This section solves and computes the efficient allocation in our model economy. Up to this point, we have measured the welfare gains from a particular policy intervention—a subsidy to induce more seasonal migration. In all the instances we studied (one-time partial equilibrium, permanent general equilibrium with distortionary taxes) the welfare gains from these interventions result from the provision of an opportunity to that allows households to better smooth their consumption by moving across space.

However, all these experiments leave open the normative question about and how much households *should* migrate when markets are complete and the economy is undistorted. In other words, what is the first-best allocation and how does it compare to the aforementioned policy interventions? This is what we study below.

Table 1: Targeted Moments in Data and Model with Different R values

Moments	Data	Model R=0.93	Model R=0.95	Model R=0.97
Control: Variance of log consumption growth in rural	0.19	0.19	0.19	0.19
Control: Percent of rural households with no liquid assets	47	60	48	38
Control: Seasonal migrants	36	38	36	35
Control: Consumption increase of migrants (OLS)	10	9	10	11
Treatment: Seasonal migration relative to control	22	20	21	21
Treatment: Seasonal migration relative to control in year 2	9	4	4	4
Treatment: Consumption of induced migrants (LATE)	30	30	29	27
Control: Probability of repeat migration	68	71	70	70
Urban-Rural wage gap	1.89	1.88	1.89	1.90
Percent in rural	62	59	60	60
Variance of log wages in urban	0.56	0.56	0.56	0.56

Note: The table reports the main moments of the paper for alternative values of R. The estimated model has $R = 0.95$. The model is not re-estimated in the cases of $R = 0.93$ and $R = 0.97$.

Table 2: Targeted Moments in Data and Model with Different β values

Moments	Data	Model β=0.93	Model β=0.95	Model β=0.97
Control: Variance of log consumption growth in rural	0.19	0.19	0.19	0.19
Control: Percent of rural households with no liquid assets	47	59	48	38
Control: Seasonal migrants	36	37	36	36
Control: Consumption increase of migrants (OLS)	10	8	10	12
Treatment: Seasonal migration relative to control	22	20	21	20
Treatment: Seasonal migration relative to control in year 2	9	4	4	4
Treatment: Consumption of induced migrants (LATE)	30	29	29	28
Control: Probability of repeat migration	68	71	70	71
Urban-Rural wage gap	1.89	1.90	1.89	1.87
Percent in rural	62	60	60	59
Variance of log wages in urban	0.56	0.56	0.56	0.56

Note: The table reports the main moments of the paper for alternative values of $\beta = 0.95$. The estimated model has $\beta = 0.95$. The model is not re-estimated in the cases of $\beta = 0.93$ and $\beta = 0.97$.

Table 3: Targeted Moments in Data and Models with no $\bar{u}$ and $\rho = 0$

Moments	Data	Model Full	Model $\bar{u} = 1$	Model $\rho = 0$
Control: Variance of log consumption growth in rural	0.19	0.19	0.19	0.28
Control: Percent of rural households with no liquid assets	47	48	48	2
Control: Seasonal migrants	36	36	55	34
Control: Consumption increase of migrants (OLS)	10	10	-7	17
Treatment: Seasonal migration relative to control	22	21	10	22
Treatment: Seasonal migration relative to control in year 2	9	4	0	4
Treatment: Consumption of induced migrants (LATE)	30	29	23	21
Control: Probability of repeat migration	68	70	56	71
Urban-Rural wage gap	1.89	1.89	1.86	1.88
Percent in rural	62	60	73	57
Variance of log wages in urban	0.56	0.56	0.65	1.54

Note: The table reports the moments targeted using simulated method of moments and their values in the data and in the model.

Table 4: Welfare Under Alternative Models with no $\bar{u}$ and $\rho = 0$

		Full Model		$\bar{u} = 1$		$\rho = 0$	
		Welfare	Migr. Rate	Welfare	Migr. Rate	Welfare	Migr. Rate
Income Quintile	1	1.0	85	1.5	87	1.3	64
	2	0.4	62	0.7	74	0.8	61
	3	0.2	53	0.4	64	0.5	57
	4	0.1	43	0.3	54	0.3	52
	5	0.1	39	0.3	49	0.1	48
Average		0.4	57	0.6	65	0.6	56

Note: The table reports the (lifetime) consumption-equivalent welfare gains from the conditional migration transfers relative to an unconditional transfer program costing the same total amount and to a rural workfare program that costs the same amount. The numbers in the table are the average percent increase in consumption each period that would make the households indifferent between the consumption increase and the transfers, and the seasonal migration rates, by quintile of the rural income distribution.

Table 5: Targeted Moments in Data and Model with Subsistence

		Model	
Moments	Data	Full Calibration	Full Calibration w/ Subsistence
Control: Variance of log consumption growth in rural	0.19	0.19	0.23
Control: Percent of rural households with no liquid assets	47	48	0
Control: Seasonal migrants	36	36	76
Control: Consumption increase of migrants (OLS)	10	10	5
Treatment: Seasonal migration relative to control	22	21	14
Treatment: Seasonal migration relative to control in year 2	9	4	4
Treatment: Cons of induced migrants relative to control (LATE)	30	29	46
Control: Probability of repeat migration	68	70	80
Urban-Rural wage gap	1.89	1.89	1.66
Percent in rural	62	60	56
Variance of log wages in urban	0.56	0.56	0.64

Note: The table reports the moments targeted using simulated method of moments and their values in the data and in the model. The final calibration reports the moments when a subsistence consumption constraint is added and set to equal 25 percent of average rural consumption in the lean season.

Table 6: Welfare Effects of Migration Subsidies with Subsistence

		Benchmark Model		Subsistence	
		Welfare	Migr. Rate	Welfare	Migr. Rate
Income Decile	1	1.5	93	2.0	92
	2	0.6	76	1.0	82
	3	0.5	68	0.8	77
	4	0.3	57	0.6	71
	5	0.3	54	0.5	67
	6	0.2	51	0.4	61
	7	0.2	46	0.3	56
	8	0.2	42	0.3	53
	9	0.1	41	0.2	52
	10	0.1	38	0.3	45
Average		0.4	57	0.6	65

Note: The table reports the (lifetime) consumption-equivalent welfare gains from the conditional migration transfers. The numbers in the table are the average percent increase in consumption each period that would make the households indifferent between the consumption increase and the transfers, and the seasonal migration rates, by declie of the rural income distribution. The first column is the benchmark model, and the second is a model with a subsistence constraint equal to 25 percent of average rural consumption in the lean season.

Table 7: Targeted Moments in Data and Model and Migration Costs

Moments	Data	Model: Full Cal $m_p = 2 * m_t$	Model: Full Cal $m_p = m_t$
Control: Variance of log consumption growth in rural	0.19	0.19	0.18
Control: Percent of rural households with no liquid assets	47	48	45
Control: Seasonal migrants	36	36	32
Control: Consumption increase of migrants (OLS)	10	10	11
Treatment: Seasonal migration relative to control	22	21	23
Treatment: Seasonal migration relative to control in year 2	9	4	4
Treatment: Cons of induced migrants relative to control (LATE)	30	29	24
Control: Probability of repeat migration	68	70	60
Urban-Rural wage gap	1.89	1.89	1.79
Percent in rural	62	60	59
Variance of log wages in urban	0.56	0.56	0.59

Note: The table reports the moments targeted using simulated method of moments and their values in the data and in the model in the benchmark calibration and under alternative assumptions about migration costs.

Table 8: Welfare Under Alternative Assumptions About Migration Costs

		Benchmark Model		$m_p = m_t$	
		Welfare	Migr. Rate	Welfare	Migr. Rate
Income Quintile	1	1.05	85	0.91	81
	2	0.40	62	0.36	60
	3	0.26	54	0.22	50
	4	0.16	43	0.15	43
	5	0.11	40	0.10	39
Average		0.39	57	0.35	55

Note: The table reports the (lifetime) consumption-equivalent welfare gains from migration transfers by income quartile under alternative assumptions about migration costs.

1. Welfare Under Alternative Parameterizations

In this section we consider alternative parameterizations of the model that yield higher welfare gains from migration subsidies. The goal is to illustrate how our model allows for an interpretation of the experiments of Section 2 based on spatial misallocation, with credit constraints and migration risk driving migration outcomes. As we show below, such an interpretation would give rise to substantially larger welfare gains from migration subsidies than found in this paper, but at the cost of making counterfactual predictions about important aspects of the experimental data.

Table **??** summarizes the model's welfare predictions under these alternatives. The first row reproduces the main experimental moments on which we will focus, and the second row reports the model's predictions for the same moments plus the average welfare gain from the migration transfers. The third row raises γ from the estimated value of 0.57 up to 1.5, meaning that shocks are now relatively larger in the urban area. By itself this leads welfare gains to fall to 0.12 percent consumption equivalent, the OLS coefficient of consumption on migration to rise to a counterfactual 51 percent, and the treatment effect on migration to fall to a counterfactually low level of 10 percent. The fourth row sets $\bar{u} = 1$, which means there is no disutility from migration. Welfare gains raise substantially to 0.51 percent, but the LATE falls to a counterfactually low level of 9 percent, and the migration rate in the control group rises to 55 percent, well above the data. Clearly though, the lower value of $\bar{u}$ is an important driver of the model's welfare gains. The fifth column doubles A_u, the urban productivity, to a value of 3. The welfare gains now increase further to 1.29 percent, while other moments remain counterfactual, in particular the seasonal migration rate, which is now an implausible 84 percent.

Table 9: Alternative Estimation with Additive Migration Disutility

Moments	Data	Benchmark	Additive
Control: Variance of rural log consumption growth	0.19	0.19	0.19
	(0.03)		
Control: Percent of rural households with no liquid assets	47	48	50
	(1.13)		
Control: Seasonal migration rate	36	36	45
	(2.64)		
Control: Consumption increase of migrants (OLS)	10	10	5
	(4.47)		
Control: Probability of repeat migration	0.68	0.70	0.60
	(0.46)		
Treatment: Seasonal migration relative to control	22	21	30
	(2.39)		
Treatment: Seasonal migration relative to control in year 2	9	4	-1
	(2.44)		
Treatment: Consumption increase of induced migrants (LATE)	30	29	14
	(9.67)		
Urban-Rural wage gap	1.89	1.89	1.89
	(0.18)		
Percent in rural area	62	60	67
	(1.36)		
Variance of log urban wages	0.56	0.56	0.56
	(0.06)		

Note: The table reports the moments targeted using simulated method of moments and their values in the data, in the baseline model, in the model with additive disutility, and the standard errors of the empirical moments.

To lower the migration rate back to a level similar to the data, the last row increases the migration cost up to $m = 0.19$, which is the value that matches the 36 percent migration rate in the control group again. This change also raises the amount of the migration transfer, by construction, since the migration subsidies are intended to cover the migration cost and actually induce migration. Under this parameterization, the welfare gains from the transfers rise to 1.98 percent, or five times what they are in the benchmark calibration. The source of the welfare gains now become relaxing credit constraints, which keep risk-averse migrants from reaching a much more productive urban area, in the spirit of the model of Bryan et al. (2014). Yet the data do not support such an interpretation. As one example, the LATE effect of consumption on migration is counterfactually lower than the OLS coefficient, pointing to inaccurate sorting

Table 10: Welfare Gains Under Alternative Parameterizations

	Average Welfare Gains	LATE (Cons.)	OLS (Cons.)	Treatment Effect (Migration)	Seasonal Migration Control
Data	-	30	10	22	36
Benchmark calibration	0.39	29	10	21	36
+ Higher urban risk	0.12	27	51	10	16
+ No migration disutility	0.51	9	29	28	55
+ Higher urban TFP	1.29	33	51	15	84
+ Higher migration cost	1.98	16	34	62	36

Note: This table reports the average welfare gains implied by the model, the LATE and OLS effects of migration on consumption, seasonal migration in the control group, and the treatment effect on migration implied by the model for each specific calibration. Row 1 shows the data. Row 2 is the benchmark calibration that results from the simulated method of moments. Row 3 ("+ Higher urban risk") changes the parameter shaping the urban relative shock by setting $\gamma = 1.5$. Row 4 ("+ No migration disutility") further removes the disutility of migration by setting $\bar{u} = 1$. Row 5 ("+ Higher urban TFP") further doubles the level of urban TFP of 3 (instead of $A_u = 1.5$). Row 6 ("+ Higher migration cost") sets p_T to be 50 percent of rural consumption so that the model matches seasonal migrant rates in the control group.

patterns for migrants. As another example, the treatment effect of migration is far too large, pointing to the counterfactually large migration costs in this calibration of the model.

References

BRYAN, G., S. CHOWDHURY, AND A. M. MOBARAK (2014): "Underinvestment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh," *Econometrica*, 82, 1671–1748.