation by population, showing that the coefficient of the triple interaction is slightly larger and still significant at 1% level.

We further demonstrate that other time-variant, unobserved changes at the village level do not alter the main results. In our main specification, SA_v is a binary variable taking the value one if Saudi Arabia is a village's main destination country in 2005, and zero otherwise. As a placebo test, we expand this dummy by a categorical variable for all twelve destination countries recorded in *Podes*. Appendix Figure 2.C.4 displays the triple interaction coefficients for this specification where the base category is villages without migrants in 2005. The only destination country displaying a positive and significant coefficient is Saudi Arabia, reassuring that the ban is the main treatment. Only villages with migration networks to that country

experience higher poverty once hit by natural disasters after 2011.[16]

Different types of welfare transfers could be used as substitutes for poverty letters. If these payments ameliorated actual poverty experienced in a village, our estimates based on the issued letters would be upward biased. Therefore in the Appendix Table 2.B.7 we include local and central government transfers as well as foreign and private citizen's aid as controls.[17] The triple difference coefficient remains unaltered across all columns, suggesting that the larger number of issued poverty cards for ban-affected villages hit by natural disasters after 2011 is not affected by differential financial inflows.

Spillovers

The effects of natural disasters and the migration ban could spill over to neighboring villages, potentially questioning the stable unit treatment value assumption (SUTVA). For example, natural disasters could push individuals to seek jobs in villages nearby without strong Saudi Arabian migratory ties. If the emigration of these individuals had detrimental effects on the economy in these destinations, our estimates would be biased downwards. On the contrary, upward biased estimations would arise if those emigrants fueled economic development in neighboring villages.

We address these potential biases directly by controlling for spillover effects and including spatial standard errors. For villages without Saudi Arabian migration networks, we calculate the distance to their closest neighbor with these ties. Based on that distance, we assign three binary variables for cutoffs of 0–10km, 10–20km and 20–30km. In our baseline regression, we then replace the indicator for Saudi Arabian migration ties with each binary variable in separate regressions. This allows us to analyze whether villages without migration ties to Saudi Arabia experience differential poverty rates depending on their distance to ban-affected villages. Appendix Table 2.B.8 shows our main effect does not change with the inclusion of these variables. Interactions for villages distant up to 30km from our treatment villages (SA=1) are insignificant as well, pointing to the absence of spillovers within this radius. Furthermore, we account for Conley-type spatial correlations of the error term (Conley, 1999) in the Appendix Table 2.B.9, where results remain statistically significant across different distance cut-offs.

[16] These coefficients are qualitatively similar when excluding villages with no emigrants in 2005 from the sample or using any other destination country as base category.

[17] This sample does not contain census wave 2005 for lack of government transfers data.

Substitution to domestic migration or to other countries

The moratorium could push individuals to substitute Saudi Arabia with other countries or internal migration as alternative coping strategies. In practice, differences in educational requirements limit short-run migratory substitution options to other countries. Saudi Arabia requires foreign domestic workers to have primary education, whereas other important destinations such as Taiwan, Hong Kong and South Korea require that workers have completed at least secondary education. Furthermore, strong kinship migration networks impede easy substitution to other destinations. Descriptively this can be seen in the Appendix Figure 2.C.3, showing that emigration to other destination countries did not increase significantly after then ban.

Choosing to migrate internally is therefore a more viable option for individuals affected by the ban. This would pose a threat to our identification only in case the ban itself affected selection into domestic migration. If the majority of those able to afford internal migration moved in the aftermath of natural disasters, the composition of stayers would be skewed towards poorer individuals. This in turn could bias the coefficient upwards because of possible general equilibrium effects towards a deteriorating economy in those villages. However, our measure of issued poverty cards captures the change in the absolute number of poverty cards emitted, or the "new poor" households, partially overcoming changes in composition. In the Appendix Table 2.B.10 we still test for any potential bias from substitution to internal migration. We proxy internal migration as the change in population, given the lack of domestic migration data in *Podes*. Column (1) shows that that the overall population of villages affected by the ban drops by 1.3%. The coefficient suggests potential substitution from international to internal migration. However, once we further interact the DDD coefficient with the change in population, we do not find differential effects on poverty as shown in column (2). It implies that villages in the treated group with higher levels of domestic out-migration do not show differential poverty rates as compared to the control group.[18]

In absence of compositional changes, substitution to any alternative coping strategies would only lead to a downward bias of our main DDD coefficient. More specifically, our main results in the DDD model imply that natural disasters increase poverty by 13% in villages with strong migratory ties to Saudi Arabia. If those who would have emigrated there moved elsewhere, the effect of disasters on poverty

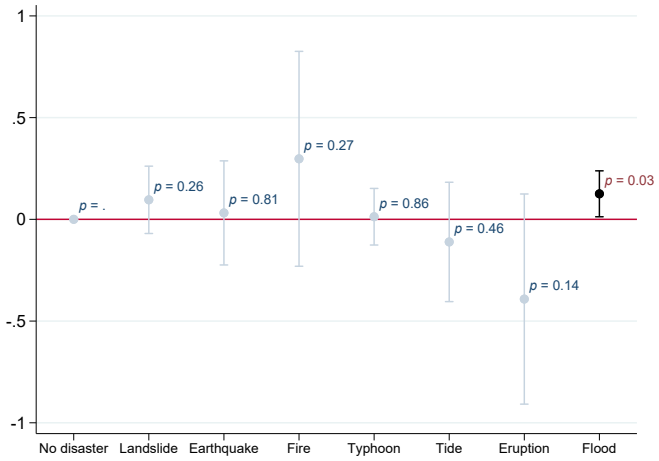
[18]The DDD coefficients in column (2) is insignificant. However, the overall marginal effect of natural disasters after 2011 on villages with Saudi Arabia as main destination is 12.8% and significant (not shown).

would be reduced. This implies that the 13% effect from the baseline estimation is a lower bound estimate.

Rainfall, floods and Indonesian weather stations

We investigate which type of natural disaster drives our results. Figure 5 displays coefficients of the triple interaction where D_{vt} is now a categorical variable for different natural disaster types. Floods, in particular, lead to a significantly higher number of issued poverty cards as compared to the base category of not experiencing any natural disaster. This is in line with research showing that floods are also one of the most devastating types of natural disasters in terms of losses and harvest failure (FAO, 2018).

Figure (5) Average effects of disasters on poverty by type of disaster



Notes: Coefficients are bound at 95% confidence intervals. The displayed coefficients capture the effect of natural disasters on the inverse hyperbolic sine (asinh) of emitted poverty cards after the migration ban in 2011 by type of disaster. The baseline type is "no disaster". We exclude the category "Tsunami" since we only have one observation in the control group after 2011. Control variables include asinh(male migrants), log(population) and a conflict event dummy. Village and year fixed effects as well as province time trends are included. Standard errors are clustered at the village level. The sample includes census rounds 2008, 2011 and 2014. Number of observations: 197,742.

Having established that our results are driven by heavy rain-caused events, we rely on alternative disaster definitions from Indonesian weather station data provided by BMKG to verify our results. This also allows us to address potential concerns related to reporting bias in *Podes*-recorded events. Rainfall data is collected from each of the 170 geocoded weather stations that operated uninterruptedly between 1990 and 2015. Extreme rainfall events are defined as the day each station recorded the largest precipitation over the ten previous years. The value of one is

assigned if extreme rainfall events occurred either between 2003–2005, 2005–2006, 2009–2011 and/or 2012–2014, and zero otherwise.[19]

Relying on precise coordinates of the stations, we use different bandwidths of either 10, 15, 20 or 30 km to assign villages to their corresponding precipitation records. Appendix Figure 2.C.5 shows the location of the weather stations and respective buffer zones used in our analysis.[20] Across all specifications in the Appendix Table 2.B.11, the effect of the triple interaction on poverty cards is significant and ranges between 25.3% and 62.9% depending on the chosen radius. Compared to our main results, these larger effect sizes could be explained by the fact that with weather station data we identify particularly extreme events for a subset of our sample.

5.5 Mechanisms and discussion

labour market adjustments

Emigration diminishes the available workforce in sending communities, thereby driving wages up (Amuedo-Dorantes and Pozo, 2006; Aydemir and Borjas, 2007; Elsner, 2013; Hanson, 2007; Mishra, 2007). Conversely, if would-be migrants can no longer move abroad, this increases the local labour supply and could negatively affect wages which could in turn increase poverty. Makovec et al. (2018) show that Indonesia's migration ban did not affect unemployment, but increased employment in the agricultural sector among those that could no longer migrate. In this sector more than half of all emigrants had already been working prior to moving abroad (Bank Indonesia, 2009). In Indonesia, agriculture is dominated by rice, the most cultivated and consumed staple yet particularly vulnerable to weather shocks. A massive shift of workers into agriculture might therefore leave rice-producing villages even more prone to poverty when disasters struck. When disasters such as floods damage crop production, they can limit the capacity of local labour market to absorb the excessive workforce of would-be migrants through jobs in the fields.

Rice production is located in rural areas of the country, where irrigation of fields is either rainfed or relies on man-made schemes (Khairulbahri, 2021). Indonesian

[19]For example, if a given weather station records the day with the largest rainfall between 1995 and 2005 between 2003 and 2005, then the binary variables takes the value one in t=2005. This is repeated for the period 1998–2008, where the variable is one again if the extreme rainfall was recorded for any day in 2005–2008.

[20]For each radius, only villages within the respective buffer are selected, where the choice of the buffer size implies a trade-off between the precision of local weather measurement and the number of villages included in the analysis.

rice farmers consider floods to be the greatest threat to their production (Rondhi et al., 2019), which particularly holds for more vulnerable rainfed irrigated areas (Panda and Barik, 2021). This is in line with our results that floods are the most impactful type of natural disaster on poverty. Therefore, we explore the identified labour market adjustment mechanism by the type of rice-irrigation villages rely on. Based on *Podes* data, we estimate a quadruple difference model by interacting all binary variables in Equation 2.2 with a variable taking the value one if a given village mainly cultivates rainfed paddy (15% of sample villages) and zero if it has an irrigation system (85%).

Table 2 displays the results of this regression for the sample of rural rice-cultivating villages (68% of sample villages). The binary variables on disasters in column (1) include seven types of disasters, whereas columns (2) and (3) are coded to capture either floods or any other disaster. In all columns, the reference group is made of villages without natural disasters. Across all columns, the control group consists of villages that did not experience any disaster in year t. The impact of any natural disaster on the treated group after 2011 indicates 26% more emitted poverty cards in villages with rainfed lowlands as compared to those with irrigated areas (column (1)). When restricting the analysis to flood-disasters in column (2) we find that villages relying on rainfed irrigation receive 42.3% more poverty cards than villages with irrigated fields. On the contrary, column (3) shows that this heterogeneity does not prevail if these villages are hit by any another type of natural disaster. We can thereby reconcile and extend Makovec et al. (2018) results: migrants confined to stay in agriculture can no longer adjust their labour market decisions towards agriculture if floods reduces crop yields.

Remittances

Sending money to support families at home is one of the key incentives to emigrate. An emigration ban reduces the remittances received, which in turn influences how receiving communities smooth income shocks from natural disasters. There are two reasons why we believe this holds particularly for the setting of our study in Indonesia. First, annual remittance inflows amounted to 9 billion USD in 2016, corresponding to 1% of national GDP (World Bank, 2017), strongly affecting local development (Bal and Palmer, 2020). With Saudi Arabia being one of the main destination countries, the observed 30% decrease in migrant stocks in villages affected by the ban strongly reduced the number of potential remitters. Secondly, Indonesian workers living in Saudi Arabia remitted more on average than migrants

Table (2) Average effect of disasters on poverty by type of rice production

Dependent	Poverty cards		
	All disasters	Floods	Other disasters
	(1)	(2)	(3)
Disaster	0.102***		
	(0.011)		
SA × Post2011 × Disaster	0.081		
	(0.061)		
SA × Post2011 × Disaster × Lowlands	0.260**		
	(0.125)		
Flood		0.142***	
		(0.017)	
SA × Post2011 × Flood		0.061	
		(0.078)	
SA × Post2011 × Flood × Lowlands		0.423***	
		(0.149)	
Other disaster			0.077***
			(0.014)
SA × Post2011 × Other disaster			0.099
			(0.081)
SA × Post2011 × Other disaster × Lowlands			0.056
			(0.170)
Village FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	183,337	145,256	147,415

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include log(population), asinh(male migrants) and a conflict event dummy. All two-way and three-way interaction terms are included in the estimation but omitted here. "Flood" and "Other disasters" take the value one in case of a flood or any other disaster than flood occurred within the three previous years, and zero with no disasters. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

in any other main destination country before the ban (Bank Indonesia, 2009). This implies even stronger effects of the moratorium for villages relying on these inflows.

Data on remittances is scarce and, to the best of our knowledge, no nationally representative survey on migration and remittances was collected before and after the moratorium. Given this data constraint, we provide a simple back-of-the envelope calculation combining our results with additional sources. First, in Figure 3 we showed that the stock of female migrants in villages with links to Saudi Arabia drops by 30.4% in 2014 compared to 2011, or 37.9% in the counterfactual scenario without the ban. Secondly, Indonesian households receiving remittances from abroad have a 27.8% lower probability of being poor than those not receiving any (Cuecuecha

and Adams, 2016). This implies that after 2011, potentially $0.304 \times 0.278 = 8.5\%$ more households are in poverty because of the lack of remittances. With respect to the counterfactual scenario, the estimate is $0.379 \times 0.278 = 10.5\%$.

In percentage points, the average pre-ban-number of migrants per capita are 1% in villages with migration links to Saudi Arabia. This roughly corresponds to 4% of the households having at least one migrant abroad. With a decrease in the stock of migrants by 30.4%, this means the new number of households depending on migration becomes $0.04 \times 0.7 = 0.028$ and the households less poor are $0.028 \times 0.278 = 0.0078$. This leads to $(0.04 \times 0.278) - (0.04 \times 0.7 \times 0.278) = 0.0033$, i.e. an increase of 0.33 percentage points in the number of households being poor because of the lack of remittances, or 0.44 pp in the counterfactual scenario.[21]

Dependency on international and internal migration

Income shocks can lead to substitution from international and domestic migration. This effect is however heterogeneous and determined by the degree of communities' dependency on international migration (Gröger, 2021). We investigate these heterogeneous substitution dynamics by splitting the sample into terciles of initial international emigration rates. This way, we capture communities' historical propensity to rely on work overseas.[22] We first check if there is a heterogeneous effect of natural disasters on poverty after the ban by each tercile of initial international emigration rate. Secondly, we investigate the potential substitution to internal migration for each sub-sample. Coefficients in Table 3 point towards heterogeneous effects of the triple difference: villages that historically relied more on international migration, i.e. with a relatively higher pre-ban international emigration rate, are those most affected by natural disasters after 2011. The decrease in the population of stayers (i.e. an increase in out-migration to other villages) appears to be driven by villages in the second tercile of ex-ante emigration rate.

The sample in column (1) and (2) consists of of villages that relied on international migration the least. These villages do not show significantly different levels of poverty (column (1)) nor different levels of internal migration (column (2)) once hit by natural disasters after 2011. In this sample, urban villages constitute an above-average share: 33% are urban, well above the sample mean of 18%. As urban precincts, these villages are potentially more resilient to climatic shocks and

[21] All these estimates can be considered conservative because the drop in 30% measure changes in stocks, not outflows. In addition this only accounts for the drop in female migrant stocks.

[22] Initial international emigration rate is defined as the stock of international emigrants divided by the population, averaged for the years leading up to the ban in 2011 (2005 and 2008).

therefore less reliant on internal and international migration as a coping strategy.

Villages in the middle tercile are those that experience the largest rise in internal out-migration and no significant changes in poverty (columns (3) and (4)). Potentially, the latter might be due to households not overshooting investment into international migration compared to households from the third tercile.

Table (3) Average effect of disasters on poverty or internal migration by terciles of initial international emigration rate

	Low initial ER		Middle initial ER		High initial ER	
Dependent:	(1) Poverty cards	(2) Internal migrants	(3) Poverty cards	(4) Internal migrants	(5) Poverty cards	(6) Internal migrants
SA × Post2011 × Disaster	0.091	0.000	0.106	-0.023**	0.113*	-0.003
	(0.072)	(0.011)	(0.076)	(0.009)	(0.066)	(0.009)
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,884	56,884	56,884	56,884	56,884	56,884
Share of rural villages	0.67	0.67	0.81	0.81	0.89	0.89

Notes. Initial international emigration rate (ER) is defined as the stock of international emigrants divided by the population, averaged for 2005 and 2008. We exclude villages with zero stock of emigrants in years 2005 and 2008. The dependent variable is the inverse hyperbolic sine (asinh) in columns (1), (3) and (5); log(population-international stock of migrants) in columns (2), (4) and (6). Control variables include asinh(male migrants), log(population) and a conflict event dummy in column (1), (3) and (5); and only conflict in columns (2), (4) and (6). All further interactions are included in the estimation but not displayed here. Robust standard errors are clustered at the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Our results indicate that communities more reliant on international migration might have over-invested in a riskier adaptation strategy to income shocks from natural disasters. Being over-dependent on international migration can make it more difficult to switch to alternatives such as moving elsewhere in Indonesia, potentially explaining the results in columns (5) and (6). Furthermore, nine out of ten villages in the sample are rural and therefore more dependent on agriculture, likely to send international migrants (Bazzi, 2017) and vulnerable to disaster-induced income shocks.

6 Conclusion

We investigate whether international migration restrictions affect the capacity of villages to absorb income shocks induced by natural disasters. Indonesia—a country with long emigration history prone to weather shocks—abruptly implemented a ban preventing all women from emigrating to Saudi Arabia as domestic workers in 2011. Exploiting this large-scale natural experiment in a triple difference analysis, we show that villages whose migratory opportunities were curtailed experienced a 13% greater increase in poverty in the aftermath of disasters.

To the best of our knowledge, we are the first to causally quantify the unintended consequences of migratory restrictions in the context of natural disasters. Our results suggest that the aim of the Indonesian government to protect citizens overseas by inhibiting emigration came at a cost for Indonesians confined to stay. The burden of this policy was particularly high for areas relying on rainfed irrigation for rice production, a sector that absorbed many would-be international emigrants after the ban. We identify floods as the most consequential disaster type, particularly when hitting these agriculture-intensive villages. These findings point towards important heterogeneities in how villages come to adapt to the ban due to their economic structure and thereby shed light on an important mechanism other than remittances.

Our results are particularly relevant in light of two of the most pressing issues worldwide: the increasing frequency of climate-induced disasters and current political debates to create restrictive barriers to migration. In this respect, we extend findings highlighting the vast gains from reducing barriers to migration (Bryan and Morten, 2019; Clemens, 2011), yet from the opposite perspective. We show that suppressing international migration curbs one major adaptation strategy to natural disasters. With a rise in restrictive migration policies against the backdrop of sharpening climatic changes, this scenario has the potential to further put livelihoods in affected communities around the world under pressure.

While the setting of our study examines the less frequent case of restrictions implemented by the country of origin, we believe that the effects on households relying on migration would be similar for policies enacted by destination countries. More specifically, implications for policy makers in both countries of origin and destination can be derived from this setting: migration restrictions can put further pressure on communities already affected by climate change, particularly when the opportunities to substitute are limited. In light of current projections on the number of climate-induced migrants going into hundred of millions (Cattaneo et al., 2019),

decision makers need to carefully take climatic changes into account when designing migration-related policies.

Appendices

2.A Background

2.A.1 Questions of key variables included in *Podes*

Stock of migrants Are there any village residents who work abroad as "overseas workers" (*TKI*)? If yes, number of males/females currently working abroad.

Main destination country What is the destination country for the majority of overseas workers from this village?

Natural disasters Has there been natural disaster in the last three years, that caused damages and losses?.

Poverty cards (*SKTM*) Number of poverty letters issued in the previous year.

Social health cards (*Askeskin*) Number of households who received "Health card/member card of the health aid program for poor people" during one previous year.

Population Residents and families - total male / female population. Note that for *Podes* 2014, we use data on household electricity access to extrapolate population figures: The number of households with and without access yields the total number of households in a village, which we multiply by the average Indonesian household size (3.6 in 2014).

Conflict Have there been any mass fights in the past year?

Source: List based on *Podes* 2005. See the Appendix Table 2.B.1 for summary statistics.

2.A.2 Criteria for the eligibility of poverty letters (*SKTM*)

1. The floor area of the building in which the household resides is less than 8 square meters per member.
2. The floor of the household's residence is made of earth/cheap cement.
3. The walls of the household's residence are made of low quality wood or are damaged.
4. Household does not have their own sanitation facility.
5. Household's lighting sources do not use electricity or share it with other families.
6. Household's access to drinking and cooking water comes from wells.
7. Household's fuel for daily cooking is firewood or subsidized gas.
8. Household consumes meat/dairy/chicken less than once a week.
9. Household can purchase a maximum of one set of new clothes per member a year.
10. Household's frequency of eating for each member is maximum twice per day.
11. Household is not able to pay for treatment to public health centre ("puskesmas"/polyclinics).
12. The income of the head of the household is less than IDR 500,000 per month.
13. The educational attainment of the head of the household is less than primary schooling.
14. Household members do not have savings/assets with the minumum value of IDR 500,000.

Source: List based on Fiarni et al. (2013).

2.A.3 Constructing a village-crosswalk

Administrative units. As a consequence of Indonesia's decentralization after the fall of the authoritarian Suharto regime in 1998, a splitting process of administrative units ensued at virtually all administrative levels. Indonesia's official administrative levels consist of provinces (*propinsi*), districts (regencies *kabupaten* and cities *kota*), sub-districts (*kecamatan*) and villages (*desa*). In the aftermath of fiscal and administrative decentralization reforms of 2000, districts (the second regional tier) started to receive substantial budgetary spending (but rather minor revenue generating) capacities. In a step-wise process of district proliferation (*pemekaran*), their number increased from 314 in 2000 to 511 in 2014 as recorded in the respective years' census data.

When using any of these administrative levels as the unit of observation, the proliferation of administrative units has to be taken into account to track units over time consistently. It is fairly common that an existing unit (mother) splits into two new units (children) in one year, and then one of the children again into three children some years later. Units therefore can be children in one year, and also mothers in another year.

Beyond names, all administrative units are numbered following a simple and coherent coding methodology based on numbers for identification purposes. The process of splitting administrative units results in shifting administrative codes that are propagated through all administrative levels.

Village crosswalk. Our approach to tracing villages across time takes the administrative codes provided in all village census-rounds from 2000 through 2014 as its basis (relying on census rounds from 2000, 2003, 2005, 2008, 2011 and 2014). A straightforward id-merge across rounds performs poorly due to the splitting process, the renaming of villages, and re-coding of village ids. To connect all rounds, we rely on three main data sources: (1) the individual census rounds' administrative codes, (2) available crosswalks on the district as well as sub-district level, and (3) village shapefiles.

We proceed in four steps: First, we merge the sub-district crosswalk provided by the Indonesian Family Life Survey (IFLS) to individual census rounds using corresponding administrative codes. This crosswalk reflects all code changes except for those on the village level. Second, we employ fuzzy string matching by village names within the same sub-district based on the reconstructed codes. We match the remaining unmatched villages based on the district-level crosswalk. Lastly, for the remainder of unmatched villages, we combine village shapefiles across time to match

them with their corresponding pair/mother. Out of the existing 82,190 villages in the 2014 census, we can trace more than 78 thousand back to 2000, representing more than 95% of all villages, thereby covering all sub-districts and identifying mother-child relationships. This allows us to create a panel of Indonesian villages and urban precincts for all existing census-rounds from 2000 through 2014.

2.A.4 Determinants of access to poverty cards

To show that poverty cards are precisely targeted towards the poorest households, we follow Priebe et al. (2014) in analysing the determinants of individual-level poverty card access. For this exercise we use the fourth wave of the panel Indonesian Family and Life Survey (IFLS) (Strauss et al., 2009). This wave was collected in 2007 covering 13 provinces and a total of 13,535 households with 50,580 individuals. We use the information about households' poverty cards uptake to estimate its determinants with the following linear probability model:[23]

$$SKTM_{ip} = \beta_0 + \beta_1 \, Poverty_{ip} + \lambda_i + \mu_p + \varepsilon_{ip} \tag{2.3}$$

$SKTM$ is a binary variable taking the value 1 if the individual i from province p lives in a household with poverty card access (SKTM). We measure $Poverty$ in two ways: First, we divide the sample into quintiles of yearly consumption expenditures. Second, we create a binary variable for individuals falling below the poverty line, i.e. those whose daily consumption expenditure is below 2$ PPP in 2007. We introduce a vector of individual- and household-level controls λ_{ip} including rural/urban status, age and age^2, years of education, marital status, religion, number of household members and number of household members squared, number of children below 5, and number of elders above 60. We further include province fixed effects μ_p and we cluster the standard errors at the household level.

Results are presented in the Appendix Table 2.B.12. It shows that individuals with lower consumption expenditures are more likely to reside in households with poverty card access. More specifically, in column (1), individuals in the bottom expenditure quintile have a 11.3 percentage points greater probability to hold poverty cards than those the top quintile. This difference monotonically decreases, but remains significant at 1% level for other quintiles. Furthermore, individuals whose daily consumption expenditure is below 2$ (2007 PPP) have 6.4 percentage points higher probability to hold a SKTM. The results are similar if we restrict the sample to individuals in rural (column 3-4) and urban areas (column 5-6).

[23] The exact question in the survey is "Does this household have a "letter of poor" (Surat Keterangan Tidak Mampu)?".

2.B Tables

Table (2.B.1) Summary statistics

	Mean	SD	Min	Max	Obs
Podes (2005, 2008, 2011 and 2014)					
Saudi Arabia as main destination	0.12	0.33	0	1	268,194
Stock of emigrants	18.39	67.40	0	5,912	268,194
Stock of female emigrants	10.78	39.76	0	3,022	268,194
Stock of male emigrants	7.61	38.54	0	4,670	268,194
Disaster in the last threee years	0.40	0.49	0	1	268,194
Number of disasters in the last three years	1.36	2.71	0	69	200,206
Poverty cards	66.58	210.62	0	41,448	268,194
Social health cards	431.93	939.95	0	55,307	268,194
Households living in slums	7.93	95.07	0	22,358	268,194
Population	3,346.63	4,731.86	4	199,996	268,194
Conflict in village	0.03	0.17	0	1	268,194
Rural village	0.82	0.38	0	1	267,724
Lowlands	0.19	0.39	0	1	183,337
Flood in the last three years	0.25	0.43	0	1	214,588
Landslide in the last three years	0.14	0.34	0	1	186,833
Forest fire in the last three years	0.05	0.22	0	1	169,542
Earthquake in the last three years	0.10	0.29	0	1	178,128
Tsunami in the last three years	0.01	0.08	0	1	162,051
Typhoon in the last three years	0.14	0.34	0	1	138,613
Tide in the last three years	0.03	0.18	0	1	123,888
Other disasters in the last three years	0.07	0.26	0	1	44,454
Smeru (2010 and 2015)					
Poverty rate (below 2$ PPP)	19.05	22.13	0	99.50	131,915

Notes. Information on type of natural disaster and number of natural disasters is restricted to the years 2008, 2011 and 2014. Types of natural disaster are categorical variables taking the value one if that type of natural disaster has occurred in the last three years and zero in absence of any natural disasters recorded.

Table (2.B.2) Average effect of disasters on poverty: with and without control variables

Dependent	Poverty cards							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SA × Post2011 × Disaster	0.110***	0.115***	0.113***	0.110***	0.118***	0.115***	0.113***	0.118***
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Log(population)		0.391***			0.385***	0.389***		0.383***
		(0.014)			(0.014)	(0.014)		(0.014)
Asinh(male migrants)			0.060***		0.056***		0.060***	0.056***
			(0.004)		(0.004)		(0.004)	(0.004)
Conflict dummy				0.122***		0.110***	0.120***	0.108***
				(0.019)		(0.019)	(0.019)	(0.019)
Village FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	268,194	268,194	268,194	268,194	268,194	268,194	268,194	268,194

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). All further interactions are included in the estimation but not displayed here. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.3) Average effect of number of disasters on poverty

Dependent	Poverty cards			
	DD			DDD
	(1)	(2)	(3)	(4)
Number of disasters		0.026***	0.019***	0.027***
		(0.002)	(0.002)	(0.002)
SA × Post2011	0.039*			0.015
	(0.021)			(0.024)
Post2011 × Number of disasters		-0.010***		-0.013***
		(0.003)		(0.003)
SA × Number of disasters			0.001	-0.011
			(0.005)	(0.007)
SA × Post2011 × Number of disasters				0.018**
				(0.008)
Village FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	200,173	200,173	200,173	200,173

Notes. The sample is restricted to census years 2008, 2011 and 2014 for lack of intensive margin disaster data in *Podes* 2005. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include asinh(male migrants), log(population) and a conflict event dummy. Binary variables SA_v and $Post2011_t$ are omitted because they are absorbed by the fixed effects. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.4) Average effect of disasters on poverty using alternative poverty measurements

Dependent	Health cards	Households living in slums	Poverty rate 2$ PPP
	(1)	(2)	(3)
SA × Post2011 × Disaster	0.154*	0.279***	1.186***
	(0.081)	(0.042)	(0.382)
Village FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	268,194	268,194	128,772

Notes. The dependent variables in columns (1) and (2) are transformed by the inverse asymptotic sine (asinh). The dependent variable in column (3) is the number of poor people below the poverty line of 2 USD PPP divided by the total population. Control variables include asinh(male migrants), log(population) and a conflict event dummy. All further interactions are included in the estimation but not displayed here. The sample consists of census years 2005, 2008, 2011 and 2014 in columns (1) and (2); and 2011 and 2014 in column (3). Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.5) Average effect of disasters in t-1 on poverty

Dependent	Poverty cards		
	DD		DDD
	(1)	(2)	(3)
$Disaster_{t-1}$	-0.018*	-0.010	-0.020*
	(0.010)	(0.009)	(0.010)
Post2011 × $Disaster_{t-1}$	0.034**		0.032**
	(0.015)		(0.016)
$SA \times Disaster_{t-1}$		0.026	0.020
		(0.025)	(0.029)
SA × Post2011			0.031
			(0.029)
SA × Post2011 × $Disaster_{t-1}$			0.013
			(0.043)
Village FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	199,899	199,899	199,899

Notes. *t-1* corresponds to the period of 3 to 6 years before *t*. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include asinh(male migrants), log(population) and a conflict event dummy. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.6) Average effect of disasters on poverty: further robustness checks

Dependent	Poverty cards					
	Java excluded	Java only	Only villages with migrants	Exclude Middle East	Trim population	Weighted by population
	(1)	(2)	(3)	(4)	(5)	(6)
SA × Post2011 × Disaster	0.177** (0.076)	0.140*** (0.048)	0.118*** (0.042)	0.118*** (0.042)	0.085** (0.041)	0.128*** (0.040)
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Province trend	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166,496	101,698	140,399	141,111	239,872	268,194

Notes. Column (1) excludes villages on the island of Java from the sample, column (2) is restricted to those villages. Column (3) restricts the sample to villages that had at least an Indonesian worker overseas in 2005. Column (4) excludes UAE, Jordan and Qatar as main destinations from the sample. Column (5) restricts the sample between the 1st and 99th population's percentile. Column (6) weights the regression by log(population). Column (6) weights the regression by population. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include asinh(male migrants) and a conflict event dummy. Log(population) is also included a control in columns 1–5. All further interactions are included in the estimation but not displayed here. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.7) Average effect disasters on poverty controlling for financial transfers

Dependent	Poverty cards					
	(1)	(2)	(3)	(4)	(5)	(6)
SA × Post2011 × Disaster	0.097**	0.096**	0.096**	0.096**	0.096**	0.096**
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)
Asinh(District transfers)		0.005**	0.004**	0.004*	0.004*	0.004*
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Asinh(Province transfers)			0.007***	0.007***	0.007***	0.007***
			(0.002)	(0.002)	(0.002)	(0.002)
Asinh(Central govn't transfers)				-0.002	-0.002	-0.002
				(0.002)	(0.002)	(0.002)
Asinh(Foreign aid)					0.021***	0.021***
					(0.006)	(0.006)
Asinh(Private aid)						-0.002
						(0.005)
Village FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	200,173	200,173	200,173	200,173	200,173	200,173

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). District transfer, province transfer and foreign and private aid are in milion IDR. Control variables include asinh(male migrants), log(population) and a conflict event dummy. All further interactions are included in the estimation but not displayed here. Sample years: 2008, 2011, 2014. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.8) Average effects in the presence of spillovers

Dependent	Poverty cards			
	DDD			
	(1)	(2)	(3)	(4)
SA × Post2011 × Disaster	0.119***	0.113***	0.0130***	0.131***
	(0.039)	(0.041)	(0.043)	(0.045)
Neighboring village with SA=1 in distance of:				
0-10km × Post2011 × Disaster		-0.009	0.007	0.008
		(0.029)	(0.031)	(0.034)
10-20km × Post2011 × Disaster			0.067	0.067
			(0.044)	(0.046)
20-30km × Post2011 × Disaster				0.005
				(0.055)
Village FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	268,194	268,194	268,194	268,194

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include asinh(male migrants), log(population) and a conflict event dummy. The additional distance controls indicate whether a village is within certain distance of a village with Saudi Arabia as main migratory destination (centroid based), and set to zero in case the village itself has Saudi Arabia as main. All further interactions are included in the estimation but not displayed here. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.9) Average effect of disaster events on poverty: Conley standard errors

Dependent	Poverty cards			
Distance cut-off	5 km	10 km	20 km	30 km
	(1)	(2)	(3)	(4)
SA × Post2011 × Disaster	0.119**	0.119**	0.119**	0.119**
	(0.054)	(0.061)	(0.057)	(0.049)
Village FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	265,804	265,804	265,804	265,804

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). Control variables include asinh(male migrants), log(population) and a conflict event dummy. All further interactions are included in the estimation but not displayed here. 604 villages are excluded from the sample because of the absence of coordinates. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.10) Average effect of disasters on population growth and poverty

Dependent	(1) Population	(2) Poverty cards
SA × Post2011 × Disaster	-0.013**	-0.524
	(0.005)	(0.416)
SA × Post2011 × Disaster × log(population)		0.082
		(0.050)
Village FE	Yes	Yes
Time FE	Yes	Yes
Province-time trend	Yes	Yes
Controls	Yes	Yes
Observations	268,194	268,194

Notes. The dependent variable is log(population) in column (1) and asinh(poverty cards) in column (2). Control variables include a conflict event dummy. All further interactions are included in the estimation but not displayed here. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

Table (2.B.11) Average effect of extreme rainfall events on poverty

Dependent	Poverty cards			
Buffer	10 km	15 km	20 km	30 km
	(1)	(2)	(3)	(4)
SA × Post2011 × Extreme rainfall	0.576***	0.629***	0.562***	0.253***
	(0.196)	(0.144)	(0.119)	(0.091)
Village FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Province-time trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	15,453	23,735	32,360	51,657
Villages	5,112	7,781	10,524	16,656

Notes. Poverty cards is transformed by the inverse asymptotic sine (asinh). Extreme rainfall events are defined as days of year t with the largest rainfall recorded in the 10 previous years. Control variables include asinh(male migrants), log(population) and a conflict event dummy. All further interactions are included in the estimation but not displayed here. Robust standard errors are clustered on the village level and reported in parentheses. Significance at or below 1% (***), 5% (**) and 10 percent (*).

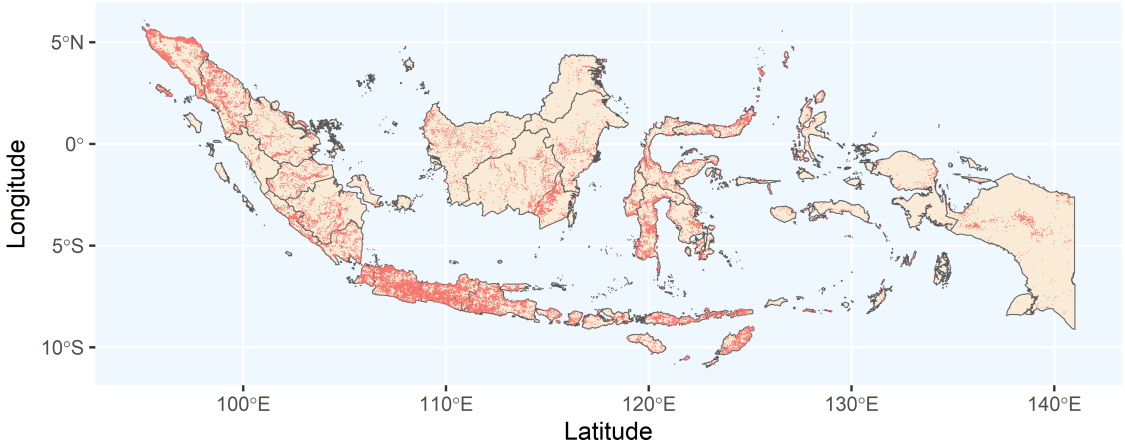
Table (2.B.12) Probability to receive poverty cards (SKTM)

Dependent	Holding SKTM					
	All		Rural		Urban	
	(1)	(2)	(3)	(4)	(5)	(6)
Expenditure quintile 1	0.113		0.078		0.149	
	(0.012)		(0.016)		(0.019)	
Expenditure quintile 2	0.098		0.063		0.133	
	(0.011)		(0.015)		(0.017)	
Expenditure quintile 3	0.060		0.035		0.077	
	(0.009)		(0.013)		(0.012)	
Expenditure quintile 4	0.021		0.013		0.022	
	(0.007)		(0.012)		(0.009)	
Poor (below 2$ PPP)		0.064		0.043		0.098
		(0.010)		(0.013)		(0.018)
Avg. SKTM uptake in q5	0.050		0.059		0.046	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45,953	45,953	20,944	20,944	25,009	25,009

Notes. The dependent variable captures the linear probability that the household holds poverty cards (SKTM). Columns (2) and (3) restrict the sample to individuals living in rural areas. Columns (5) and (6) only include the urban sample. The control group in columns (1), (3) and (5) is the expenditure quintile 5. Control variables include rural/urban residence, age and age^2, years of education, marriage status, religion, number of household members and number of household members squared, number of children below 5, and number of elders above 60. Standard errors are clustered at the household level. Survey weights are applied. Data source: IFLS 4 (2007).

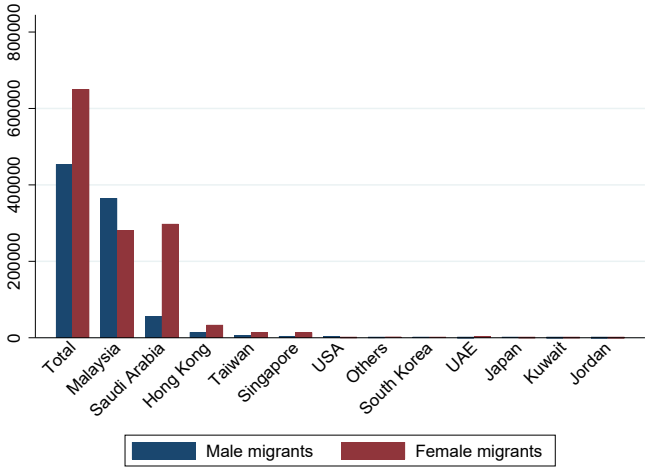
2.C Figures

Figure (2.C.1) Disaster events in the period 2003–2005



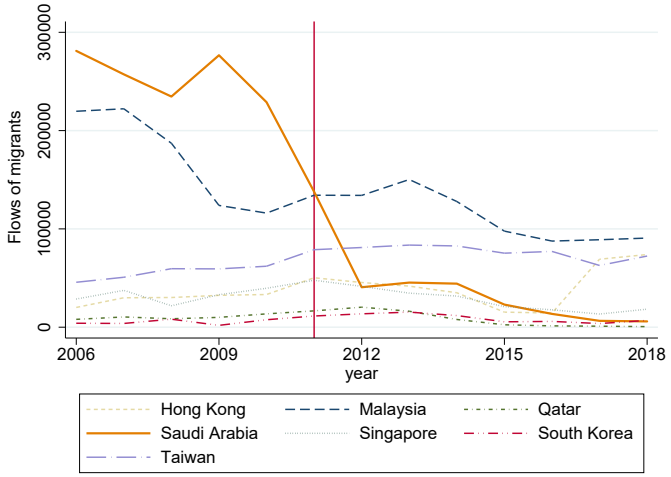
Notes: Red dots represent centroids of villages that experienced at least one natural disaster between 2003 and 2005. Source: Own computation based on *Podes* 2005.

Figure (2.C.2) Stock of emigrants by gender and destination in 2005



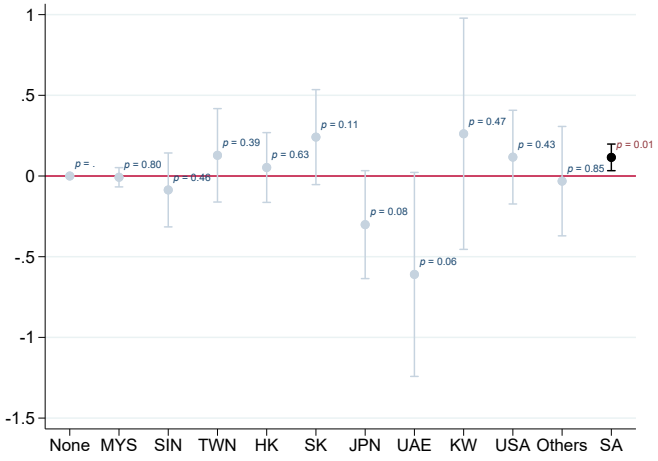
Notes: Source: Own computation based on *Podes* 2005.

Figure (2.C.3) Annual flows of documented migrants per destination



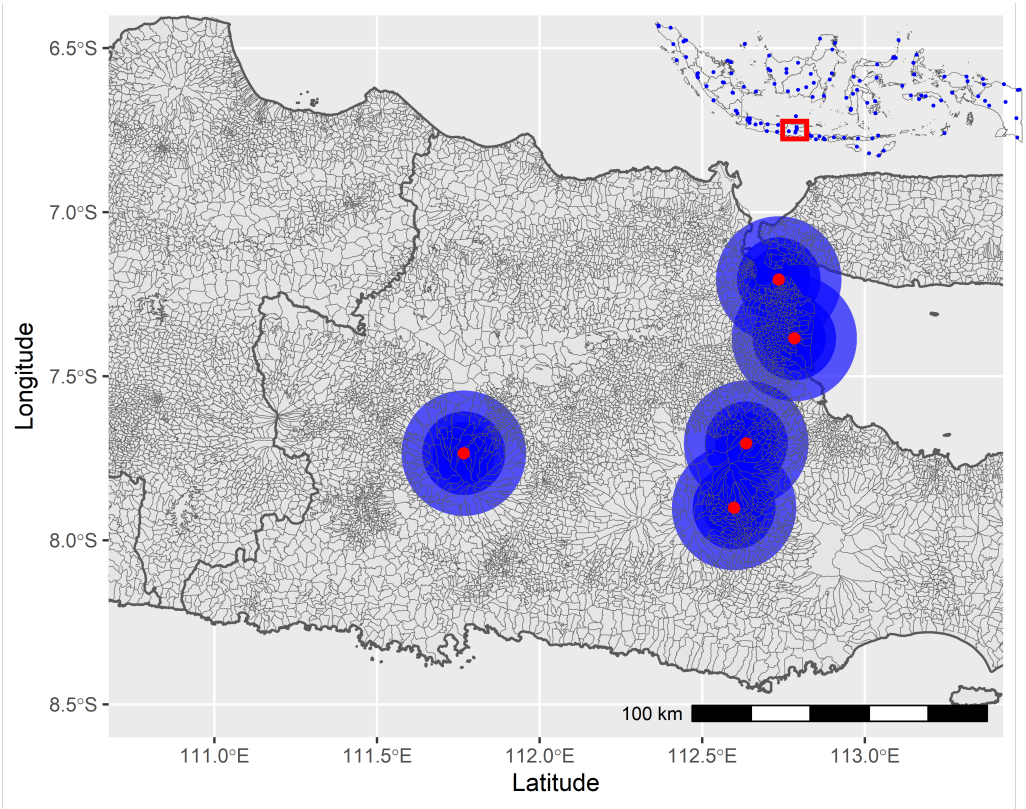
Notes: The vertical line indicates the implementation of the ban in 2011. Source: Own computation based on data from the national placement agency for Indonesian workers abroad (BNP2TKI).

Figure (2.C.4) Placebo: average effects of disasters by villages' top destination countries



Notes: Coefficients are bound at 95% confidence intervals. The displayed coefficients capture the effect of natural disasters on poverty cards transformed by the inverse hyperbolic sine. The baseline category is villages with no migrants ("None"). Countries from the left to the right are: Malaysia, Singapore, Taiwan, South Korea, Japan, United Arab Emirates, Kuwait, United States, other countries, Saudi Arabia. Control variables include asinh(male migrants), log(population) and a conflict event dummy. Village and year fixed effects as well as province time trends are included. Standard errors are clustered at the village level. Number of observations: 268,194.

Figure (2.C.5) Geocoded weather stations



Notes: The larger map plots the zoomed in area delimited by the red box in the top right corner. Red dots represent the coordinates of each weather station. Different shades of blue indicate buffer zones of 10, 15, 20 and 30 km respectively. Source: Own computation based on *SKTM* and *Podes*.

Chapter 3

Migration, Childcare and Female Employment: Evidence from Albania

Abstract

We investigate the effects of international migration of a household member on female employment in Albania, considering the availability of childcare as a conditioning factor for women's decisions. In order to instrument the presence of a migrant member abroad, we exploit the collapse of the Communist regime and the mass emigration of Albanians in the early 1990s as a natural experiment for migration networks. We use the Albanian DHS survey 2018 for our main analysis. Its geo-referenced clusters are combined with the universe of kindergartens in Albania and their geo-location to construct spatial preschool availability. Our results show that female carers of young children have a greater probability to have wage employment if a member of their household is abroad. This effect only arises for women living with children attending preschool or for those residing in high preschool-dense areas. The results are stronger for low-educated women and those not receiving remittances. The chapter thus shows that childcare services can leverage the effects of international migration in Albania. The analysis also shows that greater kindergarten availability directly increases female labour supply, particularly in rural areas.

Keywords: Migration, Female employment, Childcare, Preschools

This chapter is co-authored with Cecilia Poggi (Agence Française de Développement)

1 Introduction

International migration has strong direct and indirect effects on development outcomes at origin. In contexts dominated by male emigration, this can have repercussions on the labour force participation of women left behind. Migration often makes women bear large household-related costs and responsibilities, pushing them to join the labour market to replace the migrant's labour and income (Binzel and Assaad, 2011; Lenoël and David, 2019; Mendola and Carletto, 2012). At the same time, remittances from abroad ease liquidity constraints and increase women's reservation wage, possibly reducing their incentives to work (Amuedo-Dorantes and Pozo, 2006; Cox-Edwards and Rodríguez-Oreggia, 2009; Lokshin and Glinskaya, 2009). One issue that largely remains unexplored is how the migration of a household member influences women's decision to join the local labour market, conditional on the availability of services like childcare. This paper fills this gap by looking at how male emigration impacts women's employment, exploring in an emerging-economy setting the heterogeneity of response according to the levels of formal childcare services available to the households.

We conduct our analysis in Albania. With one-third of the population estimated to have migrated abroad after the fall of the Communist regime in 1991, Albania is among the countries with the largest emigration rate in the world (Barjaba and Barjaba, 2015). At the same time, it displays a strong gender disparity in labour market access (Miluka, 2013). With respect to family policy, the country's preschool financing level is low (UNICEF, 2017) leading to one of the lowest rates of preschool attendance in the Balkans (World Bank, 2015). No significant policy has been put into place to favour access to childcare services, but its lack is often identified qualitatively as a leading barrier for women to finding employment (Cinque et al., 2022; GADC, 2022). We, therefore, assess quantitatively if the presence of childcare services at origin plays a role in influencing the income-diversification strategy effects induced by international migration on female members left behind.

For the purpose of identification, we exploit a unique feature of the Albanian case, which allows us to causally infer the link between international migration and female labour force participation. Before 1991, international migration was virtually absent because the Communist regime prohibited movements out of the country. We thus exploit the collapse of the Communist regime and the following mass emigration of Albanians as an instrument for migration networks, similar to Mendola and Carletto (2012). This allows us to overcome the potential bias from migrants' self-selection, women's endogenous choice to join the labour market as

well as the availability of public services that could jointly influence employment and mobility decisions.

We rely on the Albanian Demographic and Health Survey (DHS) 2018. The Albanian DHS is unique in that it provides both GPS coordinates and unusually detailed household migration information. We exploit both features to identify highly localised migration networks. In addition, the Albanian DHS collects rich information on women's socioeconomic characteristics and detailed households' family connections. Besides the DHS data, we geo-reference administrative data on the universe of kindergartens in Albania. Combined with DHS clusters' coordinates, it allows the construction of spatial proxies of formal childcare availability. The rationale for inspecting the availability of childcare is that, under the possibility of outsourcing childcare, women would face a cost (direct or indirect) whilst leveraging outside options for freeing time out of care responsibilities. Under a situation of international migration of a household member, having childcare services in proximity allows women to join the labour market while a male member is abroad.

A policy-maker interested in leveraging the effects of international migration on those left behind could plausibly intervene in formal childcare services, by improving preschool availability or access. Maternal employment is influenced by the interaction of various internal factors, like the labour market participation of other members, and external factors like the presence of policies and infrastructures, all influencing the opportunity cost of dedicating time to work. The characteristics of employment in the presence of family policies vary considerably worldwide, depending on the design of the policy considered the policy combinations implemented (Filgueira and Rossel, 2020). For instance, in South Korea, greater spending on education, childcare, health and social care increases female employment more than male employment in the short run. It also raises both male and female employment in the medium run due to increasing output (Oyvat and Özlem Onaran, 2022).

For this reason, we further investigate whether the availability of such types of amenities directly affects female employment decisions in Albania. We exploit the spatial local access to kindergartens to infer how international migration decisions in the presence (or absence) of childcare amenities could influence female employment decisions. Moreover, as a secondary exercise, we use the spatial availability of preschools as an instrument for having a child enrolled in preschools and inspect the direct effect on female employment participation.

Our main results show that women with young children largely increase their employment probability if a member of the household is abroad. However, this increase only occurs among women with children attending preschool or for those

living in areas with a relatively high number of preschools per child. We further show that the rise in employment probability is driven by paid occupations and that is particularly strong for women with low educational attainment. Furthermore, we identify two potential mechanisms driving women's decision to join the labour market. First, we investigate whether migration impacts female child-carer empowerment, finding no direct correlation between migration and females' instrumental agency over specific decisions. Second, we explore whether households' credit constraints influence employment decisions, particularly via the channel of remittance receipt. We find that for women receiving remittances, there is a reduction in their probability to work.

Our study builds on Mendola and Carletto (2012), analysing the link between male migration and female employment in Albania in 2005, showing that a migrant abroad decreases female paid labour supply and increases unpaid work. However, these effects only hold for women without young children. Our paper provides an explanation of why it is the case. We show that looking at the female carers of a household almost a decade and a half later, only those women receiving remittances tend to decrease their labour supply. We unpack these results by finding heterogeneous effects of migration with respect to access to formal childcare. Fathers that leave young children behind increase the probability of paid employment for women living in areas with larger availability of preschools. We thus argue that male migration induces women to find better, paid jobs as long as they have access to childcare services.

This chapter reconciles two strains of literature. We first contribute to studies on the effect of migration on the welfare of spouses and children left behind (Amuedo-Dorantes and Pozo, 2006; Antman, 2012b; Binzel and Assaad, 2011; Carletto and Kilic, 2011; Lenoël and David, 2019), by identifying characterizations of the family policy environment where migration has taken place, as it can allow for greater depth of understanding of migration effects on local labour supply. Second, our results are in line with evidence of the positive effect of preschool access on women's labour supply (Calderón, 2014; Dang et al., 2019; Jaume and Willén, 2021; Martínez A. and Perticará, 2017).[1] This provides further evidence of the importance of policies that accompany workers and care for their dependents, without having to sacrifice either. Results are in line with the literature pledging for making

[1]Research for developed countries finds that maternal employment increases when formal childcare services are available (Vuri, 2016). The strength of the effects of interventions like childcare subsidies will also vary relative to the initial cost of childcare experienced (Olivetti and Petrongolo, 2017), or whether any preferential selection towards childcare applicants are applied (Yamaguchi et al., 2018).

public childcare in emerging economies more available, as it could induce households to substitute informal childcare with public and private alternatives (Ángel Talamas Marcos, 2022). To the best of our knowledge, this is the first empirical study to investigate the combined effect of migration and preschool access on women's labour force participation.

The rest of the chapter is structured as follows. Section 2 provides insights on the context of Albania in terms of migration, female employment and childcare provision in the country. Section 3 describes the data used for the analysis. Section 4 outlines the empirical and identification strategy. Section 5 shows the descriptive results. Section 6 provides the results (baseline, mechanisms and robustness checks). Section 7 investigates the direct effects of preschools' availability on female employment. Finally, section 8 concludes.

2 Contextual factors delineating migration, female employment and childcare in Albania

During the fifty years of the communist regime, an egalitarian system was put in place in Albania. The public sector allowed full employment for both men and women, while the strong gender norms within the household remained unaffected (Falkingham and Gjonca, 2001). After the communist regime collapsed in 1991, the rapid transition into the market economy led to the loss of thousand of jobs and increased income inequalities (Labrianidis and Kazazi, 2006). Women in particular have suffered the greatest consequences of this chaotic transition for multiple reasons (Trako, 2019). First, before 1991, women were largely employed in state enterprises, which collapsed as a result of market liberalization (Tarifa, 1994). Second, the confusing context meant that basic public services were suppressed or largely reduced. For instance, the number of kindergartens had fallen by 55% in 2004 with respect to 1990 (IMF, 2006). Together with these rapid and structural transformations, international borders were opened for the first time in fifty years. As a result, hundred of thousands men emigrated abroad (Carletto et al., 2006). Women were burdened with more unpaid work within the household and they experienced less mobility and lower chances to find jobs. Together with fewer childcare services, as a result many withdrew from the labour market (King et al., 2005).

Today, the situation is less dire, the GDP per capita has grown from 2,549 PPP USD in 1990 to 10,949 PPP USD in 2018. However, strong gender wage gaps (Miluka, 2013) as well as imbalances in intra-household resource allocations persist

(Betti et al., 2020; Mangiavacchi et al., 2018). The childcare provision has slightly improved since 2004, with an increase of 16% in the number of kindergartens over a ten-year span (Trako, 2019). However, while the number of pupils enrolled in schools largely recovered since the 2000s, the same cannot be said about preschools (see Figure 3.D.1).

There exists to date both forms of public and private childcare provision in the country. The public childcare provision includes crèches for the age 0-3 and kindergartens for the age 3-6. Both crèches and kindergartens are subsidised by the government, and parents have to pay a fee for the meal provisions. No special regulations exist regarding access to childcare for working parents. The fee is decided at the municipal level, for example in the capital Tirana it is about 1.1 USD per day for the crèche and 1.36 USD for kindergarten (Municipality of Tirana, 2022)[2]. However, preschool services still remain largely underfunded (UNICEF, 2017), making Albania one of the countries with the lowest rates of preschool attendance in the Balkans (World Bank, 2015). In the literature, social norms are often cited in association with the decisions related to childcare modality and timing (Vuri, 2016). Moreover, childcare decisions may also be dependent on the effectiveness of childcare-related leave options, with evidence that a series of institutional factors at the disposal of either parent will play a role in labour market participation, such as the length of parental leave, the presence of any job protection or income support (Olivetti and Petrongolo, 2017). In Albania, maternity leave covers formally contracted workers under the Social Insurance Scheme and is paid up to 365 days (at 80% of the net base salary of the last twelve months from 35 days before the delivery date up to 150 days after the birth, then at 50%). Paid paternity leave is three days, and unpaid parental leave to care for children under 6 years of age is up to four months. Childbirth allowance occurs only once to the insured parent (the mother or, in the absence of her insurance, the father) and it equals 50% of the monthly minimum salary stipulated by law (UNFPA, 2021). In this context, Cinque et al. (2022) find evidence that Albanian women face strong trade-offs in the choice of child-rearing and maternal employment, where the absence of childcare services is found qualitatively to be a major obstacle to job detention.

International migration of Albanians is still a pervasive phenomenon. The Albanian Institute of Statistics —INSTAT (2018a)— estimates that in 2018 about 36% of Albanian citizens were abroad. According to the Albanian DHS 2017/18, more than two-thirds of individuals that ever migrated abroad are male and 56%

[2]With the average monthly income of 465 USD per month in 2018 (INSTAT, 2018b), each child in kindergarten represents around 6% of the monthly budget.

of them are married with an average age of 29 years (see Figure 3.D.2). The top two destination countries are Greece (51.7%) and Italy (35.4%), the two largest economies nearby.

3 Data

3.1 Household and individual-level data

We use the GPS version of the Albanian Demographic and Health Survey (DHS) cross-section collected between 2017 and 2018. DHS is a nationally representative demographic survey for the whole country, as well as at regional and at urban/rural levels. DHS collects detailed socioeconomic information of female respondents aged 15-49 such as labour market characteristics, individual and household demographics, as well as information on the socioeconomic characteristics of children.

The Albanian DHS is one of the few Demographic and Health Surveys to collect detailed information on migration for each household member, such as the year of moving abroad, the main destination, the year of eventual return, gender, education, age of the migrant and relationship status to the head of the household and whether the migrant has left children or the spouse at home. We will exploit this information to construct different definitions of migrants based on the relationship with respondents. The migration module also asks whether the household has received any remittances in the last 12 months.

In the employment section, the survey contains information on the employment status of the respondent, such as if she worked in the last 7 days or if she worked in the last 12 months. In our main analysis, we use the first definition. In this way, we are sure to capture the effect of migration on current female employment, even if the household member moved abroad less than 12 months previous to the survey date.[3] We however show in the robustness section that the effects remain stable using the definition of being employed in the last 12 months.

In the education module, the survey contains information on the highest level of education for each household member, their cumulative years of schooling and current enrollment status. The Albanian DHS stands out from the majority of Demographic and Health Surveys as it also provides information on preschool enrollment status, i.e. attending crèche or kindergarten, for children of age below 6, which we will largely exploit throughout the study.

[3]In the definition of individuals working last week we include those who declare they were temporarily absent from work for sickness or holidays.

3.2 Spatial data

DHS provides precise geolocations of clusters of individuals, with a random displacement of 5 km in rural areas and 2 km in urban ones, always within the second administrative units' boundaries (Perez-Heydrich et al., 2013). We overlay GPS clusters from DHS with the geolocation of the universe of all 1936 public kindergartens and 234 private kindergartens in Albania in the school year 2015/16. This list is compiled by the Albanian Ministry of Education, Sport and Youth ("MoES"). It contains detailed school locations at the rural settlement level or urban neighbourhoods that we geocode through Open Street Maps and Google API. Due to data limitation, we match the preschool data with one school year of mismatch to the DHS (the school year 2016-17). However, this is a minor concern as the number of kindergartens does not change significantly in this period (as displayed in Figure 3.D.3). Figure 3.D.4 displays the location of DHS clusters and kindergartens across the entire country.

We include further geographic covariates from different sources. We obtained localised population data from the WorldPop database (WorldPop, 2018). These data are estimations of population counts at pixels of 100x100 metres-level disaggregated by sex and age group (Pezzulo et al., 2017). We restrict the data to children aged 0-9 to identify the population of children that are used to construct our instrument.[4]

In addition, we use the WorldPop data to control for the population (aggregated at a boundary of 10km) for two confounding aspects of our analysis: the density of the population could both be an indicator of the concentration of public infrastructure for schooling, but also reflect population agglomeration across areas attractive for female employment.

We proxy local development in two ways. First, we use the 2017 satellite nighttime luminosity data from the Visible Infrared Imaging Radiometer Suite (VIIRS). VIIRS provides nightlight intensity per 100x100 metres pixels and it has been shown to be a strong and precise predictor of local and regional output (Gibson et al., 2021; Li et al., 2013). Second, we include the number of active enterprises per municipality in 2017 (61 municipalities) obtained by the Albanian statistical institute (INSTAT). We divide the number of firms by the population of municipalities in 2015. Finally, the quality of local infrastructure is proxied by road density within a given area. The data are obtained by the Global Roads Inventory Project (GRIP)

[4]This is to obviate the fact that WorldPop does not distinguish between age groups of 0-2, 3-6 and 7-12 that we use in our analysis.

dataset (Meijer et al., 2018). We calculate road density as the total road length within a given area divided by the surface.

All geographical variables are then adjusted to the 10 km buffer areas.[5] We sum up the number of children and individuals from WorldPop within 10 km; we define night luminosity per capita by aggregating nightlight luminosity per 10 km, divided by the population in the area; we assign average elevation within 10 km; we calculate road density as road length divided by the circle area (approximately 314.16 km^2 for a 10 km buffer). Furthermore, we create a continuous variable of preschool availability as the total number of kindergartens per 100 children within the 10 km area.

3.3 Resulting dataset

The final dataset is a cross-section of 5,589 women aged 15-49, living in households where at least one child is below 18 years of age. The population of interest is any female caregiver, with any type of family relation with the minor(s) in the household, i.e. mother, grandmother, aunt etc. Sisters are considered caregivers only if the age gap with the youngest child is of at least 10 years. Taking into consideration the characteristics of the local economy, the following analysis will assess how having an international migrant household member influences the employment decisions of female caregivers left behind.

4 Empirical strategy

In order to investigate the effect of having a male member of the household abroad on female employment, we estimate the following specification:

$$Employed_{ihcar} = \beta_0 + \beta_1 \widehat{Migrant}_{hcar}^{post2010} + \beta_2 X'_{ihcar} + \beta_3 \delta_{ar} + \mu_r + \varepsilon_c \qquad (3.1)$$

Where the dependent variable is a binary variable for woman i, from household h and cluster c, living in the buffer area of 10 km a within region r. It takes the value "1" if the individual woman has worked in the last 7 days and "0" otherwise.[6]

[5] See Appendix 3.A for more information on the geocoding procedure, on the choice of the buffer size of 10km and how we deal with the random displacement of DHS coordinates.)

[6] Respondents who declare they did not work last week but have an occupation are coded as employed. In the robustness section, we show that results are robust using an alternative measure of employment, i.e. work in the last 12 months.

Our independent variable of interest is $\widehat{Migrant}_{hcar}^{post2010}$, a binary variable that takes the value one if at least one male member of the household is currently abroad. We define a male international migrant as a male household member living abroad who reports having left a child behind. This definition implies an economic connection to the household for the provision of children, so with respect to the caregiver, a migrant may be the husband, the father, or a brother for instance, who left a child behind. By extension, female caregivers i are either the mother, the aunt, the grandmother, the elder sister, or any other relationship with the child or children the male migrant left in Albania.[7] We only consider migrants that moved after 2010, in order to restrict the analysis to recent migration. We restrict the sample to women that live in households where at least one child is below the age of 18.

We apply a vector X'_{iar} of controls for individual-level characteristics such as age and its squared term, years of education, marital status, urban/rural status, number of children, age of the latest child (in months), and if the latest child is female. We further control for variables that could simultaneously affect the likelihood to have a migrant abroad and the employment probability (McKenzie and Rapoport, 2010). These are a wealth index of households' assets constructed using the Principal Component Analysis approach, and a categorical variable to indicate if the woman has ever resided elsewhere or if she has always lived in the same place.

We include δ_{ar} geographic and local economy characteristics within the buffer area a of 10 km, such as population, road density, altitude, distance to the capital Tirana, and local development proxied by night lights per capita and by the municipal-level enterprises' density.

4.1 Identification

Despite the large array of observable factors, the decision to migrate could be subject to endogeneity, due to migrants' self-selection and omitted variable bias. For example, the decision and timing to migrate, of having children, or for a woman to join the labour market could all be jointly determined within the household. Husbands could decide to work abroad as soon as the local labour market provides opportunities or easier access to jobs for women prospected to become the household primary earners. Or simply, families with migrants could be selected into both decisions, thus having a larger probability to have a member abroad and women

[7] In the robustness section we show that results remain stable using the more restrictive definitions of husbands/partners.

being employed. On the other hand, male migrants could self-select based on socio-economic and cultural characteristics. Culturally, Albanian households in which the male household head migrates might display more traditional gender norms, thereby women's role is primarily seen as childcare givers and men as breadwinners (Betti et al., 2020). More plausibly, the bias could also come from reverse causality (McKenzie and Sasin, 2007). In a scenario in which migration is a joint household maximisation decision, those male workers who could afford to make their female partner stay in Albania and take care of children solely instead of working might be more motivated to migrate, thus biasing the coefficient upwards. Alternatively, the male individual could decide to move abroad if the local labour market does not offer enough job opportunities, biasing the coefficient downwards.

For all these reasons, we use an instrumental variable approach, relying on a *quasi*-experimental setting. More specifically, we instrument the probability to have a member of the household abroad who migrates:

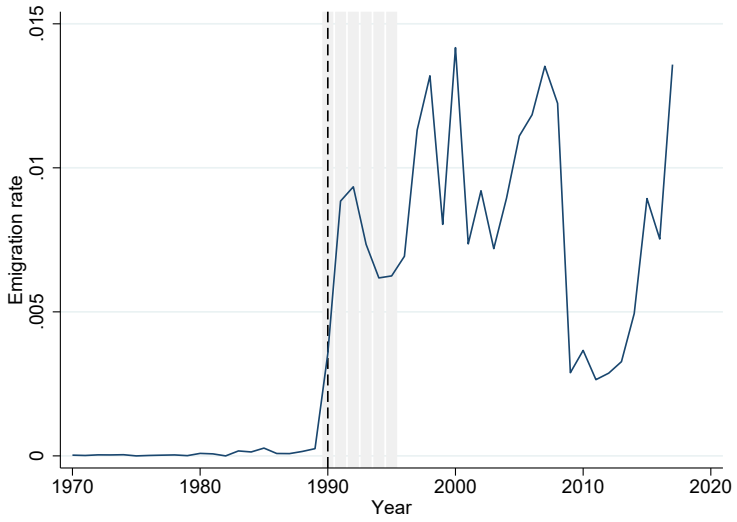
$$Migrant_{hcar}^{post2010} = \alpha_0 + \alpha_1 \frac{N\, migrants_c^{pre1995}}{N\, households_c} + \alpha_2\, X'_{iar} + \alpha_3\, \delta_{ar} + \mu_r + \varepsilon_c \quad (3.2)$$

Where the instrument is defined as the number of migrants in cluster c who migrated in the first wave or before, over the cluster population. We thus use the first wave of migrants to identify households' migration decisions after 2000.

The Albanian context makes the migration network instrument well-suited thanks to the fact that international migration was heavily restricted before 1991. Figure 1 plots the emigration rate by their first year of migration. This rate is measured as the number of household members who are declared to be abroad, over the total number of individuals within each cluster. As figure 1 shows, international migration was virtually null before the fall of the Communist regime. We exploit the fact that borders were suddenly opened in 1991 and that first emigrants could establish migration networks that could facilitate subsequent migration waves by reducing the costs of migration (McKenzie and Sasin, 2007).

This instrument has been widely used in the migration literature (Beine et al., 2011; Massey et al., 1993; McKenzie and Rapoport, 2011; McKenzie and Sasin, 2007; Munshi, 2003; Woodruff and Zenteno, 2007). The majority of studies focus on contexts with a long history of migration which makes it more difficult to isolate the causal link of persistent networks. One exception is Barsbai et al. (2017) who exploit the sudden opening of Moldovan borders to analyse how migrants influence political preferences at home. More closely to our study, Mendola and Carletto (2012) uses

Figure (1) Emigration by first year of migration



Source: DHS 2017/18

the same instrument for the Albanian context defining the local migration network at the district level. Differently from these authors, we exploit the disaggregated nature of our data by constructing the instrument at a more localised level: the DHS cluster, which corresponds to a radius of 2 km for urban households and 5 km for rural ones.

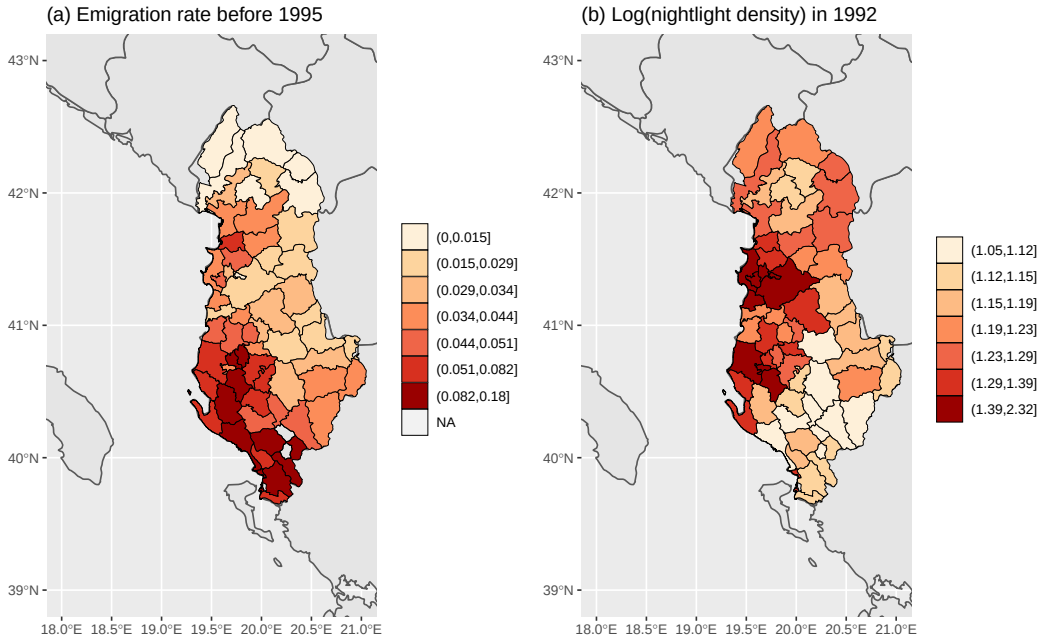
The exclusion restriction implies that the first migrants' decision to move abroad is orthogonal to current local labour markets. A possible threat to this condition derives from persistent labour market characteristics that would have affected past migration and present labour market outcomes. This issue is partially attenuated by the almost three decades span between the first wave of mass migration and the year of the sample. Furthermore, in figure 2a we highlight that municipalities that are relatively closer to Italy and Greece experienced the largest outflows of migrants. This suggests that distance to the border, a plausible exogenous component, played a role in the migration decisions of the first emigrants than persistent local labour market structures.[8] On the other hand, figure 2b shows that the economic activity in 1992 — proxied by nightlight density — is mainly located in coastal areas and around Tirana.[9] We do not find a correlation between emigration rates

[8] Argan and Cheysson (2022) study the effect of the exposition of Albanian territories close to Italy to Italian TV pre-1992 on subsequent Albanians' international migration flows. They do not find any average effects, but only on the richest and most educated individuals.

[9] We proxy local economic activity through satellite night luminosity (Henderson et al., 2012). Specifically, we construct a district-average log(night density), where night density is defined as nightlight divided by the habitable municipality area (it excludes rivers, lakes etc.). Nightlight data are obtained from the Defense Meteorological Satellite Program's Operational Line-Scan

and nightlight density at the municipality level: the correlation coefficient is -0.017 with a p-value of 0.52. Therefore, while we cannot exclude that the pursuit of better economic alternatives was one of the main drivers of international migration in 1992, we do not find evidence that regional income differentials in 1992 correlate with emigration rates before 1995.

Figure (2) Municipality migration rates and nightlights in Albania in 1992-1995



Source: (a) DHS 2017-18; (b) Defense Meteorological Program (DMSP) Operational Line-Scan System (OLS)

To estimate the full model we employ both 2SLS and bivariate probit. Our preferred specification is the bivariate probit, following Chiburis et al. (2012) who show that this estimator outperforms the linear probability model of 2SLS in small samples, in the case of a binary dependent variable and an endogenous binary regressor. As in Chiburis et al. (2012), we bootstrap the standard errors, obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010).

System (DMSP-OLS). We chose 1992 as it is the first year DMSP-OLS operated and it overlaps with the fall of the Communist regime.

5 Descriptive statistics

Table 1 displays the summary statistics for all households, households with male migrants currently abroad and households without current migrants. Overall, around 40% of female respondents declare they worked last week. However, women with migrants abroad are less likely to work, with an average of 30.2% of respondents against an average of 41.2% of those without current migrants. Similar differences can be found for wage workers, but not for unpaid and self-employed ones. Overall coefficients in Table 1 show that migrants come from households with worse socio-economic characteristics: women with migrants abroad have a lower level of wealth, education and a greater number of children; they are more likely to come from rural areas, with lower preschool density, lower firms concentration and lower night luminosity per capita.

These differences are suggestive of a negative selection of migrants into international migration. The last two rows of Table 1 compare age and education of male stayers to current male migrants.[10] It is noticeable that migrants are around three years older on average than stayers and have lower educational attainment: 53% declare that they have an education level of primary or less, against 41% for non-migrant men.

While in many contexts international migrants are positively selected (Cha'ngom et al., 2022), we find evidence of negative selection in Albania. These coefficients are however consistent with De Coulon and Piracha (2005) who show that return migrants (mainly men) in Albania are more likely to be negatively selected with respect to stayers. The strong negative selection of Albanian migrants will likely bias estimations of the effects of international migration event affects female carers employment decision. For this reason, all our estimations will always adopt an IV strategy.

6 Results

6.1 Baseline results

We start the analysis by examining the first stage regression using 2SLS (Equation 3.2) in the bottom panel of Table 2. The coefficient of the instrument is positive

[10]We restrict the educational attainment of male members to households aged 15+, to exclude children that are still attending school and are less likely to migrate independently for work reasons. A comparison between stayers and migrants of all ages would only make this gap larger.

Table (1) Summary statistics

	All households		Non current migrant		Current migrant		Tests
	Mean	SD	Mean	SD	Mean	SD	p-val
Worked last week	0.403	0.490	0.412	0.492	0.302	0.459	0.000
Unpaid worker	0.127	0.333	0.125	0.331	0.119	0.324	0.330
Wage worker	0.318	0.466	0.332	0.471	0.181	0.386	0.000
Self-employed	0.155	0.362	0.155	0.362	0.146	0.354	0.865
Preschools per 100 children	0.892	0.601	0.874	0.589	1.032	0.687	0.032
Children in the HH	2.204	0.927	2.192	0.917	2.233	0.967	0.000
Adults in the household	2.923	1.177	2.978	1.171	2.451	1.172	0.000
Latest child's age (months)	90.174	67.237	88.349	66.332	96.942	72.396	0.000
Latest child: female	0.451	0.498	0.454	0.498	0.437	0.497	0.942
Wealth	0.228	0.979	0.275	0.972	-0.201	0.923	0.000
Years of education	12.216	5.149	12.333	5.194	11.173	4.641	0.008
Married	0.951	0.215	0.950	0.218	0.961	0.195	0.043
Age	35.310	7.593	35.149	7.533	35.823	7.920	0.005
Ever lived elsewhere	0.562	0.496	0.555	0.497	0.607	0.489	0.004
Rural	0.435	0.496	0.417	0.493	0.601	0.490	0.000
Spatial variables within 10km							
Firms concentration	0.037	0.015	0.037	0.015	0.033	0.014	0.000
Population	80.293	141.782	83.557	145.596	54.750	103.550	0.141
Altitude (km)	0.211	0.287	0.206	0.285	0.257	0.303	0.037
Road density	1.671	0.564	1.688	0.573	1.540	0.462	0.532
Distance from Tirana (km)	50.097	39.960	49.515	40.670	52.794	31.766	0.001
Nightlight per capita	5.956	11.453	6.078	11.604	4.924	10.172	0.075
*Males characteristics**							
Average age	29.71	8.31	29.29	7.93	32.98	10.94	0.00
Primary education or less	0.42	0.49	0.41	0.49	0.53	0.50	0.00
	5358		4668		540		

Notes. The sample is restricted to women with at least one child of age less than 18. The table reports tests by migrant presence in the household, $\chi 2$ test for binary and t-test with equal or unequal variance for levels. Standard errors are clustered at the DHS-cluster level.

*Reported characteristics of male household members are of current male migrants themselves for households with male members abroad. The variable "Primary education or less" is restricted to household members above 15.

and significant at the 1% level and it is stable across different samples. The KP F-statistics is always above the rule-of-thumb of 10. To interpret the magnitude, a ten percentage points increase in the share of emigrants who migrated from the same cluster before 1996 increases the probability that the woman in household h has a member who migrated after 2000 by 7.2 to 8.3 percentage points.

The top panel of Table 2 reports the second stage regression using two estimation procedures, either a 2SLS or marginal effects of the bivariate probit model. We apply the analysis to household reporting living with children of different ages. For

the entire sample of caregivers living with children under the age of 18 (col 1-2), we find a positive female employment probability after a male member of the household who left the child behind left the country. This effect is driven by the sample of households with children in preschool age (3-6 years old, col 5-6), as well as primary school children (age 6-12).[11] The employment probability is decreasingly affected by the migration status as children grow older and become more independent. This is shown for the sample of women with kids aged 12 to 17 whose coefficient does not show a probability to be employed statistically different than zero.

Results using 2SLS specifications point towards a positive effect and also show strong first-stage F-statistics. Nonetheless, the magnitude of their coefficients should be taken with caution: the coefficients are consistently larger or close to one, excluding the possibility to interpret them as probabilities. In addition, as both the outcome and the instrument are dichotomous variables, 2SLS coefficients should be interpreted as local average treatment effects (Angrist and Imbens, 1995). In this case, the estimates provide information about the impact of migration of a male member on female employment only for those households whose decision to migrate was influenced by the share of migrants in the respective cluster. On the other hand, average marginal coefficients from bivariate probit estimators could be generalised to the entire population of women with children, identifying average treatment effects (ATE) (Chiburis et al., 2012).

For these reasons, our preferred results stem from the average marginal effects detailed in the bivariate probit specification. The results show that having a male household member abroad raises female caregivers' employment by 1.5 percentage points (p.p.) for households with children below 18 (Table 2, col.2), by 1 p.p. for preschool-children households and 1.8 p.p. for primary school children (col.4 and 6 respectively).

6.2 Childcare availability

Working as a paid employee is a different decision than supplying labour to the family. The former offers large wage differentials but the latter has lower fixed costs in terms of greater time flexibility for childcare and leisure activities (Edwards and Field-Hendrey, 2002; Hill, 1989; Schultz, 1990). Mendola and Carletto (2012) show that in 2005 Albanian women whose husbands or sons were currently abroad bear these extra costs: they decrease their labour supply as wage workers, but increased

[11] The estimation for the first years of the life of a child (0-2 years) is not insignificant (not reported).

Table (2) The effect of migration on employment. 2SLS and Bivariate Probit

2nd stage	Dependent: worked last week							
	Children <18		Children 3-5		Children 6-12		Children 12-17	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current migrant	0.971	0.015	1.349	0.010	1.394	0.018	0.145	0.006
	(0.265)***	(0.002)***	(0.432)***	(0.002)***	(0.704)**	(0.005)***	(0.481)	(0.022)
	[0.235]***	[0.002]***	[0.374]***	[0.004]***	[0.587]***	[0.007]***	[0.344]	[0.016]
1st stage	Dependent: current migrant							
Migrant rate 1990-1995	0.819***		0.729***		0.784***		0.832***	
	(0.086)		(0.115)		(0.157)		(0.151)	
KP F-statistic	50.05		26.09		10.11		18.13	
Estimation	2SLS	Biprobit	2SLS	Biprobit	2SLS	Biprobit	2SLS	Biprobit
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5589	5589	2389	2389	1625	1625	1363	1363

Notes: The dependent variable is a binary variable taking the value 1 if the female respondent has worked in the last 7 days. The main independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Column 1 and 2 are restricted to the sample of women with children below 18, column 3 and 5 to women with children aged 3 to 5 and so on. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

participation in family work. More than a decade later, the question remains if this labour market choice would be different and how women could be influenced in their trade-offs between care responsibilities, household financial needs and employment opportunities, once they are exposed to childcare alternatives in their local area.

For this reason, we analyse for households with children aged 3-6, what is the effect of fathers abroad on women's employment decisions, distinguishing it by type of occupation (wage employment, paid self-employment, and unpaid family work) and accounting for childcare access. To measure the latter, we adopt two strategies. A first, direct approach distinguishes among women residing in households where at least one child attends preschool. The Albanian DHS provides unique direct information on the preschool attendance of each child. This allows us to analyse in detail the effect of male migration on female employment, conditional on children attend-

ing kindergartens. Second, we measure spatial childcare availability by building a spatial variable of local preschool density. In both cases, the sample is restricted to women co-living with children aged 3-6. Preschool density is constructed as the number of kindergartens available per 100 children within a radius of 10 km. In our data, this is bounded to have a minimum of 0.58, a maximum of 4.81, and a mean of 0.96 schools per 100 children.

Table 3 displays the effect of male international migration by households living with children aged 3-6 attending preschool and those not attending preschool. Results show that only women with children attending preschool increase their probability to be employed (+ 1.6 percentage points). More specifically, this increase is driven by wage employment. We do not find statistically significant coefficients for unpaid employment using bootstrapped standard errors, and only 10% significant coefficients for paid self-employed occupations. Instrumenting the decision to migrate with migrant networks avoids these coefficients suffering from the endogenous decision to migrate, have a child in preschool and work. Moreover, by splitting the sample, we make within-group comparisons: for all women that already decided to enroll a child in kindergarten, the effect only derives from those who have a male migrant, and male migration is no longer biased because of the instrument.

In Table 4, we split the sample of women with preschool-aged children (age 3-6) into terciles of preschool availability.[12] In column (1) we show the effect of male migration on overall employment, without distinguishing across types of occupation. The coefficients show that the probability of working last week monotonically increases with the local preschool availability. More specifically, female caregivers with a male migrant abroad and living in areas with low preschool density, show significantly lower probabilities to be employed than women in households without a male member in other countries. The effect on employment is an insignificant increase overall for women living in areas with a medium density of kindergartens (0.57 to 1.02 kindergartens per 100 children) and the positive effect, especially for those in high preschool density areas (from 1.021 to 4.814 schools per 100 children).

When we distinguish by employment type (Table 4, col.2-4), we find that having an international migrant increases paid employment for women living in areas with high preschool density. The effect is positive and statistically significant at 5% for wage employment, both using clustered and bootstrapped standard errors. For paid

[12]We apply survey weights in splitting the sample of preschool availability into terciles. This makes each tercile sample representative, but it creates three different sample sizes. This is not a concern as we find similar results in Table 3.C.2 when splitting the data into equal sample sizes, without survey weights.

Table (3) The effect of male migration on female employment if at least one child attends preschool

Dependent	(1) Employed last week	(2) Self-employment	(3) Unpaid employment	(4) Wage employment
	No child attends preschool			
Current migrant	0.006	-0.005	0.003	0.002
	(0.005)	(0.014)	(0.002)	(0.006)
	[0.007]	[0.008]	[0.002]	[0.007]
Observations	1128	895	899	990
	At least one child attends preschool			
Current migrant	0.016	0.013	0.005	0.013
	(0.004)***	(0.008)*	(0.003)*	(0.004)***
	[0.003]***	[0.007]*	[0.015]	[0.005]***
Observations	1261	887	911	1047
Estimation	Biprobit	Biprobit	Biprobit	Biprobit
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes

Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. The sample is restricted to women with at least one child of age 3-6. The independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania.
Region fixed effects applied. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and age squared of the respondent, education of the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status and number of enterprises per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

self-employment, the coefficient is positive but less stable in the top tercile: it is only statistically significant when applying clustered standard errors. Similarly, women are less likely to have wage employment if living in areas with low preschool density, but the effect is only statistically significant using clustered standard errors. The coefficient of male migration on caregivers' unpaid family work is not statistically different from 0 for all terciles of preschool density, thus showing a net improvement in female labour market sorting due to migration compared to Mendola and Carletto (2012).

Overall, these results suggest that women left with children to care for all by themselves allocate extra time from childcare to more productive wage employment.

This is however only possible with adequate access to formal childcare.

Table (4) The effect of migration on types of employments by terciles of preschool availability

Dependent	(1) Employed last week	(2) Self-employment	(3) Unpaid employment	(4) Wage employment
	Low preschool density			
Current migrant	-0.003	0.006	-0.004	-0.017
	(0.001)***	(0.005)	(0.007)	(0.005)***
	[0.012]	[0.007]	[0.004]	[0.013]
Observations	388	259	260	347
Preschool's density range	[0.308 , 0.571]			
	Middle preschool density			
Current migrant	0.012	-0.010	0.003	-0.009
	(0.024)	(0.026)	(0.003)	(0.033)
	[0.012]	[0.013]	[0.007]	[0.015]
Observations	876	627	657	752
Preschool's density range	[0.572 , 1.019]			
	High preschool density			
Current migrant	0.017	0.013	0.005	0.005
	(0.004)***	(0.006)**	(0.006)	(0.003)**
	[0.005]***	[0.010]	[0.009]	[0.003]**
Observations	1125	896	893	938
Preschool's density range	[1.021 , 4.814]			
Estimation	Biprobit	Biprobit	Biprobit	Biprobit
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes

Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. Tercile samples are splitted using survey weights. The sample is restricted to women with at least one child of age 3-6. The independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Preschool density is defined as the number of kindergartens per 100 children within 10 km.
Region fixed effects applied. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality., number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

6.3 Robustness checks

We further perform a series of robustness checks and falsification tests to validate our results. In Table 3.C.1 we show that the baseline results are robust to using the alternative measure of employment, i.e. to have worked in the last 12 months instead of last week.

As a falsification exercise, we check if preschool availability influences the effect of migrants on women's employment even for those households without children. More specifically, we compare the employment of women living in households without children and without male members abroad, to women without children but with male migrants.[13]

Figure 3.D.6 shows that international migration of a male member almost never affects women's employment if without children, independently of the preschool density available in the household's place of residence. This effect is not significant for all types of occupation, with the exception of a significant reduction in unpaid employment at the top tercile of preschool density when a male member migrates. A possible explanation behind the last result is that the presence of services like preschool in the local labour market makes participation in low-productivity occupations like unpaid work less likely when a household member migrates. However, the data does not allow us to dig further into the employment options.

In Table 3.C.3 we adopt a more stringent definition of male migrants, only focusing on the respondents' husbands and sons. Here we investigate whether there are any differential effects generated to the employment decision according to the relationship with the migrant. Consistent with our baseline results, the coefficients show that husbands or partners migrating increase females' employment probability, both for the sample of women with children below 18 and women with children in kindergarten age. However, we do not find similar results for the sample of children of primary education age. Exploring the employment decision with respect to sons, we construct a sample of mothers with two or more children, where at least one of these children is the migrant (son) currently abroad. Contrary to our main findings, having sons abroad does not seem to influence mothers' labour supply decisions across all children's age groups.

In section 6.2, we have provided evidence that women's probability to work only increases for those residing in areas with high preschool density. This implies that access to kindergartens allows women to switch from child-caring activities to

[13]For this estimation we define the current migrant as any male member from household h that is currently abroad.

work. We test this mechanism directly by studying if migration affects the different types of activities women do with children in Table 3.C.4. Each column captures a different kind of activity: reading a book, playing or telling a story/singing a song. The dependent variables take the value 1 if mothers or other female caregivers spent time in a given activity or not in the last three days. Like the previous regressions, the independent variable is having a male migrant that left children behind, and we split the sample into terciles of preschool density. Coefficients of Table 3.C.4 for respondents residing in low and middle preschool density areas are not robust: while generally positive, they are always insignificant applying bootstrapped standard errors. On the other hand, caregivers whose child's father is abroad in the top tercile decrease the probability of engaging in teaching names/counting or drawing by 2.8 percentage points, with a statistical significance of at least 5%. We do not find any statistically significant difference in the time allocated to other types of activities: reading a book, playing or telling a story/singing a song. Taken together, these results show that women with a male member currently abroad are more likely to outsource the education of their children whenever kindergartens are more readily available but are not less likely to dedicate their time to other childcare activities.

6.4 Mechanisms and heterogeneous effects

The analysis so far has highlighted that women with migrants abroad choose to work more when there is a higher supply of preschool services or their household makes use of them. We identify two potential mechanisms that could be driving women's decision to join the labour market. First, we explore whether female employment decisions are influenced by changes in their empowerment. More specifically, we assess whether migration impacts female child-carer's instrumental agency over specific decisions (Malapit et al., 2019). We apply the definition of empowerment by Kabeer (1999), i.e. a process that expands people's ability to make strategic life choices, particularly in contexts in which this ability had been denied to them. As found in other studies, women left behind often take on the responsibilities to manage the household's budget and increase their control over decision-making (Antman, 2012a, 2015; Mangiavacchi et al., 2018; Mendola and Carletto, 2012).

A second channel of influence refers to household financial status, as female stayers might be pushed to join the labour force because of financial constraints. This effect would be particularly strong if migrants abroad do not send remittances, which are found to relieve households' credit constraints and reduce females' incentive to work (Calderón, 2014; Dang et al., 2019; Jaume and Willén, 2021; Martínez A. and

Perticará, 2017).

In contrast with many studies on the effect of migration on women left behind, we can directly test the empowerment channel thanks to information on the women's decision role within the household contained in DHS, and particularly about instrumental agency measures (Malapit et al., 2019). These are questions that capture a woman's influence in decisions about her own earnings, her husband's earnings, large or daily household purchases, seeking medical treatment, and visits to family and friends. The results of this test are shown in table 3.C.5. In each column, we estimate Equation 3.1 with a different binary dependent variable. Across all columns, the coefficients show that there is no statistically significant difference for women with migrants and those without in having the final say on health care (column 1), on visiting the family (column 2), as well as on economic decisions like having a final say on large household purchases (column 3), and on managing the husband's earnings (column 4). Although such measures are incomplete proxies of decision-making processes and do not reflect empowerment fully, they do not correlate with male migration in the Albanian sample. Such results are in line with other studies, like de Brauw et al. (2021) for Bangladesh.

In order to test the financial constraint channel, we check if female respondents who received remittances in the last 12 months are less likely to work than those who did not. First, we restrict the sample only to women with migrants abroad. In the absence of a valid instrument for remittances, we include the current migrant's education, age and length of the migration experience in years to alleviate the potential bias of selection into remittances.[14] Table 6 shows that women that receive remittances are less likely to work than those who do not receive any. The magnitude is substantial: financial remittances decrease the probability to work by 10 percentage points. Similar coefficients are found for working in family tasks and paid-wage jobs. In a second step, we compare women with migrants abroad and who receive remittances to those without migrants. We instrument migration and

[14]Selection into migration is not a concern if our sample is restricted to households with migrants, or if we instrument the migration decision. The only source of bias derives from the endogenous choice of remitting after migrating, possibly due to labour market shocks at destination. The direction of the bias is not clear *a priori*. On the one hand, non-remitters could be negatively self-selected with respect to remitters. This would occur, for example, if the former, after a negative shock at the destination, had lower wages than remitters. This would happen due to worse observable and unobservable characteristics, and thus this group would be less likely to send remittances. On the other hand, non-remitters could be positively self-selected, for example by having better education and coming from wealthier households. We find suggestive evidence of positive selection of non-remitters in the form of a better level of education and coming from wealthier households. These results are available upon request.

remittances using the migration network before 1996, as in equation 3.1.[15] Table 3.C.6 shows the results by terciles of preschool density. The coefficients of wage employment are negative and significant for low and middle preschool density, with all types of calculated standard errors. This coefficient is positive, but insignificant for women living in the top tercile of preschool availability. As for other types of occupation, the coefficients turn highly insignificant using bootstrapped standard errors. The fact that individuals with remittances in the top tercile do not have a statistically different probability to work than those without migrants might be the result of two opposing incentives for women that cancel out: preschool availability has a positive effect on labour force participation, whereas remittances reduce them. Although tentative, this result could also explain why remittances still have a negative sign in areas with low and medium kindergartens availability.

Overall, these results show that the financial constraint seems to be driving women's incentive to join the labour market. However, this financial burden drops if women receive remittances and thus reduce their work supply. While we cannot exclude the long-run effects of migration on women's empowerment, we do not find any statistically detectable effect for this channel in the short run.

We further explore the heterogeneous effects of male migration on women educational attainment and wealth. Table 5 shows that the migration effect tends to be larger for women whose top level of education is primary or below. However, the effect is only significant using both clustered and bootstrapped standard errors for low-skilled caregivers living in areas with relatively higher preschool density (column 5). The magnitude is also twice the baseline from Table 2, column 4. While being consistent with the financial channel explained above, this finding might be indicative that the migration decision is less impinging on women with higher education, as they have greater opportunities in the labour market to make their employment decision in the first place.

7 Access to preschool and female employment

In this section, we provide evidence of the direct effect of preschool availability on female employment in Albania. Preschool is a particularly interesting public policy instrument, as it often offers an educational component to childminding, households bear the little direct cost of enrollment and, if accessed over a full day, it may save

[15] As in Table 6, the selection into out-migration is controlled by the instrument. Any potential bias from selection into remittances would only stem from shocks at destination, as argued in the previous footnote.

Table (5) The effect of migration on female employment by women's education

Dependent:	Worked last week					
	Low preschool density		Middle preschool density		High preschool density	
	(1) Primary or below	(2) Secondary or above	(3) Primary or below	(4) Secondary or above	(5) Primary or below	(6) Secondary or above
Father migrant	0.010	0.004	0.013	0.013	0.020	0.008
	(0.007)	(0.003)	(0.005)***	(0.008)	(0.006)***	(0.011)
	[0.007]	[0.003]	[0.010]	[0.014]	[0.008]**	[0.018]
Estimation	Biprobit	Biprobit	Biprobit	Biprobit	Biprobit	Biprobit
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	180	208	392	484	461	664

Notes: The dependent variable is a binary variable taking the value 1 if the female respondent has worked in the last 7 days. The main independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, Secondary or above/Primary or below status, number of enterprises per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

also households the cost of meals (Cascio et al., 2015). To investigate this effect, we estimate the following specification:

$$Employment_{ir} = \beta_0 + \beta_1 \, Preschool_{iar} + \beta_2 \, X'_{iar} + \beta_3 \, \delta_{ar} + \mu_r + \varepsilon_{icr} \tag{3.3}$$

As previously established, the dependent variable is a dummy variable for woman i, living in the buffer area of 10 km a within region r. It takes the value "1" if the individual woman has worked during last week and "0" otherwise. Our independent variable of interest is $Preschool_{irm}$, a binary variable indicating if at least one child within the household is enrolled in preschool. We restrict the sample to female carers residing with at least a child in preschool age (3-6) so that the control and the treated group are more homogeneous. Control variables are the same as equation 3.1.

Spatial differences in child care availability may be correlated with spatial variation in labour markets, as access to day care influences labour market opportunities

Table (6) The effect of remittances on types of employments for women with male household members currently abroad

Dependent	(1) Employed last week	(2) Self-employment	(3) Unpaid employment	(4) Wage employment
Received remittances	-0.101**	-0.057	-0.108**	-0.088**
	(0.044)	(0.040)	(0.043)	(0.043)
Estimation	OLS	OLS	OLS	OLS
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Observations	730	578	555	573
Share of households receiving remittances	0.461	0.490	0.486	0.507

Notes. Coefficients are based on linear probability models. The sample is restricted to women living in households with children whose father is currently abroad. The independent variable is binary and takes the value of 1 if the household has received remittances in the last 12 months. Region fixed effects applied. Control variables are: age of the current migrant, education of the current migrant, migration length of the current migrant, number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality., number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis. All regressions are weighted by DHS survey weights.

(Owens and Rennhoff, 2014). To control for the potential endogeneity we adopt an IV estimation. The $Preschool_{iar}$ dummy is instrumented by local availability of schools obtained by the list of public schools from the Ministry of Education. To estimate the full model we employ a bivariate probit estimator so that:

$$Preschool_{icar} = \alpha_0 + \alpha_1 \, Access_{ar} + \alpha_2 \, X'_{icar} + \alpha_3 \, \delta_{ar} + \mu_r + \varepsilon_{icar} \tag{3.4}$$

$Access_{ar}$ is constructed as the number of preschools available per 100 children within the radius of 10 km. The rationale of this instrument is that the number of schools per child in the area of residence, conditional on local economic development and population, is exogenous to employment decisions: women who are willing to enrol their child in a preschool in order to work could be limited by the scarce availability of kindergartens in their area.

Table 7 displays the coefficients of the marginal effects of a bivariate probit. The results show that having a child in preschool increases women's probability to work by 22.1 percentage points. This coefficient is driven by the sample of rural

women, who have a larger probability of 23.4 pp if their child attends preschool. Within these samples, using cluster standard errors and bootstrap standard errors, the results stay significant at least 95% confidence interval. Women in urban areas do not show statistically different probabilities to work if their child is in preschool. Across all samples, the instrument is only strong enough in column 3, with a first-stage KP F-statistic of 12.97. This result suggests that our constructed measure of kindergarten density is more binding in rural and remote areas.

Although we control for geographic heterogeneity, including population, local economic activity, road density and distance to Tirana, there exist potential threats to this identification strategy. First, households could relocate where most amenities and preschools are available, often to urban areas. We address this issue by including a dummy indicating if the woman has always resided there, to account for mobility pre-trends in the cross-section under analysis.

Table (7) Average effect of having a child in preschool on female employment

	Dependent: Worked last week		
	All sample	Urban	Rural
	(1)	(2)	(3)
Child in preschool	0.221	-0.012	0.234
	(0.059)***	(0.581)	(0.037)***
	[0.099]**	[0.125]	[0.032]***
Estimation	Biprobit	Biprobit	Biprobit
Controls	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Observations	2412	1037	1375
1st stage 2SLS KP F-stat	6.12	0.27	12.97

Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.3. The sample is restricted to women with at least one child of age 3-6. The dependent variable is a binary variable taking the value 1 if the female respondent has worked in the last 7 days. The independent variable is binary and takes the value of 1 if at least one child is in preschool. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality, number of kindergartens per capita in 2010 within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 100 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Second, school locations are not random. In the scenario in which the policymakers approve the construction of kindergartens where female employment is

expanding, this could bias the results. To account for this potential bias we adopt two strategies. First, in absence of time variation in the geocoded preschool data, we include in both equation 3.3 and 3.4 district-level number of preschools per capita in 2010 to control for pre-trends. Furthermore, we perform a falsification test that regresses school access in 2015 on female employment in the same buffer in 2008, using the geocoded clusters of the Albanian DHS collected between 2008 and 2009. These results are displayed in Table 3.C.7. Female employment and having a child in a preschool in 2008/09 do not predict the preschool density of 2015. An absence of correlation between these two variables suggests the lack of pre-trends in the labour market and school locations.

8 Conclusion

We investigate the effects of male international migration on female employment and whether this differs by women's access to formal childcare. Our setting is Albania, a country with large gender disparities, low preschool attendance and one of the greatest international migration rates in the world. We exploit the sudden opening of borders in 1991 and the following mass emigration to isolate the causal effect of international migration on female employment decisions.

Our findings show that women with male household members abroad increase their probability to work. However, this effect only appears among women residing in areas with relatively high availability of preschools and whose children attend preschool. We show that migration does not influence female carers' instrumental agency over specific decisions. Still, we identify financial constraints as an important mechanism behind this effect: women that do not receive remittances are more likely to work. Nonetheless, such an incentive seems to improve the labour market access to those who need it the most. Women with current migrants are more likely to find a paid job, and those who increase their labour supply are those with the lowest level of education. Again, we only find these effects among women residing in areas with high availability of kindergartens.

Eventually, access to childcare is crucial to leverage the positive effect of male migration on female employment decisions. Furthermore, we also show that preschool availability directly increases the probability that women work, particularly in rural areas.

Our results are suggestive that policymakers, particularly those interested in pushing a gender-transformative agenda that enhances female access to the labour market, should consider increasing the supply of childcare services. At a minimum,

this analysis shows that it will directly influence the female labour supply; at best, it will also leverage the effects of international migration. Moreover, our findings are consistently stronger for the low-educated female population and, with direct effects of kindergarten availability for rural areas. In order to maximise impacts, care policy packages and direct municipal childcare service provision should be discussed on the basis of universality of access and solidarity. This could ensure affordable quality-childcare for all types of households. Improving such aspects of the care offer in Albania could thus help female carers choose between any desired leave and (re-)insertion into the local labour market.

Appendices

3.A Preschool data construction

We construct buffers of 10 kilometers radius around each DHS cluster and count the number of kindergartens within that buffer, as we 10 km is a conservative buffer area for the data at hand. This is due to the fact that this distance is the minimum radius by which the random displacement of 5 km from DHS cluster locations in rural areas will effectively include all schools within the radius of 5 km. This phenomenon can be better visualised in figure 3.D.5, in which we randomly displace GPS coordinates within 5 km. The top graph shows the scenario in which we assume the GPS coordinates of rural clusters have not been randomly displaced within 5 kilometers and that the "true" location is the one provided by the DHS survey. In "Scenario 1" there are 2 kindergartens within the radius of 5 km of the red dot. In the second scenario, we displace the GPS coordinates to the north by less than 5 km (the blue dot). The new location also has 2 schools within 5 km. Finally, the third location, represented by the green dot, moves over 5 km south, with 4 kindergartens within 5 km.

Across all scenarios, whatever the random displacement, there always are 11 kindergartens within a buffer of 10 km. Although the measurement error induced by random displacement is by definition random, the 10 km buffer size will minimise it. A 10 km radius and a displacement of less of equal 5 km implies that all kindergartens from 5 km to 10 km are included. Any buffer size of less than 10 km, for example 5 km as in figure 3.D.5, will not include all kindergartens within the radius of 5 km due to random displacement. Any buffer size larger than 10 kilometres will potentially include too many kindergartens that should not be part of a radius of 5 km. However, we will still show the results with different buffer sizes of 5 and 15 kilometres.

3.B Questions of key variables from DHS

General migration question Is there any usual member of your household in the past 12 months or later, who now resides outside of Albania? (Yes, No)

Migrants' profile Relationship to the head of the household, current country of residence, sex, age, year first left, reason for moving (work, study, accompany spouse/family).

Remittances Did (NAME) send money or goods to this household in the last 12 months? (Yes, No)

Preschool attendance [If age 0-5] Does (NAME) attend any organized learning or early childhood education programme, such as a public or private facility, including a creche or kindergarten?

School attendance [If age 6-24] Did (NAME) attend school at any time during this school year (2016- 2017)

Employment last week Have you done any work in the last seven days? (Yes, No). We coded as "yes" the following question: "Although you did not work in the last seven days, do you have any job or business from which you were absent for leave, illness, vacation, or any other such reason?"

Employment last year Have you done any work in the last 12 months? (Yes, No)

Employment type Do you do this work for a member of your family, for someone else, or are you self-employed?

Source: List based on the Albanian Demographic and Health Survey 2017/18.

3.C Tables

Table (3.C.1) Robustness: The effect of migration on employment using an alternative definition of employment

Dependent	Worked in the last 12 months							
	Children <18		Children 3-5		Children 6-12		Children 12-17	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current migrant	0.834	0.016	1.172***	0.013	1.896	0.016	0.596	0.012
	(0.268)***	(0.004)***	(0.423)***	(0.003)***	(0.595)***	(0.003)***	(0.368)	(0.014)
	[0.205]***	[0.003]***	[0.328]***	[0.005]***	[0.579]***	[0.007]**	[0.316]	[0.010]
Estimation	2SLS	Biprobit	2SLS	Biprobit	2SLS	Biprobit	2SLS	Biprobit
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4928	4928	2368	2368	2697	2697	2360	2360
First-stage F-stat	49.99		27.12		18.98		24.11	

Notes: The dependent variable is a binary variable taking the value 1 if the female respondent has worked in the last 12 months. The main independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Column 1 and 2 are restricted to the sample of women with children below 18, column 3 and 5 to women with children aged 3 to 5 and so on. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

3.D Figures

Table (3.C.2) The effect of migration on employment by terciles of preschool availability without sample weight in tercile split

Dependent	(1) Employed last week	(2) Self-employment	(3) Unpaid employment	(4) Wage employment
	Low preschool density			
Father migrant	0.006	0.005	-0.046	-0.009
	(0.011)	(0.003)*	(0.019)**	(0.025)
	[0.010]	[0.013]	[0.018]**	[0.012]
Observations	780	549	559	692
Preschool's density range		[0.308 , 0.789]		
	Middle preschool density			
Father migrant	-0.013	-0.040	-0.006	-0.020
	(0.022)	(0.029)	(0.028)	(0.019)
	[0.013]	[0.015]***	[0.020]	[0.015]
Observations	800	574	601	667
Preschool's density range		[0.793 , 1.173]		
	High preschool density			
Father migrant	0.017	0.014	0.006	0.008
	(0.005)***	(0.006)**	(0.003)*	(0.003)**
	[0.007]**	[0.012]	[0.005]	[0.004]**
Observations	809	659	650	678
Preschool's density range		[1.174 , 4.814]		
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes

Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. Tercile samples are splitted using survey weights. The sample is restricted to women with at least one child of age 3-6. The independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Preschool density is defined as the number of kindergartens per 100 children within 10 km.
Region fixed effects applied. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality., number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Table (3.C.3) Robustness: the effect of migration of the husband or of the son on female employment

Dependent	Worked last week							
	Children <18		Children 3-5		Children 6-12		Children 12-17	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Husband abroad	0.007		0.006		0.003		0.008	
	(0.003)**		(0.003)**		(0.006)		(0.005)	
	[0.003]**		[0.001]***		[0.002]		[0.007]	
Son abroad		0.004		0.001		0.003		0.006
		(0.004)		(0.000)		(0.001)**		(0.010)
		[0.003]		[0.001]		[0.002]		[0.007]
Estimation	Biprobit	Biprobit	Biprobit	Biprobit	Biprobit	Biprobit	Biprobit	Biprobit
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4517	4505	2197	2136	2520	2467	2159	2216

Notes: The dependent variable is a binary variable taking the value 1 if the female respondent has worked in the last 7 days. The main independent variables are binary and take either the value of 1 if the husband or partner of the respondent is abroad, and 0 otherwise or if the son is abroad and 0 otherwise. Column 1 and 2 are restricted to the sample of women with children below 18, column 3 and 5 to women with children aged 3 to 5 and so on. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Table (3.C.4) The effect of migration on types of activities women spend with children by terciles of preschool availability

Dependent	(1) Teaching names/ counting/drawing	(2) Read a book	(3) Playing	(4) Tell a story/ sing a song
	Low preschool density			
Current migrant	0.005	0.013	0.021	0.019
	(0.092)	(0.006)**	(0.051)	(0.007)***
	[0.013]	[0.008]	[0.013]	[0.013]
Observations	284	284	284	284
Preschool's density range		[0.308 , 0.571]		
	Middle preschool density			
Current migrant	0.024	-0.012	0.041	0.004
	(0.007)***	(0.034)	(0.054)	(0.031)
	[0.025]	[0.018]	[0.017]**	[0.023]
Observations	876	627	657	752
Preschool's density range		[0.572 , 1.019]		
	High preschool density			
Current migrant	-0.028	-0.023	0.032	-0.004
	(0.005)***	(0.023)	(0.021)	(0.040)
	[0.014]**	[0.018]	[0.020]	[0.019]
Observations	632	632	632	632
Preschool's density range		[1.021 , 4.814]		
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes

Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. Tercile samples are splitted using survey weights. The sample is restricted to women with at least one child of age 3-6. The independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Preschool density is defined as the number of kindergartens per 100 children within 10 km. Dependent variables are binary taking the value "1" if mothers or other female caretakers engaged in given activities with children in the last three days.
Region fixed effects applied. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality., number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Table (3.C.5) The effect of migration on women decision power within the household

Dependent	(1) Final say on own health care	(2) Final say on visiting family	(3) Final say on large purchases	(4) Final say on managing husband's earnings
Current migrant	-0.016	0.002	-0.018	-0.004
	(0.015)	(0.004)	(0.014)	(0.010)
	[0.010]	[0.005]	[0.012]	[0.009]
Estimation	Biprobit	Biprobit	Biprobit	Biprobit
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Observations	4778	4778	4778	4717

Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. The sample is restricted to women with at least one child. The independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Dependent variables are binary taking the value "1" if mothers or other female caretakers are have the final saying in any of the activities presented in column 1-4, and "0" if other household members have the final saying.
Region fixed effects applied. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality, number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Table (3.C.6) The effect of remittances on types of employments by terciles of preschool availability

Dependent	(1) Employed last week	(2) Self-employment	(3) Unpaid employment	(4) Wage employment
	Low preschool density			
Received remittances	-0.015 (0.004)*** [0.008]	-0.036 (0.111) [0.043]	-0.001 (0.010) [0.007]	-0.016 (0.006)** [0.007]**
Observations	389	260	261	348
Preschool's density range		[0.308 , 0.571]		
	Middle preschool density			
Received remittances	-0.013 (0.030) [0.011]	-0.018 (0.040) [0.015]	0.002 (0.002) [0.004]	-0.025 (0.007)*** [0.011]**
Observations	885	633	664	760
Preschool's density range		[0.572 , 1.019]		
	High preschool density			
Received remittances	0.008 (0.002)*** [0.010]	0.008 (0.003)*** [0.011]	0.002 (0.011) [0.009]	0.003 (0.003) [0.009]
Observations	1138	906	905	947
Preschool's density range		[1.021 , 4.814]		
Estimation	Biprobit	Biprobit	Biprobit	Biprobit
Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes

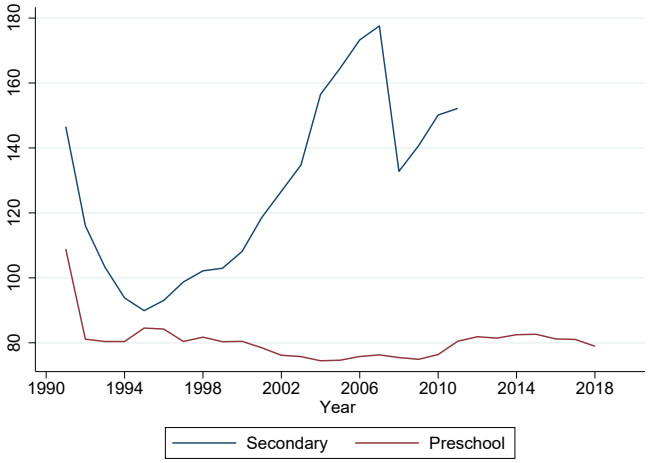
Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. Tercile samples are splitted using survey weights. The sample is restricted to women with at least one child of age 3-6. The independent variable is binary and takes the value of 1 if a male member of the household has sent remittances in the last 12 months. Preschool density is defined as the number of kindergartens per 100 children within 10 km.
Region fixed effects applied. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality., number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis, bootstrapped standard errors in brackets. Bootstrapped standard errors are obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Table (3.C.7) Falsification test: Average effects of 2008/09 variables on preschool density in 2015

	Dependent: Preschool density in 2015		
	All sample	Urban	Rural
	(1)	(2)	(3)
Worked last week	0.028	0.039	0.019
	(0.021)	(0.031)	(0.021)
Child in preschool	0.016	0.039	0.021
	(0.020)	(0.028)	(0.016)
Controls	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Observations	1,526	827	699

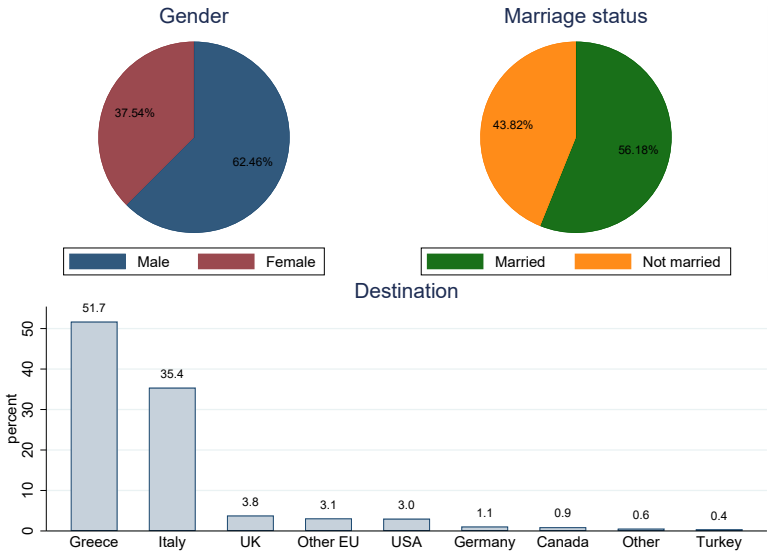
Notes. The sample is restricted to women from the DHS 2008/09 with at least one child of age 3-6. The dependent variable of columns 3-6 is the the number of kindergartens in 2015/16 per 100 children. Control variables are: number of children in the household (individuals aged<18), number of adults (individuals aged>18), age of the latest child, sex of the latest child, age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status. Spatial variables at the 10 km buffers in 2008 include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Clustered standard errors at the DHS-cluster level in parenthesis. All regressions are weighted by DHS survey weights.

Figure (3.D.1) Total number of pupils (thousands) in kindergartens and secondary schools in Albania over time



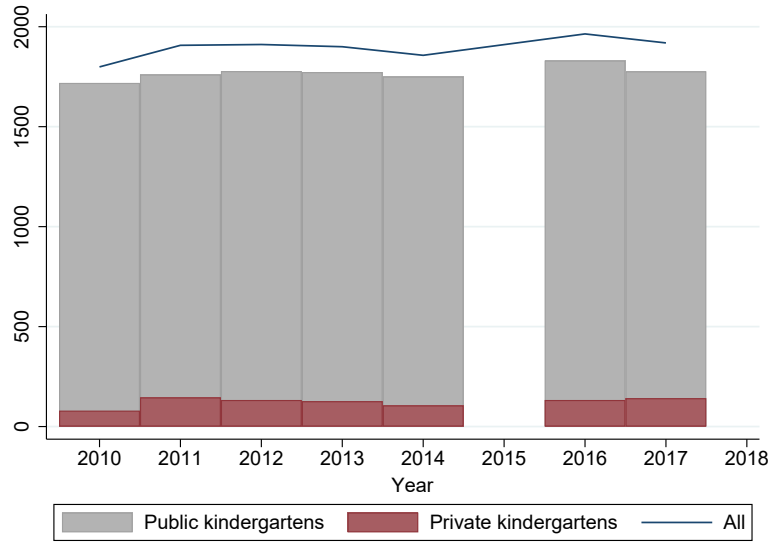
Notes: Data for secondary pupils not available after 2011. Source: INSTAT

Figure (3.D.2) Migrants' profile



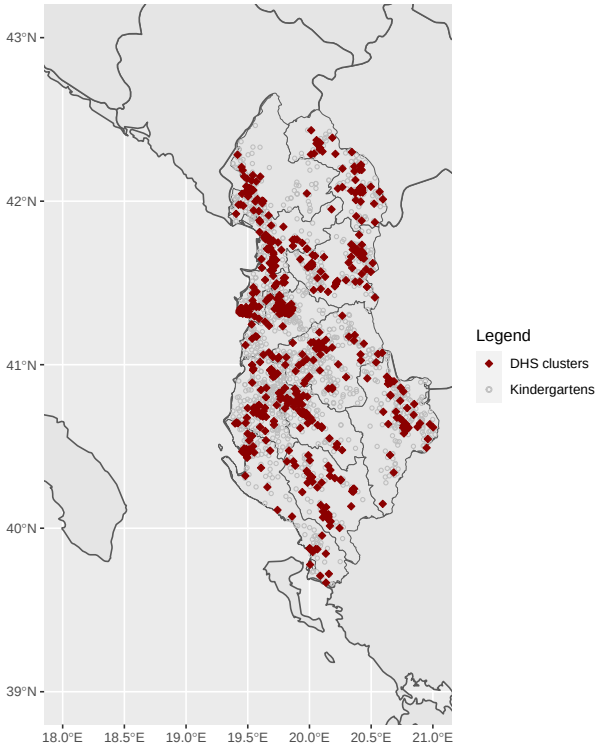
Notes: DHS 2017/18. Top left-hand pie chart reports the gender composition of international migrants; The right-hand pie chart report the shared of married international migrants; the lower bar chart reports the country of destination.

Figure (3.D.3) Total number of public and private kindergartens in Albania over time



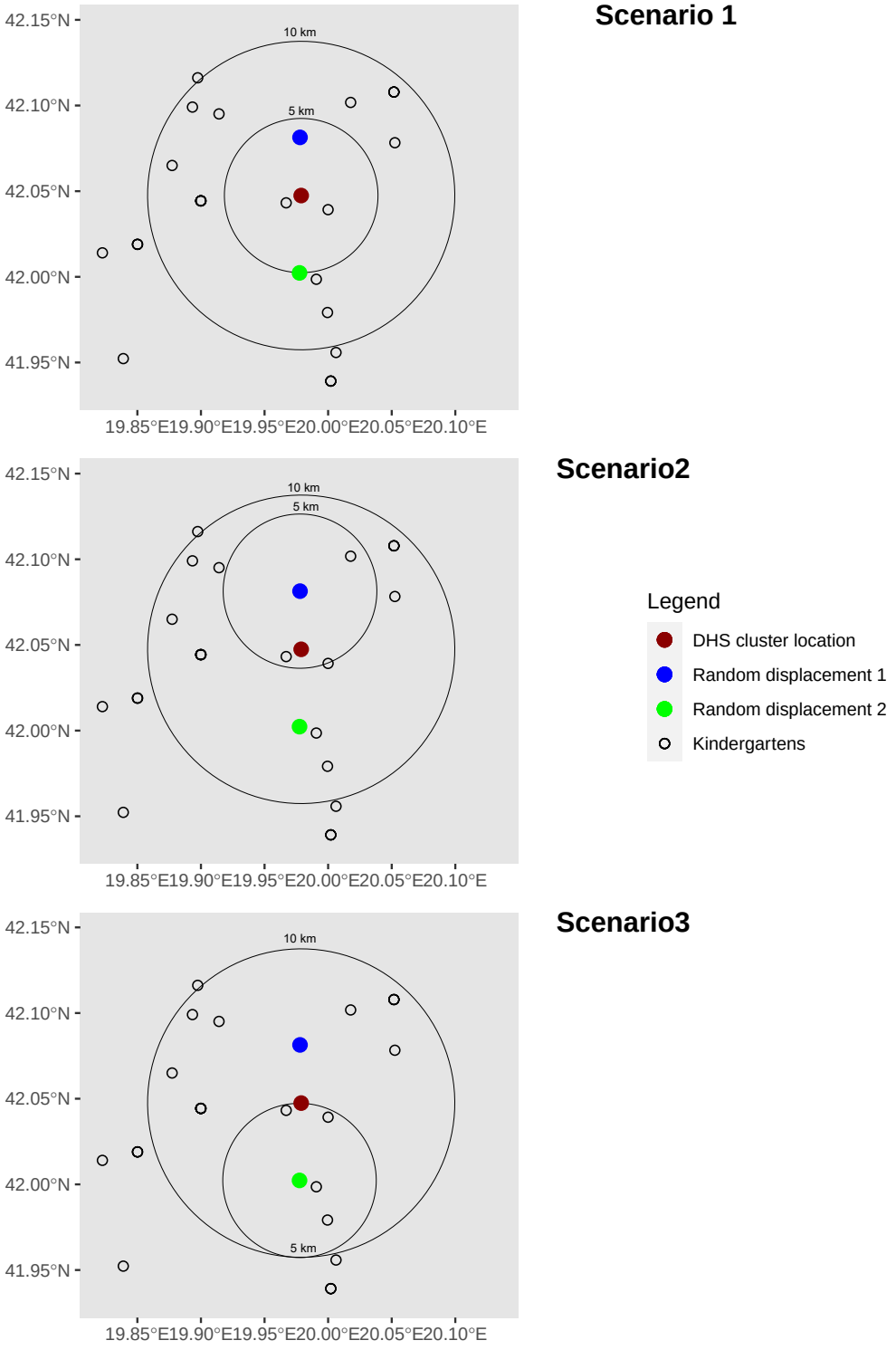
Notes: Data for 2015 are not available. Source: Albanian Ministry of Education and Sport.

Figure (3.D.4) Preschools and DHS clusters' locations



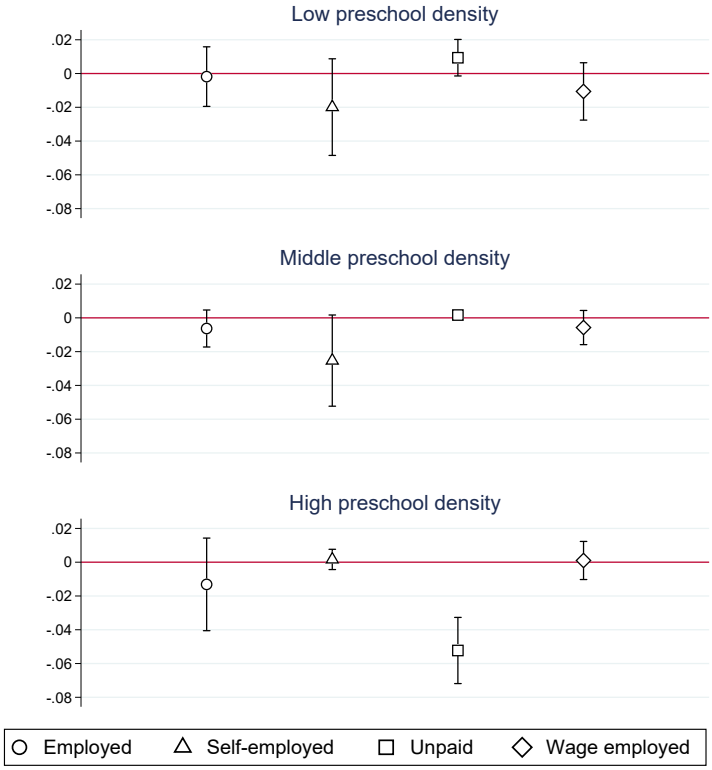
Source: DHS 2017/18 and MoES 2015/16

Figure (3.D.5) Random displacement of DHS GPS coordinates within 5 km in rural areas



Notes: The red dot displays the current GPS location of one GPS cluster. The blue and green dots represent random displacements of GPS coordinates within a radius of 5 km. The large circle represents a buffer of 10 km, the small circle a buffer of 5 km. Scenario 1 = the true GPS location is the given coordinates from DHS. Scenario 2 = the true location is from the coordinates of the blue point. Scenario 3 = the true location is from the coordinates of the green point.

Figure (3.D.6) The effect of migration on female employment for women without children by terciles of school availability



Notes. Coefficients report marginal effects using bivariate probit to estimate equation 3.1. Tercile samples are splitted using survey weights. The sample is restricted to women without children. The independent variable is binary and takes the value of 1 if a male member of the household is abroad and has left at least one child in Albania. Preschool density is defined as the number of kindergartens per 100 children within 10 km. Region fixed effects applied. Control variables are: number of adults (individuals aged>18), age and aged squared of the respondent, education the respondent, if the respondent has ever migrated herself, a household wealth index, rural/urban status, number of enterprises per capita within the municipality, number of preschools in 2010 per capita within the municipality. Spatial variables at the 10 km buffers include: population within 10 km, altitude, road density, distance to Tirana and night luminosity per capita. Standard errors are bootstrapped and obtained from 200 bootstrap samplings following the procedure of resampling variance estimation in complex survey data by Kolenikov (2010). All regressions are weighted by DHS survey weights.

Chapter 4

How does fertility affect female employment? Evidence from Albania

Abstract

This chapter inspects the relationship between fertility and employment, providing an explanatory mixed-method analysis to gauge their nexus for rural and urban Albania over the 2000s. Instrumenting reproductive decisions with having two first-born daughters in a 2SLS model of employment, we find that having an additional child influences negatively employment probability for rural mothers, but it does not influence employment decisions in urban areas. Rural women are particularly dependent on their fertility decision if they have low levels of education. This effect is not particularly relevant to specific types of rural employment, but it is reinforced by demographic traits of the household, such as if there are seniors in the household or if the partner is working. The chapter then examines qualitatively how structural and contextual settings influence women in their decisions. It inspects the experience of rural women from three distinct rural municipalities, exploring the different barriers where future policies could favour their insertion.

Keywords: Female employment, Fertility, Albania

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1 Introduction

In recent years, there has been progress in understanding how fertility choices are influenced by socio-normative, cultural, and political factors, and how they may impact employment decisions over time. Studies have demonstrated that increased access to contraceptives is associated with a decline in fertility rates globally (Bongaarts and Casterline, 2018). Furthermore, research has shown that granting women greater autonomy in their fertility decisions leads to positive welfare outcomes for them (Balbo et al., 2013; Bongaarts and Casterline, 2018; Goldin and Katz, 2002). At the same time, there has been a consistent upward trend in female participation in the labor market in recent decades. Together with greater female education resulting in improved work opportunities (Heath and Jayachandran, 2016), the economic and legislative environments are two contributing factors to women's ability to secure employment. In particular, the availability and effectiveness of family policies, such as child care and family planning, are critical determinants of labor force participation among women (Bailey, 2006; Del Boca and Locatelli, 2006; Miller, 2010).

In this paper, we investigate the effect of fertility and child-rearing on female labour force participation in the context of an emerging economy. Many studies have already examined the relationship between female labour supply and fertility, and have found a negative correlation between the two, particularly in developed contexts (for example, Angrist and Evans (1998); Blundell et al. (2013); Boca et al. (2005); Lundborg et al. (2017)). However, studies in low and middle-income countries have yielded mixed results: some show a negative relationship (Berniell et al., 2021; Bloom et al., 2009; Cruces and Galiani, 2007), others a lack of causal relationship (Aaronson et al., 2021; Agüero and Marks, 2008, 2011) and some a positive link (Priebe, 2010; Trako, 2019). A common feature across these studies is that women in emerging economies may have to balance their child-rearing and employment decisions with the issue of income inequality in the labor market, strong gender norms and informal labour markets (Berniell et al., 2021; Finlay, 2021). Albania is an interesting case study to examine the relationship between fertility and employment as it possesses all these features.

Its conservative societal norms and patriarchal values make Albania an example of a traditionalist society to analyse such nexus in an emerging economy setting. First, the values attributed to women's societal contribution today are reinforced by the historical legacy of the country. After the fall of the Communist regime, which had maintained gender roles in the household and guaranteed female employment

(Falkingham and Gjonca, 2001), market reforms led to a void in social protection and economic rights for women (Tarifa, 1994; World Bank, 2002). Furthermore, this has reinforced women's role as homemakers and increased occupational segregation (EIGE, 2020). Albania is among the most conservative countries in Europe in terms of gender norms (Grogan, 2018), ranking second in the patrilocality index among 40 low and middle-income countries included in the Demographic and Health Surveys. These values and trends are reflected today in the current gender wage gaps (Miluka, 2013), in imbalances in intra-household resource allocations (Betti et al., 2020; Mangiavacchi et al., 2018) and in a preference for boys (Grogan, 2018; Lerch, 2013; Trako, 2019). These cultural and societal characteristics may play a key role in women's decision-making as to when and how to balance child rearing and employment decisions (Finlay, 2021). Moreover, they could also affect the conditions of their work and the kind of work they decide to pursue, calling for an empirical enquiry on how they interplay in present labour markets.

Following Angrist and Evans (1998), this chapter proposes an employment probability analysis inspecting the fertility decision via the effect of having additional children. In order to establish a causal link between the two variables, we apply an instrumental variable approach that identifies fertility decisions via an instrument that indicates if the first two born children of women are female. In line with prior studies[1], our framework looks specifically at employment decisions of women who are already parents of multiple kids. Thus, we do not account in the analysis for the childless population (women have already made the choice of having a child versus none). However, we implicitly assume that, for the chosen sample of women with multiple children, there may had been a quantity/quality trade-off in the decision of having multiple children in the first place (Aaronson et al., 2014).[2] Building on the work of Trako (2019) on Albania in the early 2000s, this study examines with recent data whether there have been any significant changes over time in employment probability across rural and urban areas, as well as how rural female workers and local employers perceive such changes today. The analysis uses qualitative data collected in 2020 from three selected municipalities (Expertise France, 2021). These were chosen to represent the diversity of rural municipalities in terms of size and production. Particular attention is given to structural gaps perceived by women,

[1] For an extensive review, see Bhalotra and Clarke (2022).

[2] Aaronson et al. (2014) inspect the extensive and intensive margins of a fertility transition model. As the price of investing in children reduces with an additional child, their model predicts increased investment in children and a decline in the chances of having an additional child. Moreover, the literature suggests that having more than one child results in greater inter-generational support for senior parents (see Oliveira 2016 for an empirical application to China).

including social norms and the flexibility of labour markets, which are found in the literature to promote the conciliation of work and family (Doepke et al., 2022).

There are two distinguishing features to our research contributing to the literature on the employment-fertility relation. First, we construct our employment regressions based on the latest two waves of DHS data. This is the most robust and recent dataset on household dynamics and women's fertility available in the context of Albania, used to inspect its evolution among rural and urban areas over time. Moreover, on the methodological side, we carefully address potential endogeneity related to fertility decisions and selectivity issues with respect to the instrument and its validity in the context of Albania. Second, we conduct an explanatory mixed-methods analysis (Creswell and Clark, 2017), utilizing qualitative data from focus group discussions with women and employers in three municipalities of rural Albania. This approach serves two main purposes: it triangulates the quantitative data and validates its results, and it also provides insights into the context experienced by rural women regarding their agency over their work and reproductive and care choices. The mixed-method approach allow us to gather more in-depth understanding of the issue in question.

Our results show that having an additional child influences negatively employment probability for mothers in rural areas, but it does not influence employment decisions of those in urban areas. We find that individual characteristics matter, as rural women's employment is dependent on their fertility decision particularly if they have low levels of education. The literature shows that mothers may work more in the informal sector once their family size increases (Schmieder, 2021), but we do not find any statistically relevant effect for specific types of employment that could lead to either informal or more unstable jobs. Nonetheless, we find that the negative relationship is maintained once we explore endogenous demographic traits of the household, such as if there are seniors living in the household or if the partner is currently working. The analysis highlights that there is a different and relatively worse labour market trajectory experienced by rural women than their urban counterparts. Thus, we explore how structural settings affect the contextual surroundings where rural women make their employment decisions. Using qualitative data, we analyse the experience reported by rural women in three distinct rural municipalities of Albania, exploring the differential roles that policy could play to reduce barriers to their insertion.

The focus groups' findings indicate that rural women's participation in the labor market is constrained by the types of jobs available, which are primarily located in urban areas. Both women and employers report a lack of training and skills

mismatch, as well as limited access to information about job search and employment services. Additionally, rural women face unique challenges that differ from those faced by urban women, such as lack of childcare and inadequate childcare during working hours, long distances to jobs, low remuneration, perception of deteriorating working conditions, lack of public transportation and its high costs, and societal norms that prioritize women as primary caregivers. These factors contribute to increasing trade-offs between having children and working for rural women.

The chapter is structured as follows. Section 2 presents the data, and the variables used and it describes the estimating sample. Section 3 provides the empirical strategy. In this section we further discuss the identification strategy and the choice of the instrument for fertility, addressing the threats to the internal and external validity. The results are presented and discussed in Section 4, in which the quantitative findings are followed by the qualitative analysis for the three municipalities under study through a comparison of female workers' and employers' views in rural areas. Finally, the last section concludes.

2 Data

We adopt an explanatory mixed-methods approach (Creswell and Clark, 2017), inspecting cross-sectional data from the Demographic and Health Survey (DHS) for Albania, as well as qualitative data collected as focus group (FG) discussions with women and employers from rural Albania (Expertise France, 2021).

As primary quantitative data, we use two waves of the Albanian DHS collected respectively in 2008/09 and in 2017/18. DHS is a nationally representative survey of women, men, and households on demographic, health, and other socio-economic characteristics. The survey was collected between 2008 and 2009 and it interviewed 7,584 women and 3,013 men in the 15-49 age group. Between 2017 and 2018, DHS interviewed 10,860 women and 6,142 men. We follow the literature (Angrist and Evans, 1998) in restricting the sample of analysis to the population of women aged at least 20 years and up to 35 years old, and reporting having all children below the age of 18 (2,997 observations over two waves).

We make use of individual-level information, such as the number of children, employment status in the last seven days, and in the last twelve months, type of occupation, and stability of jobs. We also inspect a large set of controls, such as a normalized household wealth index based on household assets, age, education, religion, ethnic group, urban/rural status, number of adult household members, and other characteristics related to the fertility experience, such as age at last birth

and sex and age of the children. Table 4.C.1 displays the summary statistics for our sample. Half of the sample is residing in rural areas, has 10 years of completed education (more than primary education), and a majority is Muslim of religion. Almost all of the sample is currently married and by construction, the number of children is above 2. On average, half of the sample had a male as their first child, suggesting no reason to believe there is gender selection at first birth in this sample, and 55% of respondents had a male as the latest child. The average age of mothers is 31 years old and the age at first birth is 22. Regarding work, 32% of women in the sample worked over the last week (or similarly 38% have been working in the last 12 months). Moreover, in each household, there are more than two adults actively engaged in an occupation.

The chapter makes use of a novel qualitative survey collected in 2020 as part of a report by Expertise France (2021) as secondary data for performing a comparative analysis to inspect rural labour market differences in three areas of rural Albania.[3] We use the qualitative data for three municipalities of Lushnjë, Elbasan and Korcë. Six FG discussions were set up to inspect the conditions of rural women participating in the labour market and the perception of employers from the same areas (participants were identified with the support of the local offices of the National Agency for Employment and Skills, NAES, and the municipalities). The three rural women FG discussions were conducted in September 2020 gathering 12 women in Elbasan, 15 women in Korcë and 12 women in Lushnjë. Women invited to join the interviews across the three selected municipalities depict a balanced representation in terms of living areas, age and levels of education, and situation towards income-generating activities. Moreover, three employer FGs were conducted in September 2020 with 9 employers in Elbasan, 9 employers in Korcë and 12 employers in Lushnjë.[4] In each FG discussion, a semi-structured interview plan was used to guide the exchanges.

The structure of the interview was mainly focused on identifying access to public employment services, access to services supporting income-generating activities for women, access to decent work and non-discriminatory workplace, access to childcare

[3]The NAS report was conducted between February 2020 and February 2021, by a team led by Expertise France in close relation with the National Agency for Employment and Skills, NAES, its local offices in three selected municipalities and the three local municipalities' teams. The NAS report also benefits of a desk review and of informant interviews at municipal level performed between 2020 and 2021.

[4]The employer identification was conducted with the support of the NAES local offices and municipalities seeking for a balanced representation of company size and sector (agriculture and agricultural-processing, manufacturing, services industry, food production, hospitality and tourism.)

and supporting social services, access to mobility and transportation, and access to a gender-equality supporting environment free from adverse social norms, stereotyping and violence. To better contextualise the analysis, Appendix **??** (Online Supplementary Materials) details briefly the history and legislative context that surrounds the Albania labour market. The municipalities analysed in Expertise France (2021) account for possible structural differences in the political economy of rural areas in Albania. Each municipality was chosen as a significant share of its territory is rural, but has a distinct economic profile (encompassing sectors of economic activity such as agriculture, tourism, etc.) and shows at the political level a strong will to address women's economic empowerment issues.

Situated in West-central Albania (see Figure 4.D.1), Lushnjë is the smallest in size of the three municipalities, less developed administratively and in terms of infrastructures (government services or public transports) than the other municipalities due to its small size, agriculture accounts for approximately 60% of employment. Korcë is in the east; its agricultural employment is at 50% and has a higher level of social services offered and number of women groups. The municipality of Elbasan is located in the centre-north of the country and it has more than 60% of employment in agriculture. Nonetheless, it is slightly better in terms of policy engagement and public infrastructures than the other two municipalities, influenced by its economic and political closeness to the capital, Tirana.

3 Empirical strategy

$$Y_{ilt} = \beta_0 + \beta_1 \, Children_{ilt} + \lambda_{ilt} + \mu_l + \tau_t + \gamma_{ilt} \tag{4.1}$$

Where Y_{ilt} is the linear probability for a female individual i of location l in year t to be employed. Our preferred measure of employment follows the definition of being employed last week as this measure should be less prone to measurement error. We however frequently report the alternative measure of being employed last year. $Children_{ilt}$ is the number of children had by the individual used to represent the output of fertility decision (Agüero and Marks, 2008, 2011; Heath, 2017) and β_1 is the causal parameter of interest representing the labour market impact of an additional birth. Three vectors for individual characteristics (λ_{ilt}), location (μ_l) and time (τ_t) control the heterogeneity of this relationship. The model in equation 4.1 could possibly suffer from endogeneity due to omitted variables bias and reverse causality. Preferences could be mitigated by expectations on life expectancy, family size and/or labour market/career profiles. They could also be mediated by

social, cultural and economic constraints (Gammage et al., 2020; Oliveira, 2016; Rosenzweig and Schultz, 1985).[5]

We thus follow Angrist and Evans (1998), Trako (2019), Agüero and Marks (2011) and Ebenstein (2009) in using an Instrumental Variable (IV or Two Stages Least Squares, 2SLS) estimator for fertility decision with the gender of the first two children as a source of exogenous variation to explain decision over childbearing without directly affecting labour market participation. We thus estimate the following 2SLS model:

$$Children_{icmt} = \alpha_0 + \alpha_1 Two\,female\,children_{icmt} + \alpha_2 \lambda_{icmt} + \mu_m + \tau_t + \epsilon_{icmt} \quad (4.2)$$

The first stage regression has as dependent variable $Children_{irmt}$ that is a continuous variable capturing the number of children of a female individual i of DHS cluster c in municipality m, in year t. The instrument $Two\,female\,children_{icmt}$ assumes the value 1 if the first two children of woman i are females and 0 otherwise. The exclusion restriction derives from the fact that the sex of the child is quasi-random and uncorrelated with labour supply and other characteristics that could affect simultaneously childbearing and employment decisions. In section 3.1 we discuss more in detail the instrument identification and assumptions. The second stage is defined as follows:

$$Employment_{icmt} = \beta_0 + \beta_1 \widehat{Children}_{icmt} + \beta_2 \lambda_{icmt} + \mu_m + \tau_t + \varepsilon_{icmt} \quad (4.3)$$

Where $Employment_{icmt}$ is the linear probability for a female individual i of DHS cluster c in municipality m, in year t to be employed last week. We introduce a vector of individual- and household-level controls λ_{icmt} such as rural/urban residence,

[5] As a descriptive example, ambitious women could have higher opportunity costs of bearing children and thus voluntarily chose to have fewer of them. In this case, ambition is positively correlated with the probability to be employed and negatively with the number of children, β_1 would be biased upwards, so that the OLS coefficient is overestimated. On the other hand, some women may have strong preferences for having children but might face liquidity constraints to sustain them, the latter being alleviated when employed. In this case, having a job reduces the costs of having children, leading to a downward bias in the estimation. Although it is difficult to say which effects prevail *a priori*, we could expect that, for an emerging economy like Albania, women in urban areas may be more likely to be constructing their preferences in the first scenario, where the labour market is more diverse, wages are higher and there possibly is greater availability of contraceptives. On the contrary, women from rural villages might be more likely to form their preference set in environments characterised by stronger gender norms and lower income, therefore in this case a downward bias could prevail.

a household wealth index, years of education, number of adults in the household, marriage status, age, age^2, whether the first-born is a male and age at first birth. We also introduce religion and ethnic group fixed effects (six and seven groups respectively), as they could account for cultural heterogeneity and traditional values that are correlated with fertility decisions and with preferences for an offspring's gender. All regressions absorb local and time heterogeneity with municipality and survey fixed effects (61 municipalities in two periods). Finally, standard errors are clustered at DHS cluster level.

The analysis is performed for a sub-sample of the female population aged between 20 and 35 with multiple children below 18 years of age. Building upon the literature (Agüero and Marks, 2011; Angrist and Evans, 1998; Ebenstein, 2009) we also perform the analysis separately by urban and rural areas and by education levels, to account for underlying structural differences that could drive the relationship between fertility decision and employment probability.[6]

3.1 Instrument identification and assumptions

Angrist and Evans (1998) who first introduced this IV show that women with two same-sex children are more likely to have a third child (or higher order birth), and the instrument's validity is ensured as the gender of a future child is randomly assigned. To apply this identification to our setting, we note the traditional values towards offspring rearing in Albania. Similar to Korea and other Asian countries (Schultz, 2001, 2007), there is a strong preference for boys. This implies that several households could decide to have an additional third child in case the first two children are girls.[7]

To investigate this hypothesis, we inspect the significance and magnitude of the first stage regression in Table 1, questioning whether the instrument represented as

[6] Angrist and Evans (1998) and Agüero and Marks (2011) show that the bias from overestimation is reduced with an increase in education levels and for low-income countries. For extremely low-income countries and low-educated women, they find that OLS could even underestimate the childbearing pressure on the labour supply. Furthermore, Ebenstein (2009) compares the effect of childbearing costs on employment between Taiwanese women and US women, using the preference for male children as an instrument. He finds that, contrary to previous literature, OLS underestimate the real coefficient. He explains this result by the magnitude of the first stage coefficient: the lowest the education and stronger preference for boys, the largest the number of children and the largest the negative effect of children on employment.

[7] The LATE conditions of the 2SLS estimator imply that fertility decision is to be interpreted only at the intensive margin (how many children to have, given the cost of investing in them). This means that the external validity of the analysis applies only to the sample of women who already have made the decision to have a child (Angrist and Evans, 1998). This subset of the population however has a broad external validity, corresponding to 80.71% of women aged 20+ in Albania.

same sex of children or separate instruments by specific gender of first births have a direct influence on the number of children. We also assess the relevance of adding a binary variable for the male first child (or second child). This binary variable is used to control for those having a male firstborn, which is known to possibly affect subsequent fertility behaviour by reducing the likelihood of additional childbearing (Dahl and Moretti, 2008). This control variable is also relevant to an employment equation, as it would capture any direct influence of traditional values toward the sex of offspring that may lead women to dedicate more time to the task of rearing a son (Schultz, 2007). The table reveals that, as reported in the literature, having same-sex children increases the number of children *ceteris paribus*, even after controlling for the gender of the first (and second) order child to be a male (column 1-3). Introducing separately a binary variable for the first same-sex births by gender (column 4) as either *two male children* or *two female children*, the coefficients show that fertility preference alters the number of children solely in the event of two female first births. Moreover, the association between having a first male child and a lower number of children disappears as soon as the gender-specific indicators are introduced in the regression (column 5). The table thus confirms that for Albania fertility is more responsive to unmet gender preferences of women with two girls. Moreover, the indicator for a male offspring does not seem to significantly alter the number of children had. In the sample, 26.7% of women with multiple offspring have had two daughters. We use the *two female children* indicator variable as the main specification, keeping the male first child binary as an additional control (column 6, binary variable with mean 0.47). Either adding separately or jointly a second-order male birth indicator (with a mean of 0.49) does not improve the model F-statistic of the first-stage regression (columns 7-8).[8]

A major issue with such an instrument would be if the gender of the first two children is correlated with marital preferences. It could happen for example in case women have interrupted pregnancies (direct alteration of birth) or got divorced due to unmatched gender preferences (indirect). We do not find any statistical evidence in self-reported measures across the sample that the gender of the first child at birth tends to be predominantly male (see Table 4.C.1) nor any disproportional rate of divorced women without kids or with a female as first-born (and only child at the time of the survey - not shown, but available on request).

We compare in Table 2 the difference in means for those with or without same-female gender of two kids (column 1 and 2 respectively). We are reassured that

[8]We obtain similar results if we restrict the sample to women residing in rural areas (Table 4.C.2).

Table (1) Analysis of same gender instruments: First stage analysis of number of children.

	Dependent: Number of children							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Same sex	0.161***	0.156***	0.160***					
	(0.024)	(0.024)	(0.024)					
First child: male		0.145***	0.147***		-0.018	-0.015		-0.011
		(0.025)	(0.025)		(0.027)	(0.025)		(0.031)
Second child: male		0.163***					0.013	0.007
		(0.025)					(0.025)	(0.031)
Two male children				0.002	-0.007			
				(0.028)	(0.031)			
Two female children				0.311***	0.320***	0.320***	0.301***	0.313***
				(0.034)	(0.037)	(0.037)	(0.037)	(0.047)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,997	2,997	2,997	2,997	2,997	2,997	2,997	2,997
First-stage F-stat	46	44	46	42	38	76	67	44
Adj-R^2	0.23	0.27	0.25	0.27	0.27	0.27	0.27	0.27

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The dependent variable captures the linear probability to have at least worked once last week or in the last 12 month. The sample is restricted to women aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Controls: a household wealth index, years of education, number of adults in the household, marriage status, age, age^2, whether the first-born is a male and rural/urban residence (in column 3 only). Groups FE stands for including both ethnic group fixed effects and religious group fixed effect. Standard errors are clustered at the DHS-cluster level.

no statistical difference exists in demographics or other controls, except for having a greater number of children (the instrumented variable) and having a male first-born or last-born child (which by construction will be lower for households with two female children).

Table (2) Balance table: difference in means between the IV sample and non IV sample

	(1)	(2)	(3)
Variable	No IV	IV: Two female children	Difference
Rural	0.506	0.515	0.009
	(0.500)	(0.500)	(0.021)
Wealth	0.634	0.627	-0.007
	(0.185)	(0.188)	(0.008)
Years of education	10.485	10.545	0.060
	(4.453)	(4.483)	(0.186)
Adults in the household	2.904	2.852	-0.052
	(1.247)	(1.215)	(0.052)
Married	0.979	0.970	-0.008
	(0.145)	(0.170)	(0.006)
Muslim	0.828	0.848	0.020
	(0.378)	(0.359)	(0.016)
Age	30.632	30.645	0.013
	(3.471)	(3.364)	(0.144)
Age at 1st birth	21.806	21.650	-0.157
	(3.026)	(2.903)	(0.125)
Number of children	2.280	2.606	0.326***
	(0.540)	(0.741)	(0.025)
First child: male	0.662	0.000	-0.662***
	(0.473)	(0.000)	(0.017)
Last child: male	0.624	0.333	-0.292***
	(0.484)	(0.472)	(0.020)
Observations	2,195	802	2,997

Notes. The table reports the means for women with at least two children of mixed gender (column 1), women with at least two female firstborn children (column 2) and their statistical difference (column 3). Pooled cross-sections DHS 2007 & 2017-18. Sample selection: female respondents aged 20 to 35 years of age with at least two children, reporting having any child below the age of 18.

A potential threat to the excludability restriction would arise if households practised sex-selective abortion in favour of male children. In fact, Albania has a strong sex imbalance at birth: 114 male births per 100 female births in 2005 (UNFPA, 2012). However, this gap could simply be the result of households' decision to have additional children until the last child is male, skewing the ratio in favour of boys. We still formally test the potential selective sex abortion in Table 4.C.3. We do not find any correlation between the probability of having had an abortion or miscarriage in the past and the sex of the last or first child, for either the rural or the urban sample.

4 Results

Table 4.C.4 displays the results of the correlation between fertility and employment probability in Albania. The table reports the estimation using OLS, with the dependent variable defined as being employed in the last 7 days (Columns 1-3) and having been employed in the last year (Columns 4-6). Column 1(4) shows a negative correlation between the number of children and the linear probability to be employed last week (last year) for the entire sample of women with at least two children below 18. In terms of magnitude, having one additional child decreases the probability to be employed by 7.1 percentage points. Column 2(5) and Column 3(6) show the regression results split by rural/urban residence of households.

Although the coefficients in Table 4.C.4 are indicative of substitution between having children and being employed, the effect from such a linear model can be biased. For this reason, we apply a 2SLS strategy, with the first stage results presented in Table 4.C.5. Across all columns, having two girls increases the mean number of children compared to mixed-gender births. As in Table 4.C.4 we also include religion-fixed effects and ethnicity-fixed effects in order to rule out cultural heterogeneity in the optimal children number and especially in the decision to have a further child after having had two girls. Furthermore, larger coefficients and strong F-statistics for the sample of rural households suggests that the preference for boy may be larger in these areas than in the cities. Across all specifications, the Kleibergen-Paap F-statistic is well above 10, indicating that the instrument is relatively strong.

Table 3 displays the second stage's coefficients of the 2SLS model. The dependent variable in Columns 1 to 3 is employment last week and Columns 4-5 uses employment in the last 12 months as an outcome. The results in Columns 1 and 4, using the entire sample, show that the negative relationship persists. Interestingly, once we split the sample by rural/urban areas, the results are concentrated in rural areas, whereas for urban areas the coefficients are statistically insignificant.

The IV corrects for the simultaneous and endogenous decision to enter the labour market and have children. As expected, this upwards bias is correctly reduced for urban areas, so that the coefficients for the urban sample in Table 3 are no longer statistically different than zero. This implies that fertility decision has no significant impact on labour market participation for Albanian women from urban areas. Rural areas have strong negative coefficients of having an additional child on employment probability, and this could be due to a different type of bias: a liquidity constraint effect could prevail and a downward bias influences the OLS results. For

this reason, the IV coefficients in the rural sample are larger in magnitude than OLS. Despite correcting the opposing direction of bias, the effects of fertility on employment probability in rural areas are larger and still drive the result of the overall sample in Columns 1 and 4.[9] We thus explore in detail in the next section potential mechanisms that explain the divergence in results between rural and urban areas, looking at heterogeneity in women's characteristics and different trends over time.

4.1 Mechanisms and heterogeneity analysis

We inspect in Table 4.C.7 whether there is any heterogeneity in the analysis according to the level of education. The rationale behind this is that there might be a different attachment to the trade-off between employment and other activities according to the employment prospects available to a prospective worker. We then inspect the population with more than primary education (Col.1, for a sample combining women with achieved secondary or tertiary, respectively 26% and 11% of the sample). There is no direct impact of fertility on the decision of the probability of employment and instead the greater the number of years of age, the higher the probability of being employed. Whereas, looking at the 63% of the sample with primary or lower (Col.2), the probability of employment is strongly negatively affected by the fertility decision as well as by the presence of a first-born child. Moreover, the Table suggests that this result is solely driven by the rural sample (Col.4).

Then we inspect the heterogeneity across time. There could have been several structural modifications in both the economic environment as well the socio-normative interactions for women so, albeit acknowledging it might be sensitive to reduced statistical power, we inspect separately each cross-section to verify the estimation persists across time (Table 4.C.8). For the year 2008/09 the estimation reveals that the rural sample does indeed capture the negative effect that fertility has on employment, as opposed to no effects in urban contexts (whereas restricting further the sample to only rural women with primary education alters the overall statistical power towards zero, Col 4). The negative correlation between greater fertility and reduced employment is still present in the wave 2017/18 (Col.5). Interestingly, reducing the cross-sections to the rural sample with primary education (Col.8) reveals that the fertility decision still is a strong deciding factor for rural women with low education in their employment decision. This result suggests that

[9] In Table 4.C.6 we show that the results hold if we transform the independent variable — the number of children — in logarithms.

there is relevance to better understanding how rural women experience barriers to employment, inspecting both the structural as well as contextual factors that may impinge rural women from attending a job.

As the last heterogeneity analysis, we explore the type of employment that rural and urban women engage in within the dataset. Females residing in rural areas tend to experience lower employment participation than their urban counterparts, but structural differences exist also in terms of the type of job. Table 4.C.9 shows that women in rural areas are much more likely to work in the agricultural sector (+53 %), as self-employed (+11.2%) or for a family member (+29.2%), often without remuneration (+38 %). At the same time, they are more engaged in seasonal occupations (+32.8%). Given the characteristics of the jobs available to them, women in rural areas can react in two ways after the birth of a child. First, they leave the labour market as the opportunity cost of working is relatively high and women face stronger social pressure to care for children. Second, working in informal and agriculture jobs allows them to flexibly care for children (Aaronson et al., 2021). The statistics and main employment results found point to the first option. However, when we perform an analysis by type of occupation, we find insignificant impacts of fertility decision (Table 4.C.10, where the dependent variable is employment in a specific occupation over the last year). We notice nevertheless that for the rural women sample under analysis, in wave 2017/18 there is a higher probability for being self-employed as well as working for someone else than in 2007/08, but no significant difference in either employment in an unstable job or agriculture.[10] Whereas for urban women there is a reduced probability in 2017/18 of being employed in an unstable job (occasional or seasonal), possibly confirming that they tend to have greater access to quality occupations over time.[11]

We further explore how domestic characteristics influence fertility in its effects on the employment decision. In Table 4 we investigate a sample of women that are either living in a household where any senior member aged 60+ is present or those

[10]Table 4.C.11 compares employment means by type over time, showing between 2008 and 2018 a drop of 41.5 percentage points of women working for family members in rural areas. This decrease is only 9.7 p.c in urban areas. Likewise, more women work stably in rural areas (+17.1 pc, against +6.3 in urban areas) and they are more likely to be paid (+32.3 pc in rural areas, +0.3 pc in urban areas).

[11]Figure 4.D.2 confirms the descriptive statistics of Table 4.C.11 by regressing employment outcomes with a time and rural dummy. The Figure shows that women in rural areas have overall worse employment conditions than in urban areas, but the gap is largely reduced in 2018. The convergence in the job market between cities and the countryside could explain the null results for rural areas in 2018 of Table 4.C.8. The opportunity costs of childbearing increase as the job market improves, thus rural women are less likely to be affected in their labour market decision in 2018 than in 2008 with an additional child.

without (Panel A, columns 1-2 for the full sample, 3-4 for rural areas). The interest behind such a specification is that women with children tend to be the ones engaged in the primary care of dependent members (children and old-age individuals). The presence (absence) of somebody in retirement age could provoke different effects on the employment decision of a working-age woman. On the one side, the presence of an elderly member could alleviate the burden of childcare on the woman, thus having an additional child could be freeing some of her time allocated to household/offspring care, which could be diverted towards greater employment. On the other side, the presence of the elderly member could be in itself an addition to the care needs of the households, which would negatively correlate her fertility decision with her employment decision. Table 4 reveals that the latter trait seems to prevail for the sample: overall restricting the sample to households either with or without seniors living in the households keeps the negative fertility-employment relationship. However, the situation differs when we look at rural areas (where is more common for households to live with multiple generations under a same roof). If rural women live in a nuclear household (see Col. 4), their employment decision is not statistically significantly influenced by the fertility decision, suggesting this group might be driven by other traits, like their level of education directly influencing job opportunities available to them.

Moreover, in Panel B of Table 4 we investigate whether for the year 2018 there are any employment probability differentials among women whose partner is currently employed and those with a partner not employed (Panel B, columns 5-6 for the full sample, 7-8 for rural areas). The results again prove that household composition matters in guiding the effect of reproductive decisions towards employment. If the partner is employed, this should imply an additional source of revenue relieving the household liquidity constraints, thus women could afford to trade-off work in the presence of an additional child (Col. 5 and 7). However, in the absence of additional revenue from the husband's employment, there is a positive but statistically insignificant probability to engage in an employment activity due to an additional child.

Lastly, with the limitation of the quantitative data available, we explore some proxies for changes in gender norms within the household (Appendix 4.B).

Table (3) Second stage: Average effect of number of children on employment probability

Dependent:	Employed last week			Employed last year		
	(1) All	(2) Rural	(3) Urban	(4) All	(5) Rural	(6) Urban
Number of children	-0.242***	-0.188**	-0.325	-0.174*	-0.165**	-0.175
	(0.090)	(0.084)	(0.242)	(0.090)	(0.082)	(0.233)
Rural	-0.071**			-0.076**		
	(0.030)			(0.030)		
Wealth	0.037	0.228*	0.095	-0.108	0.094	0.162
	(0.107)	(0.119)	(0.272)	(0.111)	(0.121)	(0.268)
Years of education	0.015***	0.016***	0.013**	0.016***	0.015***	0.012**
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Adults in the household	0.016*	0.018*	0.016	0.021**	0.017	0.031**
	(0.008)	(0.010)	(0.015)	(0.008)	(0.010)	(0.015)
Married	-0.027	0.016	-0.063	-0.012	0.024	-0.036
	(0.074)	(0.101)	(0.095)	(0.075)	(0.107)	(0.093)
Age	0.060	0.003	0.142**	0.045	-0.000	0.118*
	(0.043)	(0.051)	(0.071)	(0.044)	(0.055)	(0.068)
Age^2	-0.000	0.001	-0.002	-0.000	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age at 1st birth	-0.023***	-0.022***	-0.026*	-0.017**	-0.021***	-0.012
	(0.007)	(0.008)	(0.015)	(0.007)	(0.007)	(0.014)
First child: male	0.037	0.035	0.033	0.024	0.028	0.018
	(0.029)	(0.033)	(0.051)	(0.029)	(0.034)	(0.050)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,997	1,662	1,328	2,997	1,662	1,328
First-stage F-stat	76	94	12	76	94	12

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The dependent variable captures the linear probability to have at least worked once last week or in the last 12 months. The sample is restricted to women aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Group fixed effects include religious groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

Table (4) Heterogeneous average effect of the number of children on employment probability in rural areas

	Panel A. Elderly in the household				**Panel B. Partner employment status**			
	All		Rural		All		Rural	
	Seniors in hh (1)	No seniors in hh (2)	Seniors in hh (3)	No seniors in hh (4)	Partner employed (5)	Partner not employed (6)	Partner employed (7)	Partner not employed (8)
Number of children	-0.233*	-0.245*	-0.211*	-0.153	-0.524**	0.024	-0.489*	0.026
	(0.120)	(0.131)	(0.115)	(0.117)	(0.264)	(0.165)	(0.258)	(0.162)
Rural	-0.074	-0.054			-0.164***	0.005		
	(0.045)	(0.037)			(0.045)	(0.051)		
Wealth	0.111	-0.033	0.230	0.227	0.025	0.156	0.317	0.148
	(0.154)	(0.136)	(0.188)	(0.153)	(0.233)	(0.202)	(0.220)	(0.194)
Years of education	0.009	0.020***	0.009	0.018***	0.005	-0.009	0.006	-0.008
	(0.006)	(0.005)	(0.007)	(0.007)	(0.005)	(0.008)	(0.005)	(0.008)
Adults in the household	0.037***	0.003	0.055***	-0.003	0.024*	0.018	0.019	0.018
	(0.014)	(0.014)	(0.016)	(0.019)	(0.014)	(0.018)	(0.014)	(0.018)
Age	-0.006	0.085	0.016	-0.035	0.141*	0.047	0.150*	0.047
	(0.064)	(0.066)	(0.069)	(0.088)	(0.083)	(0.070)	(0.084)	(0.070)
Age^2	0.001	-0.001	0.000	0.001	-0.002	-0.001	-0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age at 1st birth	-0.022**	-0.024**	-0.022*	-0.019*	-0.033**	-0.010	-0.031**	-0.010
	(0.009)	(0.010)	(0.012)	(0.010)	(0.016)	(0.011)	(0.015)	(0.011)
First child: male	-0.007	-0.060	-0.030	-0.020	-0.039	-0.086*	-0.032	-0.086*
	(0.038)	(0.037)	(0.043)	(0.048)	(0.051)	(0.049)	(0.050)	(0.049)
Married	0.030	-0.066	0.051	-0.192				
	(0.107)	(0.103)	(0.116)	(0.202)				
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	No	No	No	No
Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1350	1641	807	851	1355	420	1355	420
First-stage F-stat	40	42	39	59	19	15	19	15
Data	2008-2018	2008-2018	2008-2018	2008-2018	2018	2018	2018	2018

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The dependent variable captures the linear probability to have at least worked once last week. Panel B only uses data for 2018, the only DHS ave with information about the partner's employment status. The sample is restricted to women areas aged between 20 and 35 with at least two children whose age is below 18 (in rural areas only in columns 3-4 and 7-8). Sample weights are applied. Group fixed effects include religious groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

4.2 Learning from rural women

Factors affecting the child-rearing/employment decisions

The women's FG discussions in the three selected municipalities shared various concerns regarding employment services, childcare, training, infrastructure, social norms, perceived discrimination, knowledge of their rights in the workplace, etc. which affect their livelihoods, and labour market status. Moreover, childcare resulted to be among the most important reasons that hinder employment for rural mothers with young children. Out of the interviews with women and employers in rural areas, we identified three factors that affect women's childcare/employment trade-off: socially determined gender norms, the lack of childcare alternatives and perceived labour market discrimination.

First, many women mentioned that, despite the difficult economic conditions their household may encounter, they are not recognized as a labour force in the family (this role is generally embodied by the husband or other male figure): they are considered responsible for taking care of household chores and children. Women consider support from their spouses as impossible in this regard, because the mentality of rural areas does not accept that the husband may take care of the children at home and the wife works.[12] Many emphasize that even when they are dedicated to agricultural work, they have taken the children with them and could not leave them with their spouses or family members, due to the expectation that only the mother should take care of the children, with a lack of commitment from other family members in providing childcare services. As a result, many do not even actively look for jobs.

The second crucial factor reducing mothers' labour supply is the inadequacy of childcare services. The FG participants report that there are virtually no nurseries in rural areas and a very limited number of kindergartens are offered. Even if they enrol their children in kindergarten, some report that the kindergarten hours are until half-day, which means that even in this case they will have to be supported by a family member to pick up the children from kindergarten, because their work schedule goes until 4 pm at least. Others estimate that even if kindergartens and nurseries services were more available or offered with a full-time schedule, they would still be hindered by their families in their employment: many see mothers as the sole providers of childcare. Other women bring the experience of support received mainly from their mothers or mothers-in-law in caring for their children.

[12]Empirical evidence from Albania shows that male and female labour in rural areas acts as substitutes, sustaining the findings from the focus groups (Miluka, 2013).

However, it is highlighted that this type of childcare is mainly short-lived since grandmothers might give up their roles as caregivers, especially considering their age and health problems.

Finally, some women emphasise perceived discrimination towards mothers with young children in the labour market. They state that the first questions asked by employers are related to the area of residence and if they have small children, considering these two factors as the major ones that affect their employment. Women reported that they perceive that employers prefer to recruit and pay men better. They feel that employers consider men more stable and productive because they are not responsible for parental duties, do not take on parental leave or have other family obligations. As a result, women can only either perform short-term (daily) jobs in agriculture or do not work at all. On the side of employers, some admit in the FGs that they find it difficult to hire mothers with children as they are the most unstable employees at work, because their commitment to raising the children does not allow them to fully engage in a job, or it increases their probability to resign in a short period. Across the three municipalities, they confirmed difficulties in recruiting women from rural or distant areas. As such, they pointed out that there are various unfilled vacancies and rejections received from job-seekers.

Other structural factors

Women in the three rural municipalities highlighted some difficulties that employment services show in reaching rural women, and believe that more efforts should be undertaken to provide services to rural women located in distant areas. They cited that employment services were located far from their administrative units. The inability to reach employment services also limits the information available to them regarding what employment services are offered.

The lack of transportation is yet another barrier faced by women and especially rural women living in distant areas. Whereas most job opportunities are outside of the rural areas, public transport offer is very limited for rural areas with no public transport in certain areas or limited hours of transportation ending at 5 pm.

Access to decent working conditions is also a major concern for women, which often led to the rejection of job offers or labour market inactivity. A consensus exists that a high proportion of job offers provide low wages and inadequate working conditions. Women declared that low-skilled jobs often offered wages below the legal minimum wage, as well as unpaid extra hours of work reaching twelve hours per day with no days off. When looking at employers, in all three municipalities' FGs, they

report facing difficulties in recruiting in the sectors like textile or food processing, particularly in skilled positions. This is because often recruitment agencies have difficulty in providing suitable profiles that would match the wage proposed with the work-day requirements (in terms of transport and time). Employers also stated in the FGs that they perceive women to prefer other options than industry jobs, such as involvement in small agricultural activities.

There thus seems to be a mismatched perception of employment opportunities that creates friction between women's supply in rural or distant areas and employers' demand. Women report sometimes choosing economic aid over employment because of the low wages, the lack of transportation or childcare, and due to perceived deteriorating working conditions. Employers from the FGs perceive as women are shying away from employment, without necessarily understanding the reasons behind it and expressing some mistrust, and consequently substitute women's employment for other profiles.

Lastly, women in the FGs highlighted the persistence of strong patriarchal norms where women's employment is still considered an 'obstacle' to the well-being of the family. For instance, the husband's migration may leave the mother as the sole caregiver in the family, without sufficient income for the household to get extra help. Even in households where women's employment is conceivable, it is nevertheless common for women to go for a job interview accompanied by their husband or mother-in-law, who often ask the employer about working conditions or schedules, and sometimes make the final decision whether to accept the job. The household sometimes prohibits certain jobs that expose women to men or to the public (such as cleaner, baker or hairdresser). These findings are in line with an investigation on the profile of long-term registered unemployed job-seekers with the Albanian employment services (UNDP, 2021).

Comparison between quantitative and qualitative results

We inspect in Table 5 three aspects that might be essential to further advance the inclusiveness of the female labour force in rural Albania: the structural limitations of working in rural areas, the socio-cultural norms that women live and practice as well as the services at their disposal to effectively manage work-life balance when children are involved. For each of these dimensions, we compare qualitatively the results found in the FGs to DHS data, both at the national and to counties in which the Need Assessment Study had been conducted. Data from the DHS show that overall women's employment is low in all three municipalities. Elbasan

has the lowest reported rate of 20.6%, compared to Lushnjë (39.9%) and Korcë (36.8%). Women report predominantly walking to work which varies between 72.7% for Elbasan, 78.2% for Lushnjë, and 81.5% for Korcë. On average women report walking to work for about 17 minutes in Lushnjë, 18 minutes in Elbasan and 21 minutes in Korcë. Gender roles appear to be more pervasive in Lushnjë, which has the highest reported rates of husband deciding on earning (22.9% compared to 12.0% for Elbasan and 8.3% for Korcë) and husband deciding on large purchases (19.4% compared to 6.6% for Elbasan and 6.5% for Korcë. The lack of childcare services may be symptomatic of the low reported rates by women of children attending preschool. Lushnjë has the highest reported rates by women of children attending preschool at 58.6% versus 40.6% for Elbasan and 45.4% for Korcë.

The DHS findings in Table 5 support the issues reported qualitatively by women's FGs in the three municipalities. The barriers identified by the women in the FGs of long distances to work for women in the rural areas and the lack or limited schedules of public transportation are also sustained in the DHS data. It shows that women use walking as the main mean of transportation to work for longer distances in rural areas. Furthermore, the identification by women in the FGs of the lack of childcare services is also reflected in the DHS data. As presented above, there are low levels of reported preschool attendance by mothers in the three municipalities, which does not go beyond 60%, and that may point towards the unavailability of childcare, especially in rural or distant areas. Lastly, women report in the FGs that husbands influence or take their employment decision. These household members are also reported attending the job interviews to assess the quality of the work environment, a notion in line with the reported levels of decision-making among members, in which husbands decide predominantly on earnings and large purchases in the three municipalities. Such barriers identified through the DHS sample reinforce the evidence found for Albania (GADC, 2022).

Table (5) Comparing municipal differences: Qualitative and quantitative data

	NAS: key points from focus groups			DHS				
	Elbasan	Lushnje	Korce	Elbasan	Lushnje	Korce	Rural	Urban
Panel A: Unemployment								
Employment	Felt high overall	Felt high overall	Felt high, but also for women with a college degree	0.206	0.399	0.368	0.276	0.434
				(0.404)	(0.490)	(0.483)	(0.447)	(0.496)
Panel B: Distance from workplace								
Walking as main mean to commute	High transport costs	High transport costs	High transport costs	0.727	0.782	0.815	0.742	0.477
				(0.447)	(0.413)	(0.389)	(0.438)	(0.500)
Walking distance to work (minutes)				18.059	17.106	20.904	20.050	18.565
				(16.762)	(14.936)	(18.232)	(19.078)	(16.842)
Panel C: Gender norms								
Husband decides on earnings	Men administer earnings	Husbands decides about female employment	Husbands have a say on the type of jobs the wife can be employed in	0.120	0.229	0.083	0.151	0.089
				(0.325)	(0.420)	(0.276)	(0.358)	(0.285)
Husband decides on large purchases				0.066	0.194	0.065	0.113	0.078
				(0.249)	(0.396)	(0.248)	(0.317)	(0.268)
Panel D: Childcare								
At least one child is attending preschool	Feel lack of full-time kindergartens	Feel lack of full-time kindergartens	Feel lack of full-time kindergartens	0.406	0.586	0.454	0.463	0.500
				(0.493)	(0.494)	(0.500)	(0.499)	(0.500)
Observations				563	541	573	5,900	4,960

Notes. Cross sections DHS 2017-18 and qualitative data (Expertise France, 2021). The sample represents for the rural areas of each municipality the population of all female respondents. These are then compared with the whole rural and urban samples.

5 Conclusions

This chapter explores the nexus between fertility decisions and employment probability, using the latest data available for rural and urban Albania. Our analysis shows that employment probability in rural areas is diverging from urban areas and that the fertility decision is not the same in its impact on employment probabilities.

Applying a 2SLS model where we instrument the number of children had, we find that having an additional child influences negatively employment probability for mothers from rural areas, but it does not influence the employment decision of those in urban areas. Exploring the traits of the two labour markets, we ascertain that jobs have grown faster in urban areas than in rural in absorbing women's labour force. Even if between 2007/08 and 2017/18 there has been a significant improvement in the types of occupations that rural women could access, they still make their decisions on very diverse trajectories.

Moreover, we find that personal traits matter in explaining this nexus for Albania, as rural women's employment is dependent on their fertility decision particularly if they have low levels of education. As per variation across types of employment, we do not find any statistically significant effect of fertility decisions for specific types of employment. We however find that contextual or endogenously defined characteristics like demographic traits of the household do matter for this decision. The presence of seniors living in the household or the current employment status of the partner reinforces the negative association between fertility and employment.

We then explore how structural settings affect the contextual surroundings where rural women make their decisions. Using qualitative data, we analyse the experience reported by rural women and employers in three distinct rural municipalities of Albania, exploring the differential roles that policy could play to reduce barriers to mothers' insertion. Consistent with the 2SLS findings, focus groups in the rural areas point out that the presence of grandmothers in the household is an unreliable and often short-term solution to childcare, substantiating women's role as caregivers within the household. Thus, the myth that grandparents are reliable sources of childcare provisions and may thus free up women's time for participation in the labour market falls. Furthermore, women declare that the lack of childcare services or incompatible scheduling with the labour market further reinforces their role as childcare providers within the household and away from the labour market. The social norms also transcend to the labour market where women perceive discrimination by employers, who appear to be concerned over productivity issues for women

with small children. Employers are also aware of the lack of childcare and its burden or responsibility on women, and some declare they prefer to recruit men or women without children. Our findings are thus suggestive of an intrinsic female role in the dependant's care rather than shared among the multi-generational household members. This suggests that the national and local provision of childcare and elderly care are among the main factors that should be considered for improving female labour market participation.

We further examine the impact of structural factors on the context of rural women's employment decisions in the three rural municipalities of Albania. Both rural women and employers report various barriers to women's employment, including lack of or costly transportation, longer distances, the trade-off between childcare and low wages in unstable jobs with poor working conditions, and limited access to information and employment services. This creates a cycle where women in distant areas refuse job offers with low wages and poor conditions and employers perceive them as preferring economic aid over working. The findings highlight a need for targeted policies to improve rural women's access to the labour market.

In light of these findings, policymakers should focus on addressing the barriers to women's employment in rural areas through an integrated approach that includes providing easily accessible and coordinated employment and social services. This includes expanding coverage to reach rural and distant areas and strengthening social dialogue and labour inspection services to improve working conditions and wages, particularly in low-skilled sectors where women make up a significant portion of the workforce. To support this, municipalities and stakeholders should be involved in the process and social administrators, who have a deep understanding of their communities, should be provided with adequate support. Additionally, expanding public transportation and childcare services, specifically in rural areas, will help remove obstacles to balancing work and family obligations and enable more women to join the workforce.

Appendices

4.A Contextualising the evolution of female labour force participation and legislation in Albania

During the fifty years of the Communist regime, an egalitarian system was put in place in Albania, guaranteeing full employment and thus changing outcomes for women outside the household, while still keeping in place the gender roles inside the household unaffected (Falkingham and Gjonca, 2001). After the fall of communism, the initial stage of the transitional period was characterised by a time of shocks eliminating the existing social support system, revitalisation of traditional values, liberalisation reforms, and a massive outflow of migration (Carletto et al., 2006). In addition, the market reforms that followed increased earning inequalities through wage and price liberalisations, and changed the characteristics of employment and the world of work in the country (World Bank, 2002). The void of social protection and economic rights reinforced women's homemaking roles (Tarifa, 1994). Consequently, women were burdened with more unpaid work within the household, but less mobility and chances to find jobs. The degree of feminisation in the traditional fields such as public health and education inherited from the communist system continued to increase in the post-communist years. To date, occupational segregation and segregation of women in particular fields of education such as education, health and welfare, humanities and arts remain high (EIGE, 2020). A derivative of the increased feminisation was the social devaluation of these jobs in terms of wages (Vullnetari and King, 2016), which persists today (Miluka, 2013).

In the early 2000s, roughly a decade after the fall of the Communist regime, large gaps existed between women and men in terms of labour force participation and employment. In 2003, there was a 23.8% points gap in the labour force participation rate (70.5% of working-age men participated in the labour force compared to 46.7% of women) (AMLSA, 2006). Likewise, in 2004, the rate of labour force participation rate for men was 68.6%, while for women 46.4% (AMLSA, 2006). Employment statistics show that in 2004, the employment rate was 38.3% for women and 60.1% for men. Gender gaps in labour force participation and employment rates continue to persist and are considerable, but they have been slowly reduced. The labour force participation rate during this time has an average of 17.3 percentage points, with the latest rates for 2021 of 61.4% for women and 77.3% for men (INSTAT, 2021). Employment gaps in the last decade have averaged 13.9 percentage points

with the latest rates for 2021 of 53.8% for women and 68.2% for men (INSTAT, 2021). Likewise, women were mainly concentrated in the social-state-service sector, where 80.0% of employees are women (AMLSA, 2006). In 2019, the percentage of employed women in education, human health and social work activities was 13.8% compared to only 3.9% for men (EIGE, 2020).

Over the last decade, there have been scattered academic evidence produced on the determinants of employment decision in Albania. Estimates for the early 2000s show that, for parents of at least two children, there is a positive effect of fertility on parental labour supply for younger less educated parents who mainly live in extended families (Trako, 2019).[13] However, this evidence warrants a revaluation. Albania has been displaying since the last two decades the institutional and political will for putting forward considerable interventions, demonstrated by various reforms and ongoing pledges to improve female participation in the economy, thus an analysis of the most recent trends is warranted to bring scientific evidence at the service of policymaking.

Its legal framework on gender equality is quite comprehensive, earning Albania a score of 90.9% from the UNWOMEN Global Sustainable Development Goals (SDG) Database, which monitors the SDGs worldwide (UNWOMEN, 2020). There are various important pieces of legislation that protect women against discrimination, such as the Law on Gender Equality in Society (No. 9970, dated 24.07.2008), which specifically aims to guarantee protection from gender discrimination, as well as the Law on Protection from Discrimination (No. 221, dated 4.2.2010), which further extends the scope to include many grounds of discrimination. The "National Strategy on Gender Equality 2021-2030" also promotes gender equality in many fields of life including employment, and equal inclusion of women in non-traditional fields of employment, as well as education in those fields, along with promoting equality in unpaid labour and equal sharing of household responsibilities, as well as equal participation and representation in political and public decision-making. The "National Employment and Skills Strategy 2019-2020" also aims to foster gender equality in employment and skill formation, as well as greater inclusion and territorial cohesion to better include women from rural or distant areas. The strategy acknowledges the need to better serve rural women with employment services and

[13] Trako (2019) puts together different sources of data to conduct an analysis till 2012. The study finds that mothers increased their labour supply and had a greater likelihood to work off-farm. For fathers, their likelihood to work off-farm also increased, as did the probability of having a second occupation. To this end, there might be two mechanisms in place driving the results, such as childcare being provided by non-parental adults in extended families, and greater financial costs because of bearing more children (Trako, 2019).

vocational education and training (VET). In 2019, the revised Law No.15/2019 "On Employment Promotion in the Republic of Albania" specifically included women victims of trafficking, women victims of gender-based violence, and women victims of domestic violence as eligible beneficiaries of employment promotion programmes of subsidised wages, on-the-job training, and internship programmes. The 2019 law was part of the reform of employment services focusing on redesigning the Active Labour Market Programmes, their delivery, and monitoring and evaluation (in order to improve their impact and compatibility with the labour market and programmes available in the European Union). The Albanian Labour Code also provisions for gender equality demanding equal pay for equal value work, as well as including special provisions for the protection of pregnant women, and provisions against discriminatory hiring practices. In an effort to promote equality in unpaid care labour and childcare responsibilities, the latest amendment to the Labour Code also provisioned for the right of both parents to demand parental leave, but statistics at the time of writing are unavailable. Specific institutions to protect against discrimination are also in place, such as the Commissionaire for the Protection Against Discrimination and the Ombudsman.

Lastly, it is important to highlight that family policy initiatives, like childcare support, may play an essential role to determine future evolution for female active labour market participation. There exists to date both forms of public and private childcare provision in the country. The public childcare provision includes crèches for the age 0-3 and kindergartens at age 3-6. Both crèches and kindergartens are subsidised by the government, and parents have to pay a fee for the meal provisions. This fee is of about 1.1 USD per day for the crèche and 1.36 USD for the kindergarten (Municipality of Tirana, 2022). Particularly for preschool, there is a low level of financing from the part of the state (UNESCO, 2017), and to the best of our knowledge no recent reform has yet taken place to introduce any school meal programme or to revise the overall location of institutes and availability. Given the present legislative framework, it is important to enquire how women perceive their fertility-employment relation, to further guide policymaking.

4.B Inspecting proxies of household gender norms

A possible channel influencing differences between rural and urban female behaviour in the labour market might be related to gender norms and aspirations. In the absence of questions relating to the role of women in childbearing and employment, we attempt an exercise for proxying household gender norms in two ways: if the

male partner is the main decision-maker within the household and the ideal number of children. Figure 4.D.3a shows that male partners in rural areas do not necessarily have larger financial decisions than in urban areas, but they have relatively larger saying in women health care and in giving the permission to visits their relatives. However, the gap between the areas is largely reduced in 2018. Once we analyse directly how household change their fertility preferences over time, 4.D.3b shows that households in rural areas in 2018 reduce what they indicate the ideal number of children, especially boys, controlling for their actual number of children. These coefficients are also indicative of the instrument power similarly to Ebenstein (2009): larger preferences for the ideal number of boys are more likely to increase the probability to have an additional child if the first two born ones are female. However, these results do not explain the overall difference in the first stage coefficients between rural an urban in in Table 4.C.5 as the coefficients in Figure 4.D.3b are not statistically different between rural and urban. On the other hand, they might be a possible driver of the overall decrease found in the first stage coefficients over time in Table 4.C.8.

4.C Tables

Table (4.C.1) Descriptive statistics

	Mean	SD	Min	Max	N
Currently working	0.32	0.47	0.00	1.00	2,997
Employed in the last year	0.38	0.48	0.00	1.00	2,997
Rural	0.51	0.50	0.00	1.00	2,997
Wealth	0.63	0.19	0.00	0.99	2,997
Years of education	10.50	4.46	0.00	24.00	2,997
Adults in the household	2.89	1.24	1.00	9.00	2,997
Married	0.98	0.15	0.00	1.00	2,997
Muslim	0.83	0.37	0.00	1.00	2,997
Age	30.63	3.44	20.00	35.00	2,997
Age at 1st birth	21.77	3.00	13.00	35.00	2,997
Number of children	2.36	0.62	2.00	6.00	2,997
Two female children	0.26	0.44	0.00	1.00	2,997
First child: male	0.49	0.50	0.00	1.00	2,997
Last child: male	0.55	0.50	0.00	1.00	2,997
Ever aborted/had miscarriage	0.15	0.36	0.00	1.00	2,997

Notes. Pooled cross-sections DHS 2007 & 2017-18. Sample selection: female respondents aged 20 to 35 years of age, with at least two children and whose age is below the age of 18. Sample weights are applied.

4.D Figures

Table (4.C.2) Analysis of same gender instruments: First stage analysis of the number of children (Rural sample)

	Dependent: Number of children							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Same sex	0.219***	0.208***	0.219***					
	(0.033)	(0.030)	(0.032)					
First child: male		0.188***	0.189***		-0.036	-0.028		-0.020
		(0.031)	(0.031)		(0.038)	(0.032)		(0.038)
Second child: male		0.224***					0.026	0.016
		(0.031)					(0.036)	(0.042)
Two male children				0.003	-0.016			
				(0.035)	(0.042)			
Two female children				0.415***	0.432***	0.432***	0.396***	0.416***
				(0.042)	(0.044)	(0.044)	(0.048)	(0.060)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1662	1662	1662	1662	1662	1662	1662	1662
First-stage F-stat	44	48	47	50	47	94	68	48

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The dependent variable captures the linear probability to have at least worked once last week or in the last 12 month. The sample is restricted to women residing in rural areas aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Controls: a household wealth index, years of education, number of adults in the household, marriage status, age, age^2, whether the first-born is a male and rural/urban residence (in column 3 only). Groups FE stands for including both ethnic group fixed effects and religious group fixed effect. Standard errors are clustered at the DHS-cluster level.

Table (4.C.3) Robustness: Average effect of having ever had an abortion or miscarriage on the probability of having male children

Dependent:	Last child: male			First child: male		
	(1) All	(2) Rural	(3) Urban	(4) All	(5) Rural	(6) Urban
Has ever aborted	-0.010	-0.049	0.032	-0.008	0.028	-0.058
	(0.031)	(0.043)	(0.043)	(0.033)	(0.047)	(0.047)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.03	0.05	0.03	0.01	0.02	0.02
Observations	2997	1662	1328	2997	1662	1328

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. Pooled cross-sections DHS 2007 & 2017-18. The dependent variable captures the linear probability that the last(first) child is a boy. Sample selection: female respondents aged 20 to 35 years of age, with at least two children and whose age is below the age of 18. Sample weights are applied. Controls: a household wealth index, years of education, number of adults in the household, marriage status, age, age^2, whether the first-born is a male and rural/urban residence (in column 3 only). Groups FE stands for including both ethnic group fixed effects and religious group fixed effect. Standard errors are clustered at the DHS-cluster level.

Table (4.C.4) Average effect of number of children on employment probability - OLS

Dependent:	Employed last week			Employed last year		
	(1) All	(2) Rural	(3) Urban	(4) All	(5) Rural	(6) Urban
Number of children	-0.071***	-0.051**	-0.094***	-0.091***	-0.090***	-0.093***
	(0.020)	(0.022)	(0.036)	(0.020)	(0.023)	(0.036)
Rural	-0.061**			-0.071**		
	(0.029)			(0.030)		
Wealth	0.135	0.284**	0.292*	-0.060	0.125	0.231
	(0.093)	(0.115)	(0.176)	(0.101)	(0.122)	(0.179)
Years of education	0.017***	0.018***	0.014***	0.017***	0.016***	0.013**
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Adults in the household	0.019**	0.019*	0.025*	0.022***	0.017	0.035***
	(0.008)	(0.010)	(0.014)	(0.008)	(0.011)	(0.013)
Married	-0.042	-0.014	-0.066	-0.019	0.007	-0.037
	(0.077)	(0.110)	(0.097)	(0.077)	(0.113)	(0.095)
Age	0.046	-0.018	0.140**	0.038	-0.012	0.117*
	(0.041)	(0.049)	(0.065)	(0.043)	(0.053)	(0.066)
Age^2	-0.000	0.001	-0.002*	-0.000	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age at 1st birth	-0.013***	-0.013**	-0.013**	-0.012***	-0.016***	-0.007
	(0.004)	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)
First child: male	0.012	0.009	0.005	0.012	0.014	0.008
	(0.023)	(0.026)	(0.036)	(0.024)	(0.028)	(0.036)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.15	0.14	0.16	0.13	0.17	0.14
Observations	2997	1662	1328	2997	1662	1328

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. Pooled cross-sections DHS 2007 & 2017-18. The dependent variable captures the linear probability to have at least worked once in the last year. Sample selection: female respondents aged 20 to 35 years of age, with at least two children and whose age is below the age of 18. Sample weights are applied. Groups FE stands for including both ethnic group fixed effects and religious group fixed effect. Standard errors are clustered at the DHS-cluster level.

Table (4.C.5) First stage: Average effect of having two girls as first born on number of children

Dependent:	Number of children		
	(1) All	(2) Rural	(3) Urban
First and second born children are female	0.320***	0.432***	0.201***
	(0.037)	(0.044)	(0.058)
Rural	-0.060*		
	(0.032)		
Wealth	-0.558***	-0.372***	-0.849***
	(0.098)	(0.139)	(0.201)
Years of education	-0.011***	-0.016***	-0.004
	(0.003)	(0.004)	(0.006)
Adults in the household	-0.018**	-0.005	-0.039***
	(0.009)	(0.012)	(0.014)
Married	0.098	0.188**	0.034
	(0.083)	(0.093)	(0.117)
Age	0.082*	0.140**	0.009
	(0.049)	(0.060)	(0.081)
Age^2	-0.000	-0.001	0.001
	(0.001)	(0.001)	(0.001)
Age at 1st birth	-0.060***	-0.064***	-0.057***
	(0.004)	(0.007)	(0.006)
First child: male	-0.015	-0.028	0.014
	(0.025)	(0.032)	(0.039)
Municipality FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Group FE	Yes	Yes	Yes
Observations	2,997	1,662	1,328
First-stage F-stat	76	94	12

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The sample is restricted to women aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Group fixed effects include religion groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

Table (4.C.6) Robustness: Number of children transformed in logarithm

Dependent:	Employed last week			Employed last year		
	(1) All	(2) Rural	(3) Urban	(4) All	(5) Rural	(6) Urban
Log(n. children)	-0.656***	-0.511**	-0.875	-0.472*	-0.448**	-0.469
	(0.245)	(0.227)	(0.651)	(0.244)	(0.222)	(0.625)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2997	2997	1662	1662	1328	1328
First-stage F-stat	108	132	20	108	132	20

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The dependent variable is a binary variable taking the value 1 if the sex of the first two children is female, and 0 otherwise. The sample is restricted to women aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Additional control variables included are: the number of adults in the households (individuals aged>18), age of the first-born child, sex of the first-born child, age and age squared of the respondent, education of the respondent, a household wealth index and rural/urban status. Group fixed effects include religious groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

Table (4.C.7) Average effect of number of children on employment probability by level of education achieved.

Dependent	Employed last week			
Sample by education	Above primary	Primary or lower		
	education (1)	All (2)	Urban (3)	Rural (4)
Number of children	-0.322	-0.218**	-0.396	-0.147*
	(0.284)	(0.090)	(0.298)	(0.084)
Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
Observations	1112	1882	597	1279
First-stage F-stat	10	81	11	81

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The table reports a 2SLS model for having worked last week (showing the main covariates for the second stage and instrument from the first stage). The sample is composed of women aged between 20 and 35 with at least two children whose age is below 18. Column 1 restricts the data to women having achieved higher than primary education, Column 2-4 with below or equal to primary. The specification is also inspected for urban (Col.3) or rural areas only (Col. 4). Additional control variables included are the number of adults in the households (individuals aged>18), age of the first-born child, sex of the first-born child, age and age squared of the respondent, education of the respondent, a household wealth index and rural/urban status. Group fixed effects include religious groups and ethnic groups. Survey weights are applied. Standard errors are clustered at the DHS-cluster level.

Table (4.C.8) Yearly analysis: Average effect of number of children on employment - IV

Dependent	Employed last week							
	Year: 2008/09				Year: 2017/08			
	(1) All	(2) Urban	(3) Rural	(4) R Primary	(5) All	(6) Urban	(7) Rural	(8) R Primary
N. of children	-0.160*	0.161	-0.215**	-0.090	-0.360**	-0.714	-0.155	-0.210*
	(0.093)	(0.242)	(0.096)	(0.097)	(0.177)	(0.525)	(0.136)	(0.123)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1174	561	612	479	1818	762	1047	796
1st stage F-stat	47	7	51	42	33	6	42	39

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. 2SLS model with as dependent variable the linear probability to have at least worked once last week. The sample is restricted to women aged between 20 and 45 with at least two children whose age is below 18 in Year 2008/09 (Col 1-4) or 2017/18 (Col 5-8). Data is further restricted to be either for urban (Col 2 and 6) or rural areas (Col 3 and 7), or rural sample with primary education (Col 4 and 8). Sample weights are applied. Group fixed effects capture separately religion groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

Table (4.C.9) Difference in means between urban and rural areas by type of employment

Variable	(1) Urban	(2) Rural	(3) Difference
Panel A: Type of occupation			
Professional/Technical/Managerial	0.270	0.097	-0.173***
	(0.444)	(0.296)	(0.025)
Clerical	0.056	0.007	-0.049***
	(0.231)	(0.082)	(0.012)
Sales	0.113	0.043	-0.070***
	(0.316)	(0.203)	(0.018)
Agriculture	0.017	0.545	0.528***
	(0.129)	(0.499)	(0.022)
Services	0.107	0.082	-0.025
	(0.310)	(0.274)	(0.019)
Skilled manual	0.282	0.137	-0.145***
	(0.451)	(0.345)	(0.026)
Unskilled manual	0.155	0.090	-0.066***
	(0.362)	(0.286)	(0.021)
Panel B: For whom working			
For family member	0.185	0.474	0.289***
	(0.388)	(0.500)	(0.028)
For someone else	0.623	0.252	-0.371***
	(0.485)	(0.434)	(0.030)
Self-employed	0.193	0.274	0.082***
	(0.395)	(0.447)	(0.027)
Panel C: Job stability			
All year	0.897	0.544	-0.353***
	(0.305)	(0.499)	(0.026)
Seasonal	0.053	0.365	0.312***
	(0.224)	(0.482)	(0.023)
Occasional	0.050	0.091	0.041**
	(0.219)	(0.288)	(0.016)
Panel D: Payment type			
Not paid	0.037	0.423	0.386***
	(0.189)	(0.495)	(0.023)
Cash only	0.947	0.386	-0.561***
	(0.224)	(0.487)	(0.023)
Cash and in-kind	0.003	0.067	0.064***
	(0.059)	(0.251)	(0.011)
In-kind only	0.013	0.124	0.111***
	(0.112)	(0.330)	(0.015)
Observations	500	481	981

Notes. Balance table reporting means for urban, rural and their statistical difference. Pooled cross-sections DHS 2007 & 2017-18. Sample selection: employed female respondents aged 20 to 49 years of age, reporting having any child below the age of 18. The data is reported for the full sample (column 3), for urban or rural samples (2,490 and 2,778 observations respectively).

Table (4.C.10) Average effect of number of children, rural and time binaries on employment probability in different occupations.

Second stage			
A. Dependent: Self-employed	All	Rural	Urban
	(1)	(2)	(3)
Number of children	0.134	0.184	0.386
	(0.179)	(0.213)	(0.441)
Rural=1	0.132***		
	(0.047)		
Year=2018	-0.010	0.132*	-0.029
	(0.036)	(0.069)	(0.050)
B. Dependent: Working for someone else	All	Rural	Urban
	(1)	(2)	(3)
Number of children	-0.135	-0.057	-0.702
	(0.214)	(0.209)	(0.708)
Rural=1	-0.184***		
	(0.059)		
Year=2018	0.168***	0.157**	0.114
	(0.047)	(0.062)	(0.085)
C. Dependent: Working in unstable job	All	Rural	Urban
	(1)	(2)	(3)
Number of children	0.146	-0.061	0.423
	(0.161)	(0.233)	(0.338)
Rural=1	0.113**		
	(0.045)		
Year=2018	-0.007	0.088	-0.072**
	(0.034)	(0.072)	(0.033)
D. Dependent: Work in agriculture	All	Rural	Urban
	(1)	(2)	(3)
Number of children	0.109	0.100	0.116
	(0.132)	(0.189)	(0.108)
Rural=1	0.216***		
	(0.039)		
Year=2018	-0.010	0.028	0.002
	(0.028)	(0.066)	(0.013)
Municipality FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	974	473	489
First-stage F-stat	19	17	3

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The table reports a 2SLS second stage regression for having worked over the last 12 months either as A. Self-employed, B. For someone else, C. In an unstable job or D. in an Agricultural job (other main covariates for the second stage are not reported). The sample is composed of women aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Group fixed effects include religion groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

Table (4.C.11) Share of women per aggregate occupation

	Rural		Urban	
	2008	2018	2008	2018
	(1)	(2)	(3)	(4)
Panel A: Share of employed women				
Employed last week	0.246	0.248	0.322	0.432
	(0.431)	(0.432)	(0.468)	(0.496)
Employed last year	0.361	0.291	0.360	0.467
	(0.481)	(0.454)	(0.480)	(0.499)
Panel B: Occupation				
Professional/technical/managerial	0.060	0.140	0.333	0.245
	(0.238)	(0.348)	(0.472)	(0.431)
Clerical	0.000	0.014	0.037	0.063
	(0.000)	(0.120)	(0.190)	(0.244)
Sales	0.068	0.014	0.216	0.073
	(0.251)	(0.119)	(0.413)	(0.260)
Agriculture	0.681	0.387	0.018	0.017
	(0.467)	(0.488)	(0.133)	(0.128)
Services	0.085	0.079	0.122	0.101
	(0.279)	(0.270)	(0.328)	(0.302)
Skilled manual	0.093	0.189	0.262	0.290
	(0.291)	(0.392)	(0.441)	(0.455)
Unskilled manual	0.014	0.176	0.012	0.210
	(0.120)	(0.382)	(0.109)	(0.408)
Panel C: For whom working				
For family member	0.659	0.260	0.243	0.162
	(0.475)	(0.440)	(0.430)	(0.369)
For someone else	0.107	0.419	0.556	0.649
	(0.309)	(0.494)	(0.498)	(0.478)
Self-employed	0.234	0.321	0.202	0.189
	(0.424)	(0.468)	(0.402)	(0.392)
Panel D: Job stability				
All year	0.480	0.618	0.846	0.916
	(0.501)	(0.487)	(0.362)	(0.278)
Seasonal	0.398	0.327	0.056	0.052
	(0.491)	(0.470)	(0.231)	(0.222)
Occasional	0.122	0.055	0.097	0.032
	(0.328)	(0.229)	(0.297)	(0.177)
Panel E: Payment type				
Not paid	0.585	0.236	0.062	0.027
	(0.494)	(0.426)	(0.242)	(0.163)
Cash only	0.218	0.579	0.930	0.954
	(0.414)	(0.495)	(0.256)	(0.211)
Cash and in-kind	0.046	0.091	0.004	0.003
	(0.211)	(0.289)	(0.059)	(0.058)
In-kind only	0.150	0.094	0.004	0.016
	(0.358)	(0.292)	(0.066)	(0.125)
Observations	459	457	514	585

Notes. The sample is restricted to women aged at least 20, with at least two children whose age is below 18.

Table (4.C.12) Robustness: Average effect of number of children on employment - IV

Second stage	Dependent: Employed last year					
	Year: 2008/09			Year: 2017/08		
	(1) All	(2) Rural	(3) Urban	(4) All	(5) Rural	(6) Urban
Number of children	-0.171*	-0.265***	0.152	-0.213	-0.054	-0.487
	(0.095)	(0.099)	(0.242)	(0.166)	(0.128)	(0.473)

First stage	Dependent: Number of children					
	Year: 2008/09			Year: 2017/08		
	(1) All	(2) Rural	(3) Urban	(4) All	(5) Rural	(6) Urban
Two female children	0.434***	0.562***	0.293***	0.242***	0.354***	0.160**
	(0.064)	(0.079)	(0.107)	(0.042)	(0.055)	(0.064)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1174	612	561	1818	1047	762
First-stage F-stat	47	51	7	33	42	6

Notes. *** p-value <0.01, ** p-value <0.05, *p-value < 0.10. The dependent variable captures the linear probability to have at least worked once in the last 12 months. The sample is restricted to women aged between 20 and 35 with at least two children whose age is below 18. Sample weights are applied. Group fixed effects capture separately religion groups and ethnic groups. Standard errors are clustered at the DHS-cluster level.

Figure (4.D.1) Municipalities selected for the qualitative interviews

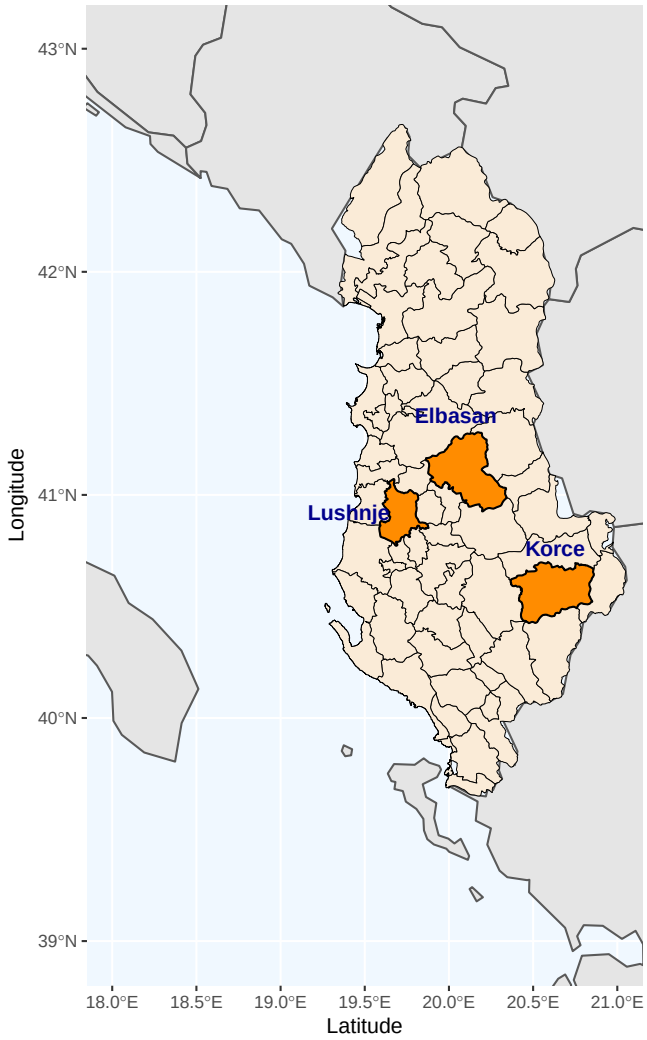
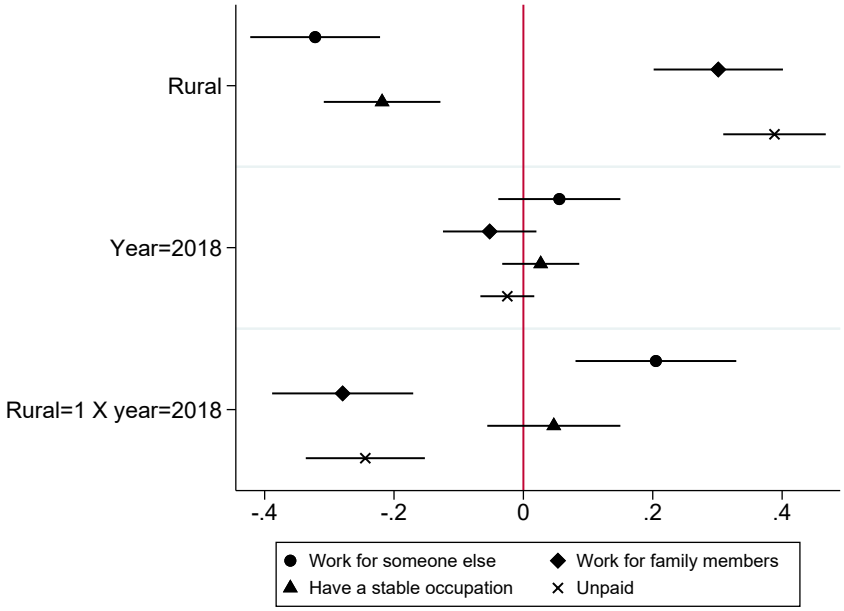


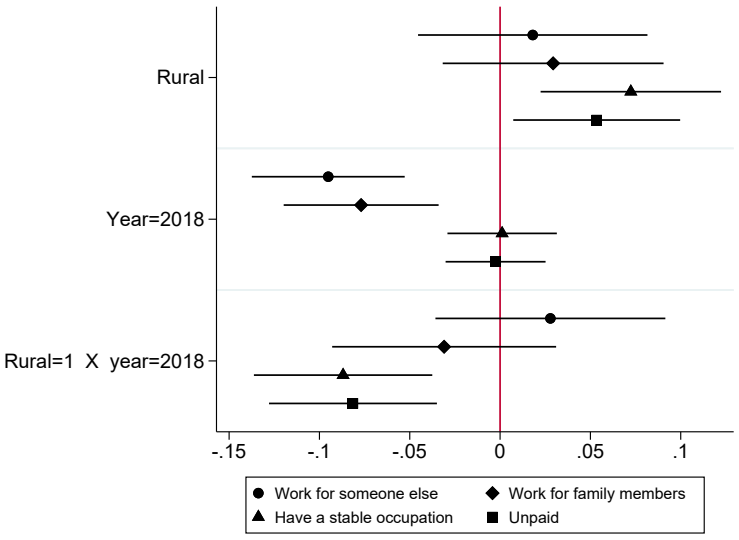
Figure (4.D.2) Employment types probability differences across regressions coefficients for rural areas and over time



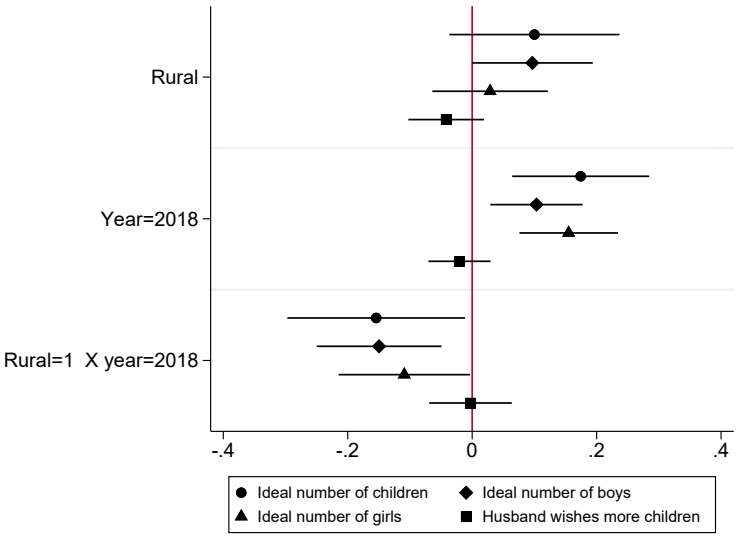
Notes. The Figure reports the coefficients for rural and year binary variables and their interactions for four employment linear probability regressions (OLS). Employment is defined as having worked at least once last year either as employee for someone (β coefficients represented as a circle), as employee for family members (square), or having a stable occupation (triangle), or as unpaid worker (cross). All regressions include the number of children, wealth, years of education, marriage status, age squared and age at birth as controls, and municipalities fixed effects. The sample is restricted to women aged 20-35 with children below 18. Confidence intervals at 95%.

Figure (4.D.3) Gender norms differences over time

(a) What husband mainly decides on



(b) Ideal number of children



Notes: Each symbol represents a different regression, with dependent variables indicated in the legends. Confidence intervals at 90%. All regressions include the number of children, wealth, years of education, marriage status, age squared and age at birth as controls and municipalities fixed effects. The sample is restricted to women aged 20-35 with children below 18.

Conclusions

The thesis has shed light on the relationship between international policy barriers and international migration, with a focus on the reduction and escalation of these barriers. The first chapter analyzed the effect of protective foreign direct investment (FDI) policies on international migration outflows from Indonesia, revealing a substitution effect from FDI to international migration and an increase in skilled migrants. In the second chapter, the impact of a migration ban on communities' ability to absorb income shocks from natural disasters was examined, revealing a negative effect on poverty levels. The third chapter focused on the sudden elimination of barriers to international migration in Albania in the 1990s, leading to the mass emigration of Albanians. This chapter found that migration had a positive effect on female employment, particularly in areas with high access to preschools. Chapter 4 explored the effect of fertility on female employment in Albania and found that an increase in the number of children decreased women's labour supply.

These findings have significant implications for international policy-making. Imposing limitations on international flows could exacerbate brain drain, as shown in chapter 1. Furthermore, migration restrictions could make communities more vulnerable to climate shocks, as discussed in chapter 2. Therefore, policymakers should consider the unintended consequences of limiting international flows. Conversely, relaxing migration barriers could lead to numerous benefits, such as enhancing female labour force participation, as highlighted in chapter 3. However, access to childcare services and favorable gender norms, as discussed in chapter 4, are essential for ensuring sustained female participation in the labour market.

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Résumé de thèse

La migration internationale a le potentiel de générer d'énormes gains, estimés à des dizaines de milliers de milliards de dollars ou à 50-150 % du PIB mondial, si les barrières à la migration sont supprimées (Clemens, 2011). Si les pays riches augmentaient leur force de travail de seulement 3 % grâce aux immigrants, cela pourrait générer 300 milliards de dollars, soit quatre fois et demie le montant de l'aide étrangère (Pritchett, 2006). Bien qu'il soit empiriquement difficile à estimer en raison des biais de sélection, la majorité des études au niveau micro-économique montrent de grands retours à la migration internationale. Par exemple, McKenzie et al. (2010), en exploitant un système de loterie dans l'attribution de visas de Tonga vers la Nouvelle-Zélande, ont constaté une augmentation de 263 % du revenu après la migration.

Les impacts positifs de la migration sur le développement économique sont importants non seulement en raison de la mobilité directe de la main-d'œuvre, mais aussi en raison d'autres effets de développement secondaires (Clemens, 2011). Les transferts de fonds sont une source vitale de revenus pour les ménages des pays en développement, et ils ont un effet positif sur la richesse et sur l'économie dans son ensemble (Adams Jr, 2011; Schiff et al., 2005). La migration peut également transférer des connaissances et des compétences au pays d'origine, conduisant à une augmentation de l'entrepreneuriat et de l'innovation à leur retour (Bahar et al., 2018; Dustmann and Kirchkamp, 2002; Gubert and Nordman, 2011; McCormick and Wahba, 2001; Wahba, 2014) ainsi qu'à une augmentation du commerce et des investissements bilatéraux (Burchardi et al., 2019; Felbermayr et al., 2015; Gould, 1994; Javorcik et al., 2011; Kugler and Rapoport, 2007; Mayda et al., 2020; Parsons and Vézina, 2018; Peri and Requena-Silvente, 2010; Rauch, 2001; Rauch and Casella, 2003). Les migrants peuvent transférer des idées sociales et politiques aux communautés d'origine, affectant la dynamique de la fertilité (Beine et al., 2013; Bertoli and Marchetta, 2015), les normes de genre (Lodigiani and Salomone, 2015; Tuccio and Wahba, 2018) ou les préférences politiques (Barsbai et al., 2017; Chauvet and Mercier, 2014; Docquier et al., 2016; Mercier, 2016; Spilimbergo, 2009).

Les grands gains de la migration à l'étranger peuvent servir de catalyseur pour investir dans les compétences et l'éducation, entraînant des effets d'entraînement positifs connus sous le nom de « brain gain ». Ce phénomène a été confirmé par des preuves empiriques tant au niveau macroéconomique (Beine et al., 2008; Docquier and Rapoport, 2012) qu'au niveau microéconomique (Batista et al., 2012; Chand and Clemens, 2011; Gibson and McKenzie, 2011; Shrestha, 2017). Enfin, la migration peut servir de stratégie d'adaptation au changement climatique et aux catastrophes naturelles, contribuant ainsi à renforcer la résilience et à réduire la vulnérabilité (Benveniste et al., 2020; Blumenstock et al., 2016; Giannelli and Canessa, 2022; Gröger and Zylberberg, 2016; Kleemans, 2015; Mbaye and Drabo, 2017; Yang and Choi, 2007).

Les gains issus de la suppression des barrières à la migration internationale l'emportent de manière impressionnante sur l'élimination totale des barrières commerciales et des flux de capitaux, estimées à seulement quelques pour cent du PIB mondial (Anderson and Van Wincoop, 2004). Pour autant, l'accès aux flux mondiaux a des effets positifs significatifs sur les pays en développement. Selon la CNUCED UNCTAD (2021), les économies en développement ont attiré 66 % des entrées de IDE (investissements directs étrangers) mondiales, ce qui marque une augmentation significative par rapport aux années précédentes. L'accès au commerce et aux IDE a été associé à une augmentation de la productivité, au transfert technologique, à la création d'emplois et à l'établissement de nouvelles industries (UNCTAD, 2021), ainsi qu'à une réduction de la pauvreté (Winters et al., 2004).

Cependant, le processus de mondialisation a ralenti ces dernières décennies, bien que largement bénéfique pour les pays en développement. La figure 1 montre que l'ouverture des échanges commerciaux, mesurée en pourcentage des exportations et des importations mondiales du PIB mondial, stagne depuis les années 2000. Cette tendance a presque complètement inversé une tendance séculaire de longue date. Des grandes puissances telles que les États-Unis et la Chine ont accru les mesures de protectionnisme commercial, telles que les mesures anti-dumping et les tarifs douaniers, et certains estiment qu'il y a un changement de paradigme vers la production nationale (European Central Bank, 2019). En même temps, de nombreux pays en développement ont mis en place des mesures de protectionnisme commercial pour réguler les flux d'IDE, telles que des procédures de sélection et des exigences de performance (Sauvant, 2009). Ces mesures sont souvent justifiées au nom de la sécurité nationale et des intérêts publics, mais elles peuvent également limiter la capacité des entreprises étrangères à accéder aux marchés locaux et conduire à une réduction de la compétitivité des entreprises nationales (Blomström and Kokko,

1996).

Du côté de la migration, la figure 1 montre également que les politiques de migration internationale sont devenues de plus en plus restrictives depuis les années 1990. Malgré les avantages potentiels que la migration peut apporter, de nombreux pays ont mis en place des politiques restrictives pour limiter les flux migratoires. Ces politiques peuvent aller des restrictions de visa, des quotas à des systèmes de points et peuvent avoir un impact significatif sur la capacité des individus à se déplacer librement et à rechercher de meilleures opportunités. Une forte augmentation des barrières politiques n'a pas coïncidé avec une réduction des flux migratoires internationaux ces dernières décennies (Clemens, 2022). Elle a plutôt remodelé la sélectivité des migrants, restreignant l'accès aux personnes peu qualifiées et vulnérables (Beine et al., 2016b; de Haas et al., 2018).

Cette thèse met en lumière les effets de la réduction ou de l'augmentation des barrières politiques internationales et leur relation avec la migration internationale. Dans le premier chapitre, j'analyse l'effet d'une politique de IDE protectrice sur les flux de migration internationale sortants de l'Indonésie. Je constate un effet de substitution de les IDE à la migration internationale, mais également une augmentation des migrants qualifiés. Dans le deuxième chapitre, j'analyse l'effet d'une interdiction de migration sur la capacité des communautés à absorber les chocs de revenus provenant de catastrophes naturelles. Dans ce cas également, je constate des effets négatifs sur les communautés en termes d'augmentation de la pauvreté. Contrairement aux deux chapitres précédents, le troisième chapitre se concentre sur un contexte où les barrières à la migration internationale ont été soudainement éliminées : j'exploite la chute du régime communiste en Albanie dans les années 1990 et la migration massive subséquente des Albanais pour identifier l'effet causal de la migration sur la participation de la main-d'œuvre féminine. Je constate que la migration a des effets positifs sur l'emploi féminin, mais que cet effet prédomine uniquement chez les femmes résidant dans des zones avec un accès élevé aux écoles maternelles. Je creuse davantage cette question de genre en analysant l'effet de la fécondité sur l'emploi féminin en Albanie dans le chapitre 4. Je montre qu'une augmentation du nombre d'enfants diminue l'offre de travail des femmes.

Cette thèse utilise les dernières méthodes empiriques de la littérature sur la migration qui n'impliquent pas d'expériences aléatoires sur le terrain (McKenzie and Yang, 2022). Le premier chapitre s'appuie sur un modèle shift-share (Bartik, 1991), largement utilisé dans la littérature sur la migration (voir Jaeger et al. (2018) pour une revue de la littérature). Le deuxième chapitre repose sur l'intersection de deux expériences naturelles. La première est un choc de politique qui affecte de manière

unilatérale un pays de destination important mais laisse les autres indemnes, créant ainsi un groupe témoin naturel. Le deuxième est les catastrophes naturelles, une source de variation quasi-aléatoire, conditionnelle aux effets fixes du village. Le troisième chapitre s'appuie sur l'instrument classique du réseau de migration. La majorité des études se concentrent sur des contextes avec une longue histoire de migration, il est donc difficile d'isoler le lien causal des réseaux persistants. Dans le chapitre 3, j'exploite le fait que les frontières ont été soudainement ouvertes en 1991, et que les premiers émigrants ont pu établir des réseaux de migration qui pourraient faciliter les vagues de migration ultérieures. Enfin, le quatrième chapitre exploite le sexe quasi-aléatoire à la naissance des enfants et les fortes préférences pour les garçons, dans l'esprit de Angrist and Evans (1998).

Les résultats de cette thèse ont des implications importantes pour l'élaboration des politiques au niveau international. Elle suggère que l'imposition de limites aux flux internationaux pourrait avoir des conséquences involontaires, telles que l'exacerbation de la fuite des cerveaux, comme le souligne le chapitre 1. De plus, les résultats indiquent que les restrictions à la migration pourraient rendre les communautés plus vulnérables aux chocs climatiques, comme discuté dans le chapitre 2. Par conséquent, les décideurs doivent tenir compte des impacts à long terme de la limitation des flux internationaux. En revanche, la levée des barrières à la migration pourrait entraîner de nombreux avantages. Le chapitre 3 met en évidence l'impact positif d'une telle levée sur la participation des femmes à la force de travail, qui est cruciale pour la croissance économique et le développement. Cependant, il convient de noter que la participation des femmes à la population active dépend des normes favorables en matière de genre et de l'accès aux services de garde d'enfants, comme discuté dans le chapitre 4. Sans ces facteurs, les femmes sont plus susceptibles de réduire leur offre de travail.

1 Chapitre 1 : Les restrictions sur les IDE induisent-elles la migration internationale ? Évidence de l'Indonésie

Le but de ce chapitre est de fournir une identification causale des effets d'une mesure protectionniste sur les IDE sur la migration internationale, dans un cadre dyadique. À partir de données dyadiques désagrégées sur les flux d'émigration internationaux des districts indonésiens, ce chapitre fournit des preuves causales

que l'investissement direct étranger (IDE) et la migration internationale sont des substituts.

De nombreuses études ont exploré l'influence des réseaux de la diaspora sur les flux d'IDE, révélant que les IDE est souvent considéré comme un complément à ces réseaux, les migrants qualifiés jouant un rôle particulièrement important (Javorcik et al., 2011; Kugler and Rapoport, 2007; Tong, 2005). Notre recherche se penche sur un domaine relativement peu étudié : comment les IDE affecte les décisions de migration, similaire au corpus de la littérature étudiant la relation entre l'aide et la migration (par exemple, Berthélemy et al. (2009); Dreher et al. (2019b); Parsons and Winters (2014)).

Ce chapitre tente de combler cette lacune en établissant l'effet causal des variations des flux d'IDE sur l'émigration internationale des régions touchées par la réglementation des IDE en Indonésie, une étude de cas qui reflète bien les tendances mondiales des flux d'IDE et qui est un pays d'origine majeur des migrants dans la région de l'ASEAN.

Nous utilisons des données d'enquêtes représentatives au niveau régional, construisant un panel dyadique enregistrant les flux de travail et de capital entre les districts indonésiens et les pays partenaires, et en régissant les flux d'émigration internationale dans les années 2005, 2006 et 2010 à 2015 sur les flux d'IDE de l'année précédente dans les effets fixes dyadiques. Pour notre identification, nous exploitons la caractéristique unique de l'étude de cas indonésienne : les changements de politique réglementaire qui ont seulement affecté les flux d'IDE, mis en place dans une liste d'investissement négative (NIL) pendant les années 2007 à 2014. La politique IDE spécifique au produit restreignait les flux d'investissement à des secteurs spécifiques à un niveau très granulaire de 5 chiffres, une politique IDE protectionniste de facto. Nous nous appuyons sur cette mesure comme instrument pour les flux dyadiques d'IDE, puisque les flux d'IDE sont endogènes à la migration. En utilisant une approche de partage de déplacement (Bartik, 1991; Dreher et al., 2019a; Nunn and Qian, 2014) basée à la fois sur la composition sectorielle initiale de chaque district et sur l'attractivité de chaque district pour recevoir les flux d'IDE d'un pays source d'investissement spécifique, nous mesurons l'exposition du district-pays-dyade à ce resserrement spécifique du IDE sectoriel. De cette manière, nous analysons efficacement l'effet des changements exogènes des flux de capitaux provenant de chaque pays source sur les changements dans l'émigration internationale vers ce même pays en tant que choix de destination.

Nos résultats montrent que les réductions relatives des flux d'investissement direct étranger (IDE) dyadiques après la réforme ont provoqué une augmentation de

l'émigration dyadique, indiquant ainsi une relation de substitution entre les IDE et la migration qui avait déjà été suggérée par la théorie commerciale standard. Dans les districts où les flux d'IDE bilatéraux ont été effectivement réduits après les réformes réglementaires du NIL, les flux d'émigration vers les mêmes pays partenaires ont augmenté. Nous constatons également que l'effet est particulièrement fort parmi les ménages ayant un niveau d'éducation tertiaire. Étant donné l'intérêt politique élevé pour le lien entre les flux de capitaux et de main-d'œuvre, nos résultats suggèrent que le protectionnisme de les IDE peut non seulement avoir des conséquences directes sur les flux de capitaux, mais également entraîner une augmentation de l'émigration hautement qualifiée (fuite des cerveaux) vers le pays d'origine à partir duquel les investissements provenaient par le passé.

2 Chapitre 2 : Confiné à rester : les catastrophes naturelles et l'interdiction de migration en Indonésie

Nous étudions si la migration internationale est une stratégie de mitigation pour le revenu perdu après une catastrophe naturelle. Nous établissons de manière causale le lien entre les catastrophes naturelles et la migration internationale comme stratégie de mitigation en exploitant une expérience naturelle : une interdiction de migration internationale à toutes les femmes indonésiennes désireuses de migrer en Arabie Saoudite. Bien que les catastrophes naturelles augmentent la migration, la restriction de migration vers l'Arabie Saoudite réduit l'effet à zéro dans les villages avec une forte propension ex-ante à migrer vers l'Arabie Saoudite. Par conséquent, la pauvreté augmente face aux catastrophes naturelles après 2011, aggravant davantage les conséquences graves du choc naturel.

Pour tester cette hypothèse, nous construisons un panel de près de 70 000 villages indonésiens à partir des Statistiques de Potentiel des Villages (PODES), un recensement des villages indonésiens collecté tous les trois ans. Nous utilisons les vagues de 2005, 2008, 2011 et 2014, qui contiennent, entre autres, des informations sur les catastrophes naturelles, le type de catastrophe, la migration internationale et le nombre de cartes de pauvreté émises. Nous utilisons ces informations pour estimer de manière causale l'effet de lissage de la migration dans un cadre de triple différence-différence (DDD). Nous comparons les niveaux de pauvreté des villages dont la majorité des migrants sont allés en Arabie Saoudite en 2005 par rapport au

reste de l'échantillon, comparés aux villages touchés par des catastrophes naturelles, avant et après la date du moratoire (2011).

Les résultats montrent que les villages les plus touchés par l'interdiction ont connu une réduction drastique de la migration. Ne pouvant pas atténuer l'impact des catastrophes naturelles grâce à la migration, ces villages connaissent une augmentation de la pauvreté, mesurée par le nombre de cartes de pauvreté émises. Nous constatons en outre que cet effet est dû à un type spécifique de catastrophe : les inondations. Cette effet est particulièrement plus fort dans les villages qui cultivent du riz à travers des pluies, plus vulnérables aux inondations.

À notre connaissance, il s'agit de la première étude examinant l'effet des restrictions de migration dans le contexte des événements climatiques extrêmes, ce qui est particulièrement pertinent compte tenu des débats politiques actuels visant à accroître les barrières à la migration. Nous montrons que la suppression de la migration internationale réduit l'une des rares stratégies d'atténuation des catastrophes naturelles, la modification climatique ne faisant qu'aggraver le problème en augmentant la fréquence des événements climatiques extrêmes au cours des prochaines décennies.

3 Chapitre 3 : Migration, Garde d'Enfants et Emploi Féminin : Évidence en Albanie

Ce chapitre analyse l'effet de la migration internationale d'un membre du ménage sur l'emploi des mères et comment cela diffère en fonction des différents niveaux de disponibilité de la garde d'enfants dans le contexte de l'Albanie. Avec un tiers de la population estimée avoir migré à l'étranger après la chute du régime communiste en 1990, l'Albanie est l'un des pays ayant le taux d'émigration le plus élevé au monde (Barjaba and Barjaba, 2015). En même temps, le pays présente une forte disparité entre les sexes (Miluka, 2013) et l'un des taux de fréquentation les plus bas des écoles maternelles dans les Balkans (World Bank, 2015).

Pour instrumenter la présence d'un membre migrant à l'étranger, nous exploitons la chute du régime communiste et l'émigration massive des Albanais du début des années 1990 en tant qu'expérience naturelle pour les réseaux de migration. Nous utilisons l'enquête DHS Albanie 2018 pour notre analyse principale. Ses clusters géo-référencés sont également combinés à l'univers des écoles maternelles en Albanie et leur géolocalisation pour construire une disponibilité spatiale des écoles maternelles. Nos résultats montrent que les femmes ayant de jeunes en-

fants augmentent largement leur probabilité d'emploi si un membre du ménage est à l'étranger. Cependant, cet effet ne se produit que si les mères ont accès à la garde d'enfants (accès aux écoles maternelles).

Ce chapitre concilie deux branches de la littérature. Nous contribuons d'abord aux études sur l'effet de la migration sur les ménages restés à l'arrière, en particulier sur la participation de la main-d'œuvre féminine (Amuedo-Dorantes and Pozo, 2006; Binzel and Assaad, 2011; Mendola and Carletto, 2012; Miluka, 2013). En même temps, nos résultats sont en ligne avec des études montrant l'effet positif de l'accès à l'éducation préscolaire sur l'emploi féminin dans les pays émergents (Calderón, 2014; Dang et al., 2019; Martínez A. and Perticará, 2017).

Près de notre chapitre, Mendola and Carletto (2012) se concentrent sur le lien entre la migration masculine et l'emploi féminin en Albanie. Ils constatent qu'un migrant à l'étranger diminue l'offre de travail rémunéré des femmes et augmente le travail non rémunéré. Dans ce sens, ils affirment que la migration du membre masculin du ménage augmente les responsabilités des femmes, mais la garde d'enfants les empêche de rejoindre des emplois rémunérés. Nous concilions leurs résultats en montrant des effets hétérogènes en ce qui concerne l'accès à la garde d'enfants formelle : les pères qui laissent de jeunes enfants derrière eux augmentent la probabilité d'emploi rémunéré pour les femmes vivant dans des zones avec un accès plus important aux écoles maternelles. Nous soutenons donc que la migration masculine incite les femmes à trouver de meilleurs emplois rémunérés, pour autant qu'elles aient accès à des services de garde d'enfants.

4 Chapitre 4 : Comment la fécondité affecte la participation des femmes au marché du travail en Albanie ?

Ce chapitre est une continuation naturelle du Chapitre 3 car il examine la relation entre la fécondité et l'emploi des femmes en Albanie. Nous utilisons à la fois une approche quantitative et qualitative pour évaluer leur nexus pour les zones rurales et urbaines au fil du temps. La littérature sur la relation entre l'offre de travail féminin et la fécondité a trouvé une corrélation négative entre les deux dans les contextes développés, mais les études dans les pays à faible et moyen revenu ont donné des résultats mitigés (Aaronson et al., 2021; Agüero and Marks, 2008, 2011; Priebe, 2010; Trako, 2019). Cela peut être dû aux défis uniques auxquels les femmes des

économies émergentes sont confrontées, tels que l'inégalité des revenus, les normes de genre et les marchés du travail informels. L'Albanie est une étude de cas intéressante car ses normes sociétales conservatrices et ses valeurs patriarcales peuvent jouer un rôle clé dans les décisions des femmes concernant l'éducation des enfants et les décisions d'emploi.

Pour établir un lien de causalité entre le nombre d'enfants qu'une femme a et sa probabilité d'emploi, nous nous appuyons sur une approche d'instrumentation. Nous exploitons ainsi le caractère aléatoire du sexe des deux premiers enfants et la préférence pour les garçons en Albanie pour examiner l'effet du nombre d'enfants sur la participation des femmes au marché du travail. Nous montrons ensuite que les femmes rurales sont particulièrement dépendantes de leur décision de fécondité si elles ont un faible niveau d'éducation. Cet effet n'est pas particulièrement pertinent pour des types d'emploi ruraux spécifiques, mais il est renforcé par des caractéristiques démographiques du ménage, telles que la présence de personnes âgées dans le ménage ou si le partenaire travaille.

En plus de l'analyse quantitative, nous menons une analyse mixte en utilisant des données qualitatives provenant de discussions de groupe avec des femmes et des employeurs dans trois municipalités rurales d'Albanie.

Les résultats de l'étude suggèrent qu'il existe une relation négative entre la fertilité et la probabilité d'emploi en Albanie. L'analyse révèle également des lacunes structurelles perçues par les femmes, notamment les normes sociales et la flexibilité des marchés du travail, qui favorisent la conciliation entre travail et famille. L'analyse mixte met en lumière les défis auxquels sont confrontées les femmes pour concilier les responsabilités professionnelles et familiales ainsi que les stratégies utilisées par les employeurs pour attirer et retenir les travailleuses.

Ce chapitre apporte deux contributions clés à la littérature sur la relation emploi-fertilité. Premièrement, il utilise les deux dernières vagues de données DHS, qui constituent le jeu de données le plus robuste et le plus récent sur la dynamique des ménages et la fertilité des femmes dans le contexte de l'Albanie, pour examiner l'évolution de la fertilité dans les zones rurales et urbaines d'un contexte émergent. Deuxièmement, l'analyse mixte fournit également un aperçu des lacunes structurelles perçues par les femmes, notamment les normes sociales et la flexibilité des marchés du travail, qui sont identifiées dans la littérature comme favorisant la conciliation entre travail et famille. Dans l'ensemble, ce chapitre met en lumière l'interaction complexe entre la fertilité, l'éducation des enfants et la participation des femmes au marché du travail dans les économies émergentes et offre des perspectives sur les défis auxquels sont confrontées les femmes dans des sociétés traditionalistes

comme l'Albanie.