Lebanon: Of Migration, Brain Drainage, and Developement

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Contents

1 Introduction

Human capital drainage is unavoidable in countries experiencing political instability, conflict, or low economic opportunity. This has been observed in countries such as Nigeria, Ethiopia, Kenya, and most notably in Lebanon. The issue then is replenishing human capital stock which would, according to the Human Capital Production Function, an edition of the Cobb-Douglas production function, contribute to economic growth, as seen below:

$$Y = AK^{\alpha}H^{\beta}L^{1-\alpha-\beta}$$

where Y is economic output, A is total factor productivity, H is human capital, L is labor, and α and β are parameters that describe the elasticity of each factor. Lebanon's economy is in one of the worst conditions in the world; their financial collapse unraveled in 2019 when the Lebanese government, seeped in financial mismanagement and political corruption, caused a debt mountain equivalent to 150% of national output. With high risk regarding future economic opportunities, the international eye witnessed a mass exodus as millions of Lebanese left the country seeking opportunity elsewhere. We seek to address the following problem by determining the loss in economic productivity caused by mass brain drain, as specified below:

What is the loss in potential economic output if Lebanon's proportion of skilled workers did not exit the country, and were working in Lebanon at full capacity?

The Lebanese people have long suffered from unreliable electricity, rising public debt, financial bankruptcy, and virtually no economic growth for nearly a decade. On October 17 in 2019, tens of thousands of Lebanese took to the streets, protesting new tax measures the Lebanese cabinet wanted to enforce, as well as the decades of nationally regulated Ponzi schemes the government engaged in behind their citizens backs. The protests worked and most of the cabinet resigned, which subsequently led to capital inflows halting and forced banks to tightly regulate financial withdrawals. Inflation soared. A foreign black-market

exchange emerged. Then, the COVID-19 pandemic hit, crippling the medical system that has already been depleting since the beginning of the economic crisis.

Little research is being done on Lebanon's economic crisis, and so as of this date, there is no model that has brain drain as a function of economic output including certainty of leaving if an individual is considered highly skilled or educated. This paper would contribute to the growing literature assessing brain drain and its impact on developing countries and will uniquely contribute to economic assessments of Lebanon because there is currently little research addressing Lebanon's human capital drainage, especially in comparison to other developing countries suffering with similar economic issues. As of now, there exists no model whatsoever describing Lebanon's unique crisis of brain drainage. This paper seeks to explore these issues and develop policy recommendations to aid in addressing Lebanon's growing economic crisis and how to minimize loss by investing in means that would seek to refill the human capital stock.

2 A Review of Impactful Literature Regarding Brain Drain

The proportion of skilled workers in a population plays a key role in determinants of economic growth and stability. Globalization was one of the major changes that reduced barriers to international trade, along with an increase in "integration of the national capital markets of the advance countries into a world capital market, the growth of direct foreign investment of the large international corporations, the rapid spread of modern technology from country to country, and the modernization of traditional class and status-oriented societies into less personal, more mobile, and flexible modes of interpersonal relationship conducive to economic output" (La Parte). An increase in the factors opened a new market for human capital trade, as emigration and migration rates boomed over the past 50 years, most notably from developing countries to developed countries. There is economic consensus that one of the main economic indicators for migration is educational opportunities and achievement,

both of which have consequential implications as to whether an individual will stay or leave their home country.

Researchers Beine, Docquier, and Rapoport note that "achievement of the educational requirement is a necessary, but not sufficient, condition to be allowed to immigrate. Educated agents face uncertainty...this could be due to both internal and external factors" (Pg. 278). Indeed, political stability is a motivating factor for an individual to leave or stay and has large effects on the push and pull of migrants to a country. Inflows and outflows of migrants in a country is normal, and in some cases necessary for economic growth, as will be discussed below. However, a lot of emigration can become a major source of economic weakening if a large proportion of that outflow are skilled workers.

Political stability affects human capital stock through migration patterns. If there is political instability within a country, then economic opportunities contract, which incentives citizens to migrate to another country with more opportunities. This phenomenon has become widespread, first emerging as a major public health concern in the 1940s when many European professionals emigrated to the UK and USA. International migration patterns garnered attention due to it's significant increase, and in the 1970s, the WHO published a detailed 40-country study on the magnitude and flow of health professionals (La Porte).

The report outlined that out of all migrating physicians at the time, close to 90% were headed to just five countries: Australia, Canada, Germany, UK and USA. This is particularly problematic when considering the scale in which developed countries have on the pull effect; it was reported that "in 2000 almost 175 million people, or 2.9% of the world's population, were living outside their country of birth for more than a year. Of these, about 65 million were economically active. This form of migration has in the past involved many health professionals: nurses and physicians have sought employment abroad for many reasons including high unemployment in their home country (La Porte)." This has opened discussion in a recent term that was coined by the Royal Society, a learned society and the United Kingdom's national academy of sciences during the 1940s, to describe such migration

patterns; brain drain.

Brain drain is the trend that occurs when a high proportion of skilled workers migrate from their native country to another country. The general narrative that is associated with brain drain is as follows: when human capital is low, there is limited incentive and opportunity to acquire education and skill sets, both of which are thought of as engines for economic growth. This argument is being challenged, however, with new theoretical literature that examines the impact of migration on human capital stock within the context of uncertainty. In general, emigration always increases productivity, while on the other hand, economists argue that a brain drain can increase or decrease productivity. This suggests that it is possible for a brain drain to lead to a higher level of long run productivity than a general emigration. (Mountford.) This necessarily implies there is an equilibrium, an optimal level of migration inflow and outflow that will contribute to long run economic growth. This model holds, however, when migration is not a certainty, implying that there is not a patterned outflow of skilled workers leaving the country. This paper seeks determine the impact of economic growth when migration is a certainty, a scenario which is taking place in Lebanon today.

Lebanon has experienced more brain drain over the past decade than other moderately developed countries, exceeding most low and middle-income countries (LMICs). Lebanon's main sources of revenue are restricted to a variety of agricultural exports, such as fruits and vegetables, and it does not have crude oil. Other exports include "wood, tobacco, cotton, and fertilizers. Yet Lebanon's main resource is its human power" (Helou 1995). Beirut, Lebanon's capital, was considered more than a banking and commercial center; it attracted students internationally, particularly from the Near and Middle East, to it's universities and colleges.

The sudden halt and subsequent emptying of Lebanon's human capital stock has led to further deterioration of the country, most notability realized when the WHO reported that "since 2009, 40% of doctors have left Lebanon. This percentage is 30% for paramedics. In

2021, the number of departing doctors rose to 1,500, compared to 100 doctors per year in the past. According to the register of the Order, the total number of doctors today is 15 thousand (Fadi, AsianNews)." Lack of stable medical support with the additional issues outlined above probably motivated the responses from a survey which questioned Lebanese youth's desire to stay or leave the country; 75% reported wanting to leave the country, and out of these responses 68% said they wanted to leave permanently (Fadi, AsianNews). Given the urgency of the situation, we will attempt to model these results to determine how large of an impact brain drain is having on economic contraction, and what this will imply for the future of Lebanon's economy.

3 Empirical Strategy

We start by supposing that aggregate product follows the Cobb Douglas function,

$$Y_t = A_t S_t^{\alpha} N_t^{1-\alpha}$$

where

- A_t =total factor productivity
- S_t =total quantity of skilled workers in Lebanon
- N_t =total quantity of unskilled workers in Lebanon
- $\alpha \in [0, 1]$ = skilled workers intensity output.

An important assumption we are establishing with the model is fully flexible labor markets to have full employment.

Let $L_t = S_t + N\_t$ denote total population. Then, solving for per capita GDP, we have

$$y_t \equiv \frac{Y_t}{L_t} = A_t \left(\frac{S_t}{L_t}\right)^{\alpha} \left(\frac{N_t}{L_t}\right)^{1-\alpha}$$

where, denoting λ_t^S and λ_t^N denote real world share of skilled and unskilled workers in Lebanon, respectively, we can express the following:

$$= A_t \left(\lambda_t^{S,R}\right)^{\alpha} \left(\lambda_t^{N,R}\right)^{\alpha}$$

Then, considering $\lambda_t^{S,CF}$ $\lambda_t^{N,CF}$ as the share of skilled and unskilled workers in Lebanon if all migrants were to return to Lebanon, respectively. The key variable we are interested in determining the overall effect of brain drain is

$$\ell = \frac{A_t \left(\lambda_t^{S,CF}\right)^{\alpha} \left(\lambda_t^{CF}\right)^{1-\alpha} - A_t \left(\lambda_t^{S,R}\right)^{\alpha} \left(\lambda_t^{N,R}\right)^{1-\alpha}}{A_t \left(\lambda_t^{S,R}\right)^{\alpha} \left(\lambda_t^{N,R}\right)^{1-\alpha}}$$

which simplified comes out to

$$\ell = \frac{\left(\lambda_t^{S,CF}\right)^{\alpha} \left(\lambda_t^{CF}\right)^{1-\alpha} - \left(\lambda_t^{S,R}\right)^{\alpha} \left(\lambda_t^{N,R}\right)^{1-\alpha}}{\left(\lambda_t^{S,R}\right)^{\alpha} \left(\lambda_t^{N,R}\right)^{1-\alpha}}$$

In general, if $\alpha > \lambda^{S,i}$ for $i = R, CF$, we can expect there to be losses from brain drain when $\ell < 0$. This assumption is plausible as we expect $\lambda^{S,i} < \alpha$, as α can be interpreted as the fraction of output that is paid to skilled workers.

Note that by keeping total factor productivity exogenous to the model, our estimates are likely to understate the difference as seen by ℓ. To account for these differences, we will solve for α to solve for A_t. Consider the log-derivative approach to estimating these coefficients:

Recall our production function

$$Y_t = A_t S_t^{\alpha} N_t^{1-\alpha}$$

where, evaluating the natural log of both sides of the equation, we have

$$ln(Y_t) = ln(A_t) + \alpha ln(S_t) + 1 - \alpha ln(N_t)$$

Then, taking the partial derivative with respect to time yields

$$\frac{dln(Y_t)}{dt} = \frac{dln(A)}{dt} + \alpha\frac{ln(S_t)}{dt} + (1-\alpha)\frac{ln(N_t)}{dt}$$

implies

$$\frac{1}{Y}\frac{dY}{dt} = \frac{1}{A}\frac{dA}{dt} + \alpha\frac{1}{S_t}\frac{dS_t}{dt} + (1-\alpha)\frac{1}{N_t}\frac{dN_t}{dt}$$

$$\implies g_Y = g_A + \hat{\alpha}g_{S_t} + (1-\hat{\alpha})g_L,$$

where g_Y is the growth rate of output, g_A is the growth rate of total factor productivity, g_{S_t} is the growth rate of output with respect to skilled workers in Lebanon, and g_L is the growth rate of output if all workers were to come back to Lebanon.

Using this information, we may estimate A_t as the difference

$$g_A = g_Y - \hat{\alpha}g_S - (1-\hat{\alpha})g_N,$$

which tells us the difference between the actual value and predicted value.

3.1 Empirical Considerations

To estimate these values, we will be evaluating the difference in intensity of skilled labors using three data sets. Due to limitations, we will evaluate the differences in per-capita income associated to those of Lebanese origin in the US. This will be compared with the proportion of skilled workers in Lebanon to determine the difference in per-capita income, and estimate those results as total GDP loss in Lebanon to evaluate how brain drain is effecting Lebanon and what possible edits to the model could instead aid with economic growth.

As for estimating α, a fundamental assumption we make is that $E[Y|S,N] = 0$ which is very difficult to justify when estimating a parameter such as skilled workers intensity share in output. While it is possible, this paper will let α be the standard metric of 0.5.

In a recent report to the world bank, researchers Badr and Akl "recently proposed that

creating a regional network of medical centers of excellence in the Middle East and establishing collaborations with North American and European partners might be a fruitful approach for luring health workers back to their home country, and contended that Lebanon could act as a hub. This would contribute to growing harm of lack of medical supplies, which Romer specifies to have negative impacts on population growth and therefore general economic growth. This illustrated in a recent report that found"for months, pharmacy shelves have been bare, exacerbated by panic buying and suppliers holding back drugs, hoping to sell them later for higher prices amid plans to remove government subsidies. Hospitals are at a breaking point, barely able to secure diesel to keep generators and life-saving machines operating day to day as the cash-strapped government struggles to import basic materials"(Deeb, 2022).

Some further considerations of the model may be in order to unpack in greater detail how the exogenous factors that contribute to economic growth in a country such as Lebanon that is fundamentally economically unstable. Consider David Romer's evaluation regarding total factor productivity: the importance of population growth, for instance, is a contributing factor to overall skilled laborers and therefore economic growth. By Romer's analysis, an increase in population growth causes income per person to also rise faster than it would if both increased at a constant rate. Then, positive population growth is an important element in understanding how long-run economic growth is sustained.

If we consider Romer's knowledge accumulation equation, defined below as

$$g_{A_t} = Ba_L^{\gamma} L^{\gamma} A^{\theta-1}$$

where B is a shift parameter, θ reflects the effect of existing stock of knowledge on the success of research and development, and γ is the output per capita.

This implies, then, that brain drain has direct impacts on total factor productivity as it not only impacts A_t, but also Romer's θ. A limitation of the model we have developed thus far is is the drawback of not representing capital, as is typically discussed in a production

function. This is an area we that the may be a drawback of the data available, as it's difficult to determine the availability of durable capital in Lebanon as compared to the US. The Beirut explosion that occurred in April of 2020 may have interesting implications, however, as to how shocks of capital destruction impact migration flows and deplete the human capital stock.

3.2 Data and Cross-Tabulation Results

The next steps will be showing the deceptive statics, and running these averages through the model to obtain an estimate for ℓ. As this develops, some further econometric analysis may be in order to back up the policy claims that we are interested in suggesting.

My analysis draws on survey data collected by the Lebanese Central Administration of Statistics (CAS) and the Integrated Public Use Micro data Series (IPUMS USA) to households and individuals alike. The CAS data was was conducted by CAS between 2018 and 2019 and was entirely funded by the Delegation of the European Union to Lebanon, with the technical cooperation of the International Labor Organization (ILO), Regional Office for Arab States. The data set contains a sample size of over 39,000 households, and excludes population living in non-residential units, such as refugee camps and non-residential units.The IPUMS data set was conducted in collaboration of the federal census and the American Community Surveys . I restrict my analysis to the skilled Lebanese workers living in America because it is one of the main countries Lebanese migrate to, and will let this data sample represent part of the share of skilled workers if they returned to Lebanon.

Using these descriptive statistics, we will be able to estimate the differences in output as described in the model above. Given the data's amount of observations and specificity, our analysis should be fairly straightforward as there are no major robustness checks or fundamental assumptions that necessitate further data cleaning or alternate considerations.

Table 1 shows the sample composition of educated and noneducated Lebensease in Lebanon and in the US. I construct two measures of workers, skilled and unskilled workers,

both of which groups have Lebanon as their birthplace. Previous studies have used non-production workers (as defined as workers in management, professional fieldwork, and other nonprescription jobs) as a proxy for determining skilled and nonskilled workers. A limitation of the data I have is to filter for different production workers and cross-apply their job status with wage earnings. My main measure between skill and nonskilled workers then is their level of college attainment, which is what Table 1 describes.

Table 1: Descriptive Statistics - Education Status

Education Status	n	Proportion of Educational Attainment
Currently in College or more in LB	6,142	0.159
Currently.no.degree.attained.in.LB1	32,526	0.841
Attained.College.Degree.and.Higher.in.LB	28,108	0.197
No.College.degree.attained.in.LB	114,498	0.799
Attained.College.Degree.and.Higher.in.USA	6,284	0.426
No.college.degree.attained.in.USA	8,460	0.574

We see that 79% of Lebanese have not attained a college degree or more, and the remaining 19% have not attained a college degree. This is a large gap compared to Lebanese in the US, where nearly half of US-Lebanese migrants have a college degree. We expect such outcomes as this follows the narrative that migrants who are educated have more certainty of migrating out of a country than staying, due to high opportunity costs of staying in a country that lacks economic stability and opportunity. We also observe that those who were at the time in university or more in Lebanon were 15%, which is 4% less than those who attained a college degree. This is not surprising as discussed in Section 2; with a higher certainty of leaving, there will be a diminishing human capital stock.

Table 2 tells us the demographics of monthly earnings in terms of US dollars, adjusted for inflation during 2018 and 2019. We see that in Lebanon, Lebanese are nearly half have earnings less than $500 per month, and nearly 80% have monthly earnings less than 1,000$. This aligns with our claim of opportunity costs due to economic stability. With low education rates and high reported amounts of government and political mismanagement and

corruption, we are not surprised to see these statistics.

Table 2: Descriptive Statistics - Monthly Earnings (in USD)

Monthly Earnings	n	Proportion of Monthly Earnings (USD)
Monthly Earnings less than 500	20,270	0.451
Monthly Earnings less than 1000	19,951	0.444
Monthly Earnings less than 3000	3,652	0.081
Monthly Earnings equal or more than 3000	830	0.018

The comparison between incomes earned in the US and in Lebanon is striking. I have US wages in a different table because the IPUMS data collected annual earnings, whereas the CAS data collected monthly earnings. However, we can still infer the wealth difference based on the estimated annual earnings for Lebanese, which would fall somewhere between 12,000$ USD and 15,000$ USD. For reference, the poverty line in the US in 2018 was 25,000$ for a family of four. Of course, we may also account for the purchasing power differences due to the value of the dollar compared to the Lebanese lira, but this is still considered low earnings regardless of the exchange rate.

Table 3: Descriptive Statistics - LB in US Earnings

Earnings	n	Proportion of US Monthly Earnings
Income less than 15,000	7,649	0.519
Income less than 50,000	2,723	0.185
Income less than 75,000	1,006	0.068
Income at or greater than 75,000	3,108	0.211

In the US, a bit more than half the population makes less than $15,000 annually, which is a smaller group compared to the Lebanese in Lebanon. These differences, again, fit the narrative of our model, but it is important to notice its limitations: while there are large differences in income earnings between Lebanon and US, there has been no causal relationship established between the two thus far. We see, however, that if our main concern is the GDP gap due to brain drain in a country, we have evidence to continue the investigation and

determine just how large of an effect this is.

From section two, we can relate this difference to the plausible theory by Badr and Akl (2010). They proposed that migrants in another country could create an opportune climate between the Middle East and North America by establishing collaborations with North American and European partners could be an effective way to incentives health workers to return to their home country in an effort to offset the issue of brain drain altogether.

By observing these wage differences and by the large migration outflows from Lebanon to the US and other countries (Helou, 1995), I realize that the model needs to be further developed to account for these changes.

3.3 Solving the Model

As noted in Section 3, we let $\alpha = 66\%$, as laid out by Paul Douglas (1976). There are too many limitations in the data to formally calculate α, as seen in Table 4. Our linear equation of interest is

$$g_Y = g_A + \hat{\alpha} g_{S_t} + (1 - \hat{\alpha}) g_L,$$

and transforming this to a regression equation, we have

$$Y_t = \beta_0 + \beta_1 skilled_t + \beta_2 unskilled_t + \epsilon_t$$

Thus, our coefficients of interest in measuring the skill intensity in output are β_1 and β_2. Table 2 shows that β_1 = -0.252 and β_2 = -0.439. There are already several concerns that are raised with these values. The first is that these outputs do not add to one, which contradicts our brain drain model's assumption of constant returns to scale. The second is the omitted variable bias which is undoubtedly skewing our results. This informs us at least that the model needs to include covariates to account for effects on earnings other than skill.

This regression does not account for the differences in income earnings between Lebanese in the US and in Lebanon, and this is because we are more interested in the gap left by the Lebanese who migrated out of Lebanon than the differences strictly in their incomes.

Again, this reinforces that the brain drain model needs to be updated to account for more

Table 4: Education on Monthly Wage Earnings (in USD)

	Dependent variable:
	Monthly Wage Earnings
Skilled Worker in LB	-0.252^{**}
	(0.116)
Unskilled Worker in LB	-0.439^{***}
	(0.116)
Constant	3.813^{***}
	(0.116)
Observations	47,791
R^2	0.005
Adjusted R^2	0.005
Residual Std. Error	1.196 (df = 47788)
F Statistic	127.509^{***} (df = 2; 47788)
Note:	*p<0.1; **p<0.05; ***p<0.01

changes, because Table 5, while it shows statistical significance for the coefficient, again, does not have proper robustness checks and a plausible case for no omitted variable bias. However, we continue with the assumption that skilled workers still have a large enough impact to affect overall output, as we see in the next table.

Table 5: Wage on Education

	Dependent variable:
	Monthly Wage Earnings in Lebanon
Attained College Degree in Lebanon	0.023^{***}
	(0.003)
Constant	3.313^{***}
	(0.018)
Observations	47,791
R^2	0.001
Adjusted R^2	0.001
Residual Std. Error	1.198 (df = 47789)
F Statistic	46.499^{***} (df = 1; 47789)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 6 shows the respective variables for the brain drain model, as outlined below:

$$\ell = \frac{\left(\lambda_t^{S,CF}\right)^{\alpha}\left(\lambda_t^{N,CF}\right)^{1-\alpha} - \left(\lambda_t^{S,R}\right)^{\alpha}\left(\lambda_t^{N,R}\right)^{1-\alpha}}{\left(\lambda_t^{S,R}\right)^{\alpha}\left(\lambda_t^{N,R}\right)^{1-\alpha}}$$

along with their values I calculated by finding the proportion of Lebanese in the US and in Lebanon that met the criteria of what I considered to be skilled and unskilled, and their corresponding proportions.

Table 6: Descriptive Statistics

Education Status	value
λ_t^S	0.1971
λ_t^N	0.7988
$\lambda_t^{U,S}$	0.4262
$\lambda_t^{U,N}$	0.5737
S_t	28108
St_u	6284
N_t	114498
Nt_u	8460
L_t	142606
$\lambda_t^{S,CF}$	0.6233
$\lambda_t^{N,CF}$	1.3726

where I included $\lambda_t^{U,N}$ and $\lambda_t^{U,S}$ to be the share of unskilled and skilled workers in the US, respectively. Thus, we see in Table 7 and estimate of the brain drain in income as caused by skilled and unskilled workers alone, as a function of output. With α estimated at the Douglas level of 0.66, we see that ℓ is

$$\ell = \frac{(0.6233)^{0.66}(1.3726)^{0.34} - (0.1971)^{0.66}(0.7988)^{0.34}}{(0.1971)^{0.66}(0.7988)^{0.34}}$$

$$\ell = -0.0431$$

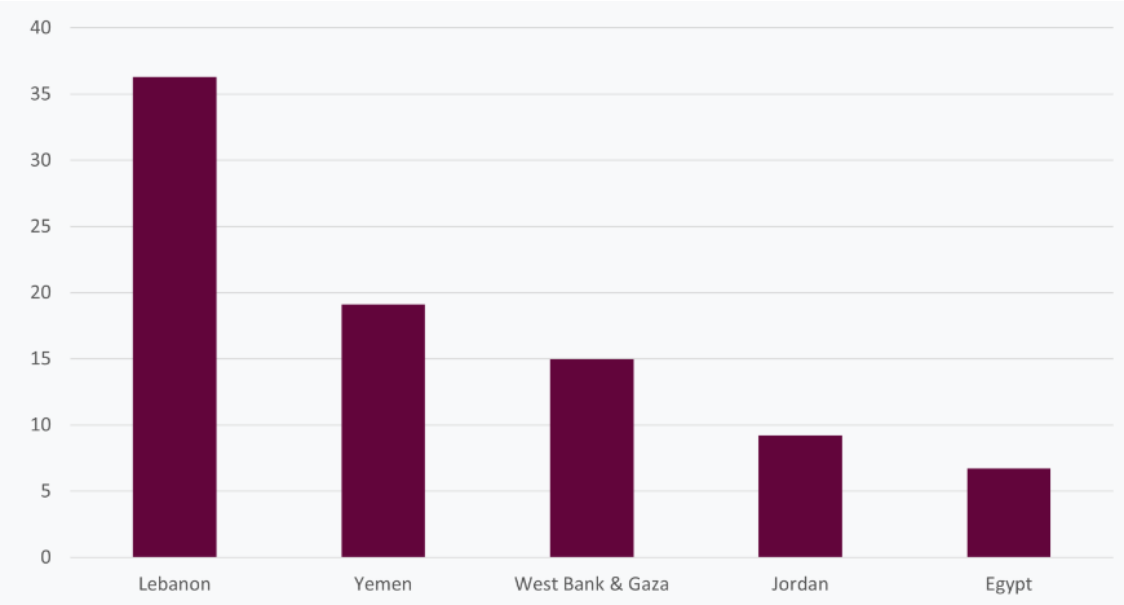
This estimate is consistent with our model, as we expected ℓ to be negative along given the chosen α level. As mentioned in Section 3, we have an underestimated effect because of the data constraints that we saw in the regression output, which resulted in A_t remaining exogenous to the brain drain model.

Additionally, as stated before, estimates for ℓ will become more accurate without the data constraints and current model restrictions. This leaves a broader discussion open as to the best methods in calculating and finding α so that the effect of brain drain in a country that is impacted by many factors that contribute to a weak economy may fully be explored.

3.4 Future Research

When discussing brain drain, a large portion of why Authors such as Beine, Docquier, and Rapoport argue that Brain drain in some ways necessary to encourage economic growth. In Lebanon's case, remittances made up a staggering 53.8% in 2021, making it one of the world's most remittance-dependent nation[1], with an estimated 6,841,077.10 coming from remittances in 2022 according to the World Bank. An estimated 15%-30% of households in 2022 depended on remittances as a source of income. Understanding these inflows and outflows could have deeper implications on how future economic research should be conducted. Remittance senders are not a sustainable form of economic support for long-run development in Lebanon as this paper has explored, and brain drainage is a prohibition to human capital calculation, which was one of Lebanon's main economic drivers.

Figure 1: Top Recipients of Remittances



(a) Data: MENA, Region by share of GDP

The increase in of cost of living in Lebanon is rising faster than remittances can keep up, Lebanon's main channel to effecting change will be through increasing their education and

[1]Shehadi, Sebastian. "Lebanon Is Now the Most Remittance-Dependent Country in the World." Investment Monitor, December 15, 2022. https://www.investmentmonitor.ai/features/lebanon-remittance-dependent-country-world/.

competition with the world market to help the country from the economic turbulence and hardship it has experienced for the past decades. Using data disaggregated data from the World Bank that captures remittance flows would improve the model to quantify the true differences in wage earnings with respect to Lebanese migrants and Lebanese natives.

4 Conclusion

Our brain drain model suggested that migration outflows from Lebanon have a negative gap, which impacts output for Lebanon. This is observed in the descriptive statistics and in the ℓ gap, which, by the model assumption that if $\ell < 0$, there will be economic losses due to brain drain specifically, suggests that the brain drain model successfully captures the narrative we are interested in. However, due to many limitations with data accessibility and the simplicity of the model, we can confidently say that our estimate of ℓ is understated and should warrant further research and inquiry in the output gap due to brain drain.

While brain drain remains a persistent issue in Lebanon, policy recommendations must engage attrition in Lebanon of skilled workers. This would encompass issues pertaining to lack of educational opportunities, lack of job opportunities, and political corruption. Much work remains to be done in accessing the key factors that contribute to Lebanon's economic crisis, and I hope to have contributed to the larger discussion of finding such solutions.

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