IFPRI

INTERNATIONAL
FOOD POLICY
RESEARCH
INSTITUTE

CGIAR

RESEARCH
PROGRAM ON
Policies,
Institutions,
and Markets

Led by IFPRI

IFPRI Discussion Paper 01862

August 2019

**Modelling the Economic Impact of the Rohingya Influx in
Southern Bangladesh**

Mateusz Filipski

Ernesto Tiburcio

Paul Dorosh

John Hoddinott

Gracie Rosenbach

Development Strategy and Governance Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI), established in 1975, provides research-based policy solutions to sustainably reduce poverty and end hunger and malnutrition. IFPRI's strategic research aims to foster a climate-resilient and sustainable food supply; promote healthy diets and nutrition for all; build inclusive and efficient markets, trade systems, and food industries; transform agricultural and rural economies; and strengthen institutions and governance. Gender is integrated in all the Institute's work. Partnerships, communications, capacity strengthening, and data and knowledge management are essential components to translate IFPRI's research from action to impact. The Institute's regional and country programs play a critical role in responding to demand for food policy research and in delivering holistic support for country-led development. IFPRI collaborates with partners around the world.

AUTHORS

Mateusz Filipski (mfilipski@uga.edu) is currently an Assistant Professor in the Agricultural and Applied Economics Department of the University of Georgia, Athens, GA.

Ernesto Tiburcio (e.tiburcio@cgiar.org) is a Research Analyst in the Development Strategy and Governance Division of the International Food Policy Research Institute, Washington, DC.

Paul Dorosh (p.dorosh@cgiar.org) is a Director in the Development Strategy and Governance Division of the International Food Policy Research Institute, Washington, DC.

John Hoddinott (jfh246@cornell.edu) is a Nonresident Fellow in the Poverty Health and Nutrition Division of International Food Policy Research Institute, Washington, DC. and H.E. Babcock Professor of Food & Nutrition Economics and Policy at Cornell University, Ithaca, New York.

Gracie Rosenbach (g.rosenbach@cgiar.org) is a Research Analyst in the Development Strategy and Governance Division of the International Food Policy Research Institute, Washington, DC.

Notices

¹ IFPRI Discussion Papers contain preliminary material and research results and are circulated in order to stimulate discussion and critical comment. They have not been subject to a formal external review via IFPRI's Publications Review Committee. Any opinions stated herein are those of the author(s) and are not necessarily representative of or endorsed by IFPRI.

² The boundaries and names shown and the designations used on the map(s) herein do not imply official endorsement or acceptance by the International Food Policy Research Institute (IFPRI) or its partners and contributors.

³ Copyright remains with the authors. The authors are free to proceed, without further IFPRI permission, to publish this paper, or any revised version of it, in outlets such as journals, books, and other publications.

Contents

Abstract	iv
Acknowledgements.....	v
List of Acronyms	vi
1 Introduction: The Rohingya crisis viewed through a General Equilibrium lens.....	1
2 Literature review: impacts of refugees on local economies and labor markets.....	3
3 LEWIE Model	4
3.1 Model structure.....	4
3.2 Model specifics	5
4 Data and calibration	6
4.1 Host community, migrants and labor markets.....	6
4.2 Consumption	6
4.3 Production.....	7
5 Simulations	9
5.1 Design of simulations	9
5.2 Impacts on wages	9
5.3 Impacts on prices	11
5.4 Impacts on welfare.....	12
5.5 Sensitivity analysis	13
6 Conclusions	15
7 References.....	16

Tables

Table 1: Population figures by groups, 2018	2
Table 2: Populations of households analyzed and sampled	6
Table 3: Average annual household consumption (corrected by per capita nominal GDP growth)	7
Table 4: Average household annual production value (or revenue for activity).....	8
Table 5: Simulated impact on wages of integration of Rohingya into Cox's Bazar labor market.....	10
Table 6: Simulated impact on wages of integration of Rohingya into Chittagong labor market	10
Table 7: Simulated impact on wages of integration of Rohingya into Chittagong labor market, under different aid and investment scenarios	11
Table 8: Simulated impact on prices of integration of Rohingya into Chittagong labor market	12
Table 9: Simulated impact on real incomes of integration of Rohingya into Chittagong labor market, under different aid and investment scenarios	13
Table 10: Sensitivity of results to the elasticity of local labor supply assumption.....	14

Maps

Map 1: FDMN population by camp (as of June 15 th , 2019).....	1
--	---

Abstract

In the context of the massive influx of Forcibly Displaced Myanmar Nationals to Bangladesh, this paper aims to evaluate the potential consequences on the Southern Bangladesh economy. It adopts an economywide perspective to study the impacts of increased labor supply and increased consumer demand in a general equilibrium framework, using a Local Economy-wide Impact Evaluation (LEWIE) model. The model is used to illustrate the potential effect of a large arrival of displaced populations on wages, the supply and demand of goods, and incomes of migrant and host populations. Simulations enable comparisons between possible scenarios, including two options for the size of the market being impacted (either the smaller Cox's Bazar District, or the larger Chittagong Division) and several options for aid provisions from international actors. The databases used are the Forcibly Displaced Myanmar Nationals (FDMN) and Host Community Household Survey carried out by IFPRI, BIDS, WFP and ACF in late 2018 and the official Bangladesh Household Income and Expenditure Survey (HIES) 2016. We find that if the migrants enter the Cox Bazar labor markets only, their large number could potentially lead to a large drop in wage levels of around 30%. However, under similar conditions their impact in the much larger Chittagong Division would be limited to a drop of less than 4%. Cash transfers to migrants could mitigate the wage effects by stimulating local demand, but this effect is limited. Some local households may be hurt due to lower wages and higher prices. Matched transfers to local populations and investments in local industry could potentially offset some of these negative impacts.

Keywords: Economic Development; Local Economy Wide Model; Forced Migration

Acknowledgements

This work was undertaken as part of the CGIAR Research Program on Policies, Institutions, and Markets (PIM) led by the International Food Policy Research Institute (IFPRI). We are grateful to the World Food Programme (WFP) and PIM for funding this study.

The community and enterprise surveys covered in this report were implemented by teams from dRi (Development Research Initiatives) led by Dr. Munshi Sulaiman, and BIDS (the Bangladesh Institute of Development Studies), led by Dr. Mohammad Yunus.

We would also like to thank and acknowledge the Kutupalong Camp in Charge and the Bangladesh Ministry of Relief and Rehabilitation for their logistical support. Finally, we would like to thank Peter Guest, Akhter Ahmed, and Shahidur Rashid for their administrative and research support.

List of Acronyms

ACF: Action Contre la Faim (Action Against Hunger)
BBS: Bangladesh Bureau of Statistics
BDT: Bangladesh Taka
BIDS: Bangladesh Institute for Development Studies
CGE: Computable General Equilibrium
FDMN: Forcibly Displaced Myanmar Nationals
GDP: Gross Domestic Product
HIES: Household Income and Expenditure Survey
IFPRI: International Food Policy Research Institute
IMF: International Monetary Fund
LEWIE: Local Economy-wide Impact Evaluation
PIM: Poverty, Institutions, and Markets
UNHCR: United Nations High Commissioner for Refugees
USD: United States Dollar
WFP: World Food Programme

1 Introduction: The Rohingya crisis viewed through a General Equilibrium lens

Since August 2017, more than 700 thousand Rohingya individuals residing in the Rakhine region have crossed into Southern Bangladesh. These immigrants have joined the over 150 thousand that had arrived since the late 1970s (UNHRC, 2018). Hence, there are currently over 910 thousand Rohingya (210 thousand families) residing in Southern Bangladesh. Virtually all of them live in camps in the Ukhia and Teknaf *upazilas* (UNHRC, 2019b). The early-arrivers have been living in a few “registered camps” for decades, but the large wave of newcomers settled in new makeshift camps they built in proximity to the original ones.

Map 1: FDMN population by camp (as of June 15th, 2019)

Source: UNHCR; 2019b.

These numbers represent a sizeable influx of population for the area. Depending on the area we focus on, the demographic weight of the Rohingya community varies considerably. The approximate 2018 populations of the Chittagong Division and the Cox's Bazar District are 30.7 and 2.4 million respectively (Table 1). Thus, the Rohingya community represents less than 1% of total Bangladesh population, but it represents 3% of the Chittagong population, and 37% of the Cox's Bazar population. These distinctions matter, because while a 1% increase in population may have limited effects, a 37% increase in population is much more likely to generate serious disruptions in the economy. Women and children, who participate little to the labor market, are the largest groups among the Rohingya.

Adult Rohingya men represent 2.2% of those in Chittagong and 28.3% in Cox's Bazar. Their participation to the labor market could have sizeable impacts on labor dynamics.

Table 1: Population figures by groups, 2018

		People	Households	Adult males	Adult females
Bangladesh	<i>Number</i>	155,856,944	34,812,239	46,008,882	48,014,766
	<i>Share represented by Rohingya</i>	0.6%	0.6%	0.4%	0.5%
Chittagong	<i>Number</i>	30,754,035	6,087,732	8,172,505	9,071,120
	<i>Share represented by Rohingya</i>	3.0%	3.5%	2.2%	2.5%
Cox's Bazar	<i>Number</i>	2,477,796	450,067	640,939	623,524
	<i>Share represented by Rohingya</i>	36.8%	46.7%	28.3%	37.0%
Rohingya	<i>Number</i>	911,149	210,158	181,575	230,967

Note: For consistency, the numbers for Bangladesh are a linear projection of the 2011 figures (enumerated) presented in the 2011 census, as opposed to the latest figures published by the World Bank or other official reports.

A person is considered an adult when he or she is over 18 years-old.

Source: BBS, 2011; World Bank, 2019; ISCG, 2019b; UNHCR, 2019a.

Bangladesh is not a signatory of the 1951 Refugee Convention nor the 1967 Protocol relating to the Status of Refugees. It also lacks a refugee law, so it does not officially recognize the displaced Rohingya as refugees. This means that displaced individuals enjoy but a limited list of rights. Only those arrived in the first waves are legally permitted to leave the camps and to marry Bangladeshi people. None are permitted to work outside the camps or effectively access the legal system (Zetter & Ruaudel, 2016). Therefore, their livelihood strategies are reduced to obtaining transfers and working inside the camps (though in practice, some do work outside). Virtually every family receives either food assistance or cash transfers from the World Food Programme (ISCG, 2019a), and around 47% are engaged in an economic activity (IFPRI-BIDS FDMN Household Survey, 2018).

Labor and movement restrictions, low capital, high aid dependency, high unemployment and a sizable potential aggregated demand define the economic situation of the Rohingya community in Southern Bangladesh. In this scenario, it is unclear what would be the consequences of altering one or many of these parameters, both for the Rohingya and for the host communities. Would removing the labor and movement limitations and allowing the Rohingya to join the labor market necessarily lead to a reduction of wages or employment rates? Would universal transfers for immigrants and Bangladeshis inevitably drive inflation up? These implications are not straightforward to predict, as they are shaped by the specific policies and interventions put in place by local authorities, NGOs, and other stakeholders.

The goal of this paper is to model the consequences that certain modifications to the status quo would have in the economy of the Cox's Bazar District and the greater Chittagong Division. Particularly, it explores the potential impacts of removing the labor and movement restrictions, to different extents. To do so, it relies on a local economy wide impact evaluation (LEWIE) model, which is a general-equilibrium model centered on a subnational area.

2 Literature review: impacts of refugees on local economies and labor markets

A vast literature seeks to understand the effects that a sudden influx of people has on key economic indicators. In his seminal study, Card (1990) observed that the arrival of 125,000 Cuban immigrants in the Mariel boatlift to Miami, which represented a 7% increase in the labor force, did not depress wages or employment rates, even among less-skilled workers. More recently, Borjas (2017) reanalyzed the effect of that influx and found, in contrast, that wages of high school dropouts in Miami, the relevant reference population, decreased by 10% to 30% following the arrival of the *Marielitos*. More generally, by revising studies of similar cases around the globe, Borjas and Monras (2016) have found that refugee shocks have distributed effects: wages and employment rates of host workers with similar skill levels to refugees tend to be hurt, while wages and employment rates of host workers with different skill levels tend to rise. These analyses, nonetheless, are all conducted in developed economies and focus on rather small areas. Similarly, in their recent meta-analysis, Maystadt et al. (2019) identified that sizable influxes of displaced people have complex distributional consequences in the host community, according to market conditions and specific policy responses.

A different strand of literature has focused on assessing the impacts of migration using economy-wide modeling and simulation tools. Brücker and Kohlhaas (2004) develop a multi-region CGE model of Germany and the rest of the European Union and find that an influx of low-skilled workers into Germany may lead to some unemployment, due to rigidities in this segment of the labor market. Similarly, Dixon, Johnson and Rimmer (2008) find that restricting illegal migration to the US may reduce unemployment in a dynamic CGE model. Another CGE analysis by Sussangkarn (1996) finds that while migrants from Myanmar may compete for jobs with local unskilled workers in Thailand, their influx allows for higher production output and economic growth. These studies, however, focus on economic migrants, and do not take into account the particularities of the refugee situation. An exception is Taylor *et al.* (2016), who build a LEWIE model of a refugee settlement and its surrounding area. They show that, because they bring both labor and consumer demand (through aid packages) into the local economy, refugees create a net income gain for host households.

This work builds on those insights and provides a complementary approach. We develop a LEWIE model in the spirit of Taylor *et al.* (2016), and calibrate it to represent either the Cox's Bazar District economy, or the larger Chittagong Division economy. In both cases, we simulate the influx of Rohingya under various conditions, to understand how the economy might be affected. Cox's Bazar (2,500 square kilometers) is the natural area of reference, as the totality of Rohingya have settled within that district and tend to remain within its geographic boundaries. Using the greater Chittagong Division (33,800 square kilometers) provides a useful comparison. Aside from the fact that Divisions are the immediate upper geographic unit, the reason to do so is because the language spoken in Chittagong is similar to that spoken by Rohingya, making the idea of a single labor market plausible.

3 LEWIE Model

The LEWIE methodology (Taylor & Filipski, 2014) was designed to capture general equilibrium impacts of economic shocks at a local scale. LEWIE has its roots in input-output analysis (Leontief, 1986), agricultural household models (Singh, Squire, & Strauss, 1986), and Computable General Equilibrium (CGE) modeling. LEWIE models rely on general equilibrium principles to represent whole economies, thus including both supply and demand of all commodity and factor markets in the economy. A LEWIE can be constructed for an economy of any scale: in this case at the level of the Cox's Bazar district or of the Chittagong division.

The choice of using a LEWIE approach to evaluate the impacts of a migrant influx is directly motivated by three considerations. First, such an influx is likely to affect host economies through complex channels, including through commodity and factor markets, which LEWIE is uniquely adapted to represent. Secondly, the lack of before and after data on both the migrants and the local hosts poses serious challenges to econometric evaluation but is not as stringent a constraint for LEWIE. Finally, LEWIE can be used to compare scenarios and explore hypotheticals that are of unique value to policymakers.

It is important to note that LEWIE modeling is limited to economic impacts that can be expressed in monetary terms (incomes, wages, profits, consumption, etc.). The model is not capturing non-economic impacts such as the strains that refugees may impose on the environment, sanitary systems, and infrastructure, or the potential for social conflicts and public health issues.

3.1 Model structure

At its core, the model is focused on households, who are the producers and consumers in the economy. Equations in a LEWIE model describe the behavior of those households: how they combine inputs to generate outputs, how they spend their income on consumption, and how they trade with each other and the rest of the world.

The LEWIE nests household-farm models with household-specific consumption and production, within a local-area economy. Consumption is defined by Stone-Geary demand schedules. Production output is defined as the combination of value added and intermediate inputs. Value added is created from factors by a Cobb-Douglas production process, and intermediate inputs are added in fixed (Leontieff) proportions. The equations in the model are described in detail in Taylor & Filipski (2014)

There is no theoretical limit to the number of factors, commodities, or households that can be represented. Households are mapped into groups and villages according to their geographic location. Commodities can be represented as traded only locally or as traded with the rest of the world. The same is true for factors, which can also be fixed in a given production activity. The model is set up in a way that allows us easily to alter those assumptions to perform simulations. The model is static in nature, though it can easily be modified to perform recursively dynamic simulations.

3.2 Model specifics

For the present application, the model was calibrated to include three household types: rural host households, urban host households, and migrant households. These households generate income by combining their factors of production (land, labor, capital) with purchased inputs to produce goods they provide to the markets. We also grouped all possible commodities and services into six categories: crops, fish, meat, crafts, services, and others. Further, depending on the source of each item consumed, we sorted these categories between items purchased from local producers and items obtained from retailers. The following section provides details regarding the calibration specifics of the model.

4 Data and calibration

4.1 Host community, migrants and labor markets

To better understand the effects of easing labor market restrictions, we compare the pre-influx (before August 2017) and post-influx scenarios based on the available demographic information. Using HIES 2016, we divide the universe of Bangladeshi households between those living in urban and rural areas and study the effect of the influx separately. This is so that we can later run two alternative versions of the model, one at the larger division scale, and one at the smaller district scale. Overall, 6157 rural households and 1760 urban households were sampled in the Chittagong division and 600 rural households and 120 urban households in Cox's Bazar district.

In October/November 2018, IFPRI, the Bangladesh Institute of Development Studies (BIDS), the World Food Programme (WFP) and Action Against Hunger (ACF) conducted the Forcibly Displaced Myanmar Nationals (FDMN) and Host Community Household Survey inside the Rohingya camps and in their immediate vicinity. This survey collected information on nutrition, income, employment, consumption, housing, protection strategy, assistance and life histories of 2,089 households inside the camps and 504 outside the camp.

Table 2: Populations of households analyzed and sampled

	Cox's Bazar district		Chittagong division		Rohingya
	Rural households	Urban households	Rural households	Urban households	
<i>Pre-influx</i>	342,869	97,515	4,458,667	1,498,091	47,233
<i>Post-influx</i>	350,408	99,659	4,556,702	1,531,030	210,158
Sample Size	600	120	6157	1760	2089

Source: BBS, 2014,2016; FDMN Household Survey; 2018; World Bank, 2019; IMF, 2019.

4.2 Consumption

Since there is virtually no production in the camp except for some crafts (thatch, etc.), the Rohingya obtain almost everything through retail. Table 3 presents the average yearly household consumption for urban and rural households in Cox's Bazar, urban and rural households in Chittagong, as well as the Rohingya migrants. The calculations reveal that consumption of Rohingya households is around 40% that of rural households in the host community. It is even less when compared to urban households. Compared to the World Bank's 2018 GDP per capita estimates for the country (USD 1,749 per person), the average per capita consumption we compute among rural and urban inhabitants are only about a third and a half, respectively, of the national average. For the Rohingya, however, is only 13% of that amount.¹

¹ Using nominal per capita GDP growth, the numbers for the host communities were inflated to be comparable to the 2018 GDP per capita level.

The differences between consumption patterns of groups are consequential for our simulations because expenditures are the mechanism that translates incomes into demand. Since migrants spend nearly half of their income on crops from retailers, aid distribution is likely to affect demand for such retail. Services, on the other hand, are unlikely to be strongly impacted.

Table 3: Average annual household consumption (corrected by per capita nominal GDP growth)

	Cox's Bazar		Chittagong		Migrants
	Rural Hosts	Urban Hosts	Rural Hosts	Urban Hosts	
Expenditure shares:					
Local Crops	3.6%	1.3%	4.1%	0.9%	0.0%
Local Crafts	1.4%	0.9%	2.4%	0.7%	2.9%
Local Fish	0.4%	0.1%	0.4%	0.8%	2.9%
Local Meat	0.7%	7.3%	1.1%	9.8%	0.0%
Local Services	4.5%	7.3%	7.6%	9.8%	0.0%
Retail crops	28.0%	25.4%	23.0%	19.3%	47.0%
Retail crafts	2.2%	1.3%	2.2%	1.1%	0.0%
Retail fish	11.8%	10.7%	8.7%	7.9%	5.3%
Retail meat	5.5%	4.0%	6.2%	6.0%	11.6%
Other retail	41.9%	48.9%	44.4%	53.4%	30.3%
Average household expenditures (USD)	\$ 3,080	\$ 3,300	\$ 2,910	\$ 3,722	\$ 1,211
Household size	4.8	4.6	4.4	4.3	5.3
Expenditures/capita	\$ 641.67	\$ 717.39	\$ 661.36	\$ 865.58	\$ 228.49

Source: BBS, 2014, 2018; FDMN Household Survey, 2018; World Bank, 2019; IMF, 2019. Note: Since there is virtually no production in the camp except for some crafts (thatch, etc.), the Rohingya obtain almost everything through retail.

4.3 Production

We calculated production using the same commodity and service categories as for consumption. In this case, we only divided crafts and services between domestic and retail: a business was considered retail if what it spent on finished goods was more than twice the sum of that spent in inputs. A caveat of the estimations is that in both FDMN Household Survey and HIES 2016 the agricultural enterprise module contains separated sections for specific crop and non-crop production, and for production costs. Thus, the imputation of costs per category was done indirectly, based on total production shares.

Table 4 presents the average annual production for Rohingya households, urban host households and rural host households. For lack of enough observations in each category, we did not compute different figures for Cox's Bazar and Chittagong households, thus making the implicit assumption that production patterns are similar at both scales. As expected, agricultural output is higher among rural households, whereas crafts and services are higher among urban ones. Total production per household in the Rohingya camps is only about 20% of the value produced by a host rural household, highlighting the level of constraints faced by the migrants.

Table 4: Average household annual production value (or revenue for activity)

	Cox's Bazaar and Chittagong		Migrants
	Rural Hosts	Urban Hosts	
Production/Revenue:			
Local crops	313	46	31
Local crafts	418	578	0
Local fish	30	12	3
Local meat	42	11	0
Local services	147	518	39
Retail crops	671	937	350
Retail crafts	106	43	0
Retail fish	253	319	39
Retail meat	180	277	86
Other retail	1291	2129	226
Total (USD)	\$ 3,409	\$ 4,870	\$ 774
Observations	600	120	2089

Note: For lack of data, Cox's Bazaar and Chittagong host households were assumed to have similar production patterns on average. **Source:** BBS, 2018; FDMN Household Survey, 2018; World Bank, 2019; IMF, 2019. Conversion rate 1 USD = 83 BDT

It is important to mention that the model does not assume that production should be equal to consumption within the household. For the migrants, self-sufficiency is impossible due to the serious restrictions to work and the scarcity of land. The difference between consumption and production is covered by social assistance. For the host communities, the difference can be explained by trade with other regions.

5 Simulations

5.1 Design of simulations

We use the LEWIE model to simulate an influx of Rohingya, taking the year 2015 as a baseline (when there were nearly 200,000 displaced Rohingya, mostly living in the official camps). We simulate the influx using two parameter manipulations which we can turn on or off independently:

- An increase in the total supply of labor from the migrant group;
 - An increase in the amount of exogenous incomes of the migrant group (to simulate cash aid).
- This also has the effect of increasing consumption demand (expenditures) by that group.

One of the key questions we aim to answer with the model regards the impacts of allowing the displaced Rohingya to enter the labor market under different circumstances, and in particular the size of the labor market necessary to absorb them.² To do this, we run these simulations at two scales: either the Cox's Bazar District, or the larger Chittagong Division. This is done with two alternative versions of the model, which have the same parameters for the migrant household group but different parameters for the host household groups (urban and rural). They match the population, consumption, and production patterns estimated for households in those two geographic areas outlined in Table 2, Table 3, Table 4.

In addition to running simulations of the influx of Rohingya with and without aid support, we also perform simulations that include support for host community households, that might offset some of the impacts of Rohingya influx. One involves distributing cash to host economy households, in an amount chosen (arbitrarily) to equal to the total spending on aid transfers to the Rohingya. The other involves adding capital investments in host businesses, in an amount also chosen to equal the total spending on aid transfers to the Rohingya. These simulations are meant to provide an order of magnitude of potential impacts under hypothetical scenarios. At the time of writing, no specific plan existed to direct compensatory aid nor investment to host populations.

The following tables report the model results impacts from these simulations. We focus primarily on the impacts on wages, but also report impacts on prices and household real incomes. Finally, we perform some sensitivity analysis on the model parameters.

5.2 Impacts on wages

We first report the impact of the Rohingya entering the Cox's Bazar labor market only, without any mitigating intervention (Table 5) and without taking into account any of the potential impacts on demand driven by aid distribution.³

² Evidence suggests that some of the displaced Rohingya already participate in local labor markets, though precise estimates are challenging to obtain.

³ We ignore aid in this simulation so as to isolate the labor effect from demand effects. This should not be thought of as a simulation of refugees being left without aid, but rather as aid being offered 100% in-kind using imported, non-resalable goods.

The five rows of the table show results for increasing numbers of the Rohingya. An influx of 100,000 people (men, women and children, in the current proportions of the Rohingya population) corresponds to a 50% increase from the 2015 baseline (~200,000). If Rohingya workers were allowed to enter the Cox's Bazar labor market, simulations suggest it would lead to a modest decrease in the local wage (-5.62%). However, an increase of 800,000 migrants (approximately the actual influx between 2015 and 2018) would lead to a 31.01% drop in the wage.

Table 5: Simulated impact on wages of integration of Rohingya into Cox's Bazar labor market

Influx of migrants only (no mitigating interventions) (starting from 200k people base)	Impact on Local Wages in Cox's Bazar labor market
100,000 people (50% increase in Rohingya population)	-5.62%
200,000 people	-10.57%
300,000 people (100% increase from base)	-14.95%
600,000 people	-25.52%
800,000 people (x5 increase from base = Current estimated influx)	-31.01%

Note: The simulations are based on an exogenous increase in total labor supply in the Cox's Bazar economy corresponding to the Rohingya influx.

In contrast, if the migrants were integrated into the larger Chittagong labor market without any mitigating intervention (Table 6), the impacts on wages are much more limited. An influx of 100,000 migrants leads only to a -0.48% drop in the wage. The full 800,000 migrant influx induces a wage drop of -3.68%, which is not negligible but also not dramatic.

These simulations suggest that, while the Cox's Bazar labor market is much too small to absorb the Rohingya influx without severe disturbances, the Chittagong Division is large enough that it could probably weather such a shock.

Table 6: Simulated impact on wages of integration of Rohingya into Chittagong labor market

Influx of migrants only (no mitigating interventions) (starting from 200,000 people base)	Impact on Local Wages in Chittagong labor market
100,000 people (50% increase in Rohingya population)	-0.48%
200,000 people	-0.95%
300,000 people (150% increase from base)	-1.42%
600,000 people	-2.79%
800,000 people (x5 increase from base = Current estimated influx)	-3.68%

Note: The simulations are based on an exogenous increase in total labor supply in the Chittagong economy corresponding to the Rohingya influx.

In Table 7, we repeat one of these labor force influx simulations (Simulation A, influx of 300,000 people, which on its own leads to a wage drop of -1.42%) and combine it with various mitigating interventions. In simulation B, we match the increase in migrants (+150%) with a similar increase in their exogenous income (+150%). This has the effect of increasing the migrant's consumption demand thereby stimulating the local economy, and it mitigates the wage effect somewhat (-1.25%).

One option to mitigate the negative impacts on local wages is to stimulate the local economy, which we simulate in simulations C and D. In simulations C, we increase labor supply and aid to the Rohingya, but also provide cash to the local hosts. We chose the amount of cash arbitrarily to match the budget being spent on Rohingya aid in simulation B, and distribute it proportionally to population to the host rural and urban household groups. Table 7 shows that this has the effect of further mitigating the impact of the Rohingya influx on wages, to just -1.04%. In simulation D, we further simulate an influx of investment capital into the economy, also chosen to match the budget spent on Rohingya aid in simulation B, and injected proportionally to current capital levels in all production activities. This further reduces the impact on wages to -0.64%.

Table 7: Simulated impact on wages of integration of Rohingya into Chittagong labor market, under different aid and investment scenarios

<i>All in USD</i>	Influx of Rohingya with other treatments	Impact on Local Wages
A	+300,000 migrants only (150% increase from base, no aid)	-1.42%
B	Simulation A + cash transfers to migrants (WFP aid)	-1.25%
C	Simulation B + matched transfers to hosts	-1.04%
D	Simulation C + matched investment in capital	-0.62%

Note: The simulations are based on an exogenous increase in total labor supply in the Chittagong economy corresponding to the Rohingya influx. Simulation C assumes a cash transfer to local households equal (in total spending – not per household) to the spending on Rohingya aid. Simulation D adds that same amount as capital investments in the local economy.

5.3 Impacts on prices

We report the impacts on market prices in Chittagong region under simulations A to D (above) in Table 8. The results show that none of the local price levels are affected very dramatically: the maximum impact magnitude of -1%. The negative sign of the impact on prices reflects the lower production costs associated with an increase in labor supply. In simulations B through D, aid distribution increases consumption demand and mitigates the price drops, but not enough to offset it completely.

Overall, the simulations suggest that the broader consumption markets in the Chittagong Division would not likely be severely affected by the Rohingya influx. This does not, however, exclude the possibility price shocks in areas immediately adjacent to the camps, where temporary spikes in demand are likely to have occurred.

Table 8: Simulated impact on prices of integration of Rohingya into Chittagong labor market

	Sim. A (labor only)	Sim. B (Sim A + Rohingya aid)	Sim. C (Sim B + host aid)	Sim. D (Sim C + capital investment)
Locally produced crops	-1.04	-0.91	-0.73	-0.75
Locally produced fish	0.21	0.70	0.87	-0.81
Locally produced meat	-0.90	-0.78	-0.59	-0.62
Local services	-0.30	-0.26	-0.20	-0.39
Retail crop	-0.26	-0.20	-0.14	-0.04
Retail crafts	-0.86	-0.75	-0.59	-0.31
Retail fish	-0.29	-0.24	-0.19	-0.09
Retail meat	-0.26	-0.20	-0.15	-0.05
Other retail	-0.42	-0.35	-0.27	-0.13

Note: The simulations are based on an exogenous increase in total labor supply in the Chittagong economy corresponding to the Rohingya influx. Simulation C assumes a cash transfer to local households equal (in total spending – not per household) to the spending on Rohingya aid. Simulation D adds that same amount as capital investments in the local economy.

5.4 Impacts on welfare

Finally, in Table 9 we report the impact of the four simulations on real incomes in the Chittagong economy, for the three groups of households we distinguish in the model. The migrants' column of the table shows large and positive impacts on the real incomes (incomes accounting for price levels) of the migrant group, which is not surprising as it reflects a population influx and/or aid transfers. However, the table also provides two important conclusions with respect to the host household groups.

First, the influx of Rohingya does have the potential to negatively influence host-country real incomes. In simulation A, host households are hurt because local wages drop. This loss of welfare is more salient for rural host households, not only because they outnumber urban host households, but also because they derive a larger share of their income from wages. Simulations A and B show that these impacts remain negative even when aid to Rohingya is accounted for, likely reflecting the fact that Rohingya consumption is largely satisfied using imported goods, and thus generates only limited income spillovers.

Second, simulations C and D show that it is possible to largely limit and even reverse these negative impacts with some interventions aimed at the host populations. Spending an equal budget on local host households as on Rohingya (Simulation C) almost eliminates the negative impact on rural hosts, and creates income benefits for urban hosts. If, in addition to this, a similar amount of money was to be invested into local capital (Simulation D), this creates sizeable increases in real incomes for the locals.

Table 9: Simulated impact on real incomes of integration of Rohingya into Chittagong labor market, under different aid and investment scenarios

<i>All in USD</i>	Influx of Rohingya with other treatments	Impact on Real Incomes		
		Rural Hosts	Urban Hosts	Migrants
A	+300,000 migrants only (no aid)	-29.6M	-5.5M	+54.4M
B	Simulation A + cash transfers to migrants (WFP aid)	-25.3M	-4.6M	+79.4M
C	Simulation B + matched transfers to hosts	-1.8M	+2.4M	+79.6M
D	Simulation C + matched investment in capital	+21.3M	+12.0M	+80.0M

Note: The simulations are based on an exogenous increase in total labor supply in the Chittagong economy corresponding to the Rohingya influx. Simulation C assumes a cash transfer to local households equal (in total spending – not per household) to the spending on Rohingya aid. Simulation D adds that same amount as capital investments in the local economy.

5.5 Sensitivity analysis

The results presented in this paper were generated using a simulation model, and as such they are sensitive to the assumptions that are embedded in the model equations, structure, and parameters. One particularly important assumption in the case of the work presented here relates to the local labor markets. If we assume that local labor markets are tight, the wage should be very responsive to changes in labor supply or demand. In contrast, we can assume that local labor supply is very elastic, in which case changes in supply have limited impact on the wage.

In the simulations presented above, we assumed that the elasticity of labor supply with respect to the wage was $\eta = 0.3$, meaning that a 1% increase in the wage would be accompanied with a 0.3% increase in supply. This corresponds to a labor market that is neither fully elastic nor inelastic, and is a plausible value for an area like Chittagong region. We present tests of this assumption in Table 10.

Results of the sensitivity analysis show that, if labor markets were significantly tighter ($\eta = 0.1$ – lower elasticity, more responsive wage) the impact of the Rohingya influx would have a stronger impact on the wage, but not dramatically different (-1.84% versus -1.42% for simulation A). Similarly, if labor

markets were significantly more elastic ($\varrho = 1$), the impact on wages would be mitigated but not eliminated (-0.79% versus -1.42% for simulation A). In contrast, if the labor market were infinitely elastic to begin with ($\varrho = 100$ – practically infinite elasticity), the effects on wages disappear entirely. This is because if the economy were already facing huge labor surpluses, the addition of Rohingya workers, even in large amounts, would have virtually no bearing on that situation.

Table 10: Sensitivity of results to the elasticity of local labor supply assumption

		Impact on Wages in Chittagong			
		Baseline ($\varrho = 0.3$)	Labor supply less elastic $\varrho = 0.1$	Labor supply more elastic $\varrho = 1.0$	Labor market infinitely elastic $\varrho = 100$
A	+300,000 migrants only (no aid)	-1.42%	-1.84%	-0.79%	-0.01%
B	Simulation A + cash transfers to migrants (WFP aid)	-1.25%	-1.62%	-0.69%	-0.01%
C	Simulation B + matched transfers to hosts	-1.04%	-1.35%	-0.58%	-0.01%
D	Simulation C + matched investment in capital	-0.62%	-0.79%	-0.34%	-0.01%

Note: ϱ is the elasticity of labor supply with respect to the wage.

6 Conclusions

This paper used simulation methods to explore the potential economywide impacts of the influx of Rohingya, particularly with regards to the labor markets. The modeling is primarily focused on wages, and reflects only the market-driven impacts of the migrant influx: we are not able to assess any of the potential non-economic impacts. Areas of concern such as potential harm to the environment, social conflicts, or public health issues, require additional study. With this important caveat in mind, the findings can be summarized as follows:

- 1) Given the large number of Rohingya migrants, a small-scale labor market could easily be overwhelmed by the influx. Were the migrants to enter the Cox's Bazar labor market and be limited to that area, wages would likely drop by about a third.
- 2) However, given a large enough market to integrate, the Rohingya's influx would not necessarily lead to a dramatic fall in wages. The Chittagong Division labor market, where language would not be a barrier, is large enough that, were the migrants to enter it, the wage drop would not exceed -4%.
- 3) Aid distributed to the migrants mitigates the negative wage impacts somewhat by stimulating local demand, but that effect remains limited by the fact that most of their consumption is satisfied by imported goods.
- 4) In real income terms, host households are likely to be negatively impacted by the wage and price drops associated with the migrant influx. Those negative impacts could potentially be mitigated or reversed with donor contributions or public expenditures targeting the host economy in addition to the migrants themselves.

These simulation results suggest that incorporating the Rohingya into a larger area would minimize the size of the impact they would have on the local economy, at least when it comes to wages. It is worth noting that while our simulations consider the impact on average wage levels, certain industries may be more affected than others. Migrants may tend to concentrate in certain activities, and the model may understate the impacts on wage rates in those subsectors. Further study is necessary to understand these labor dynamics at a more disaggregated level.

Our results further point to the important role of policy in determining the nature of impacts. Rules and policies regarding the geographic areas where the Rohingya may legally travel, whether they may work for a wage, and the level of enforcement of these rules, are important determinants of the ability and willingness of migrants to participate to the economy. They ultimately shape the nature and magnitude of the economic impact of displaced populations.

Finally, the simulations suggest that mitigating or reversing the potentially negative effects of the migrant influx into the economy would not be costless. Donors and/or public authorities would need to coordinate a program of aid and investment that spurs enough growth to offset the wage drop. The feasibility of such a coordinated effort would be constrained by budgets and political concerns. Government and/or donor funding for investments to offset potential adverse consequences are certainly not guaranteed to materialize, and the political resistance to a policy of permitting greater legal participation of the Rohingya in the greater Chittagong labor force should not be under-estimated.

7 References

- Bangladesh Bureau of Statistics (BBS). (2018). *Household Income and Expenditure Survey (HIES) 2016*.
- (2014). “National Volume-2: Union Statistics”. *Population & Housing Census- 2011*. Available at : <http://203.112.218.65:8008/WebTestApplication/userfiles/Image/National%20Reports/Union%20Statistics.pdf>
- Borjas, G. J. (2017). “The wage impact of the Marielitos: A reappraisal”. *ILR Review*, 70(5), 1077-1110.
- Borjas, G. J., & Monras, J. (2017). “The labour market consequences of refugee supply shocks”. *Economic Policy*, 32(91), 361-413.
- Brücker, H., & Kohlhaas, M. (2004). *International Migration to Germany: A CGE-Analysis of Labour Market Impact*. Berlin: German Institute for Economic Research (DIW).
- Card, D. (1990). “The impact of the Mariel boatlift on the Miami labor market”. *ILR Review*, 43(2), 245-257.
- Dixon, P. B., Johnson, M., & Rimmer, M. T. (2008). *Reducing Illegal Migrants in the US: A Dynamic CGE Analysis*. Centre of Policy Studies/IMPACT Centre Working Papers. Monash University, Centre of Policy Studies/IMPACT Centre.
- IFPRI, BIDS, WFP and ACF. 2019. Forcibly Displaced Myanmar Nationals and Host Community Household Survey. (Unpublished).
- Inter Sector Coordination Group (ISCG). (2019a). *Situation Report Rohingya Refugee Crisis. Cox’s Bazar | 10 January 2019 (covering 11 December 2018 – 7 January 2019)*. Available at: https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/iscg_situation_report_10_jan_2018_0.pdf
- . 2019b. *Rohingya Refugees Population by Location at Camp and Union Level - Cox's Bazar*. Available at: <https://data.humdata.org/dataset/site-location-of-rohingya-refugees-in-cox-s-bazar>
- International Monetary Fund. (2019). “Bangladesh”. *World Economic Outlook Database*
- Leontief, W. W. (1986). *Input-output economics* (2nd ed.). New York: Oxford University Press.
- Maystadt, J.F., Hirvonen, K., Mabiso, A. and Vandecasteele, J., (2019). Impacts of Hosting Forced Migrants in Poor Countries. *Annual Review of Resource Economics*, 11.
- Singh, I., Squire, L., & Strauss, J. (1986). *Agricultural household models: extensions, applications, and policy*.
- Sussangkarn, C. (1996). Macroeconomic Impacts of Migrant Workers: Analyses with a CGE Model. *TDRI Quarterly Review*, 11(3), 3–11.
- Taylor, J. E., & Filipowski, M. J. (2014). *Beyond Experiments in Development Economics: Local Economy-wide Impact Evaluation*. Oxford, UK: Oxford University Press.
- Taylor, J. E., Filipowski, M. J., Alloush, M., Gupta, A., Rojas Valdes, R. I., & Gonzalez-Estrada, E. (2016). Economic impact of refugees. *Proceedings of the National Academy of Sciences*, 113(27), 7449–7453. doi:10.1073/pnas.1604566113

The World Bank. (2019). “Population, total (Bangladesh)”. *Data*. Available at:
<https://data.worldbank.org/indicator/SP.POP.TOTL?locations=BD>

United Nations Human Rights Council (UNHRC). (2018). “Oral update of the High Commissioner for Human Rights on Situation of human rights of Rohingya people”. *Annual report of the United Nations High Commissioner for Human Rights and reports of the Office of the High Commissioner and the Secretary-General*. Available at:

_____. (2019a). *Bangladesh Refugee Emergency Population factsheet (as of 15 March 2019)*. Available at:
<https://data2.unhcr.org/en/documents/download/68476>

_____. (2019b). *Bangladesh Refugee Emergency Population factsheet (as of 15 June 2019)*. Available at:
<https://reliefweb.int/sites/reliefweb.int/files/resources/69954.pdf>

Zetter, R., and Ruaudel, H. (2016). *Refugees’ right to work and access to labor markets—An assessment*. World Bank Global Program on Forced Displacement (GPDF) and the Global Knowledge Partnership on Migration and Development (KNOMAD) Thematic Working Group on Forced Migration. KNOMAD Working Paper. Washington, DC: World Bank Group.

ALL IFPRI DISCUSSION PAPERS

All discussion papers are available [here](#)

They can be downloaded free of charge

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
www.ifpri.org

IFPRI HEADQUARTERS

1201 Eye Street, NW
Washington, DC 20005 USA
Tel.: +1-202-862-5600
Fax: +1-202-862-5606
Email: ifpri@cgiar.org