LABOR MARKETS IN LATIN AMERICA AND THEIR CREDIT IMPLICATIONS

Presented by

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Executive summary

This report analyzes the impact of labor markets on country risk in Latin America and the Caribbean. Using academic literature, the paper builds a theoretical framework that focuses on two main metrics through which this effect occurs: labor force participation and labor productivity. These two metrics are directly related to economic, fiscal and institutional strength, and therefore to governments' credit ratings. They are also driven by many variables, including gender equality, population growth, age composition, education, and informality. These can help assess labor market resilience and may help forecast economic trends.

The report also studies whether these labor market impacts are already accounted for in Moody's framework. An econometric analysis shows that labor force participation and labor productivity, as well as their main drivers, associate positively with Moody's ratings, suggesting that our client's current methodology is already incorporating these effects through their indicators.

Finally, the paper uses the significant variables to determine scores and compare countries with available data. Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Mexico, Peru and Uruguay are ranked from least to most risky in terms of their labor market indicators. Peru, Chile, Uruguay, and Colombia exhibit the strongest regional labor markets, while Bolivia, Ecuador, Argentina, and Guatemala appear to have the weakest indicators. These scores are weakly aligned with the current sovereign ratings assigned by Moody's, thus suggesting that such information is captured in their methodology.

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I. Introduction

The 1990s and 2010s were a time of moderate but unstable GDP growth and stagnant per capita GDP growth in Latin America. Economic growth in the region declined slightly by the end of last decade -in contrast with the high-growth of the early 2010s[1]- and it is now expected to suffer greatly as a result of Covid-19.

LAC's obstacles to economic growth are mainly macroeconomic instability and an overall low growth rate of productivity. These two factors are related to features of the regional labor markets, especially the relatively high rate of unemployment, rising wage differentials associated with gender and tertiary education, and increasing demand for skilled workers (Edwards, 2011). Low potential growth and limited economic resilience have direct economic and social effects that impact countries' sovereign ratings.

Our capstone team's objective was to explore the relationships between the labor market and sovereign credit ratings in Latin America and the Caribbean. We aimed to answer several questions: Do labor markets impact country risk? How does this occur? Does Moody's framework already capture this effect? How do our selected countries compare in terms of their labor markets?

We reviewed academic literature and developed a theoretical framework that links labor markets to country risk. We found two main metrics in the labor market that are relevant to sovereign risk assessment: labor force participation and labor productivity. We also identified some of their drivers, which can be observed in Figure 1. We then built a database with countries' indicators to observe their labor market variables and analyze whether they were already accounted for in Moody's methodology. We tested univariate and multivariate econometric specifications and concluded that the relevant labor force indicators are already accounted for in Moody's country

[1] According to the World Bank, the annual GDP growth rates fluctuated between 0.1% to around 6%, while the growth rate significantly declined from 5.8% in 2010 to 1.5% in 2018.

risk assessment. Finally, we ranked our selected countries in terms of the significant labor market variables to examine how they are benchmarked relative to each other within the Latin American region.

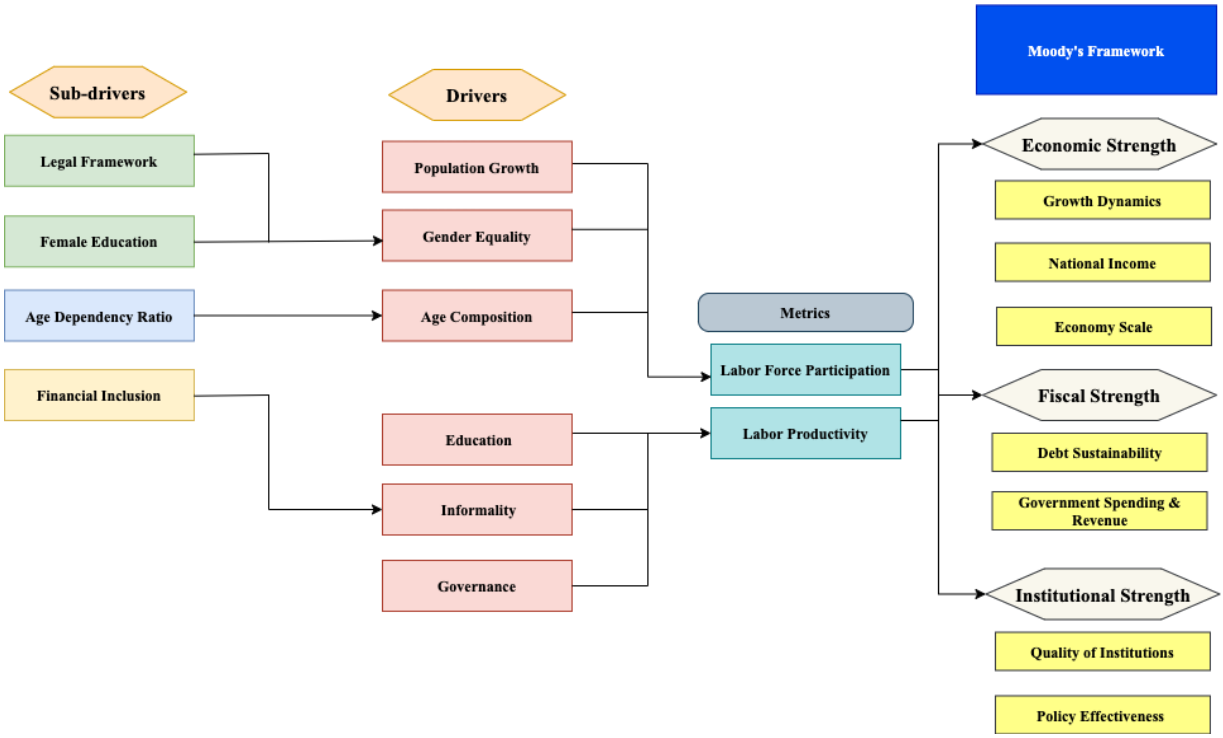
II. Our methodology

1. Theoretical framework

We conducted academic research to study how the literature explains the impact that labor markets have on country risk, if any. Relying on the Cobb-Douglas Production Function, our analysis focuses on the two main metrics in the labor market that can impact a country's output: Labor Force Participation (LFP) and Labor Productivity (LP).

We observed how these two metrics impact Moody's sub-factors, namely economic, fiscal, and institutional strength. We also explored several drivers, as well as sub-drivers, that could affect each metric in the region. The drivers we include for LFP are: age composition; population growth; and gender equality. Gender equality and female labor force participation are in turn impacted by female education and the legal framework, while dependency ratio is a crucial implication of age composition dynamics. Similarly, the key drivers that we investigate for LP are education, governance, and informality. The latter is itself affected by government policies and credit constraints. Figure 1 shows a simplified map of our theoretical framework.

Figure 1: Theoretical Framework



2. Empirical analysis

The literature review allowed us to create a dataset with variables that measure the relevant labor market indicators for our empirical analysis. A detailed list of all these indicators can be found in Table 1 of the appendix. We then developed our empirical research to answer two main questions: 1) whether Moody's methodology was already accounting for relevant labor market indicators and 2) which significant indicators should we employ to compare and rank countries. With this goal, we regressed each of these variables on Moody's ratings for countries' economic, fiscal, and institutional strength, as well as on the overall country ratings. To do this, we transformed the ratings into numerical values, ranging from 1 for most risky to 19 for least risky.

The indicators we gathered to observe labor productivity are output per worker and its growth rate, output per employed person and its growth rate, and total factor productivity. Moreover, we analyzed what the research informed us were the three main drivers of labor productivity in Latin America: education, informality, and governance. For the first driver we observed employed

workforce with advanced, intermediate, basic, and less than basic education. In the second one we included the percentage of firms with a bank loan/line of credit, the percentage of firms with a checking or savings account, the proportion of informal employment in non-agricultural employment disaggregated by male and female, and percentage of vulnerable employment (modeled by ILO). As a proxy for governance, we used the Worldwide Governance Indicators (WGI) which include indicators for voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. To measure governance we also included the number of days it takes to register a property and to start a business.

In order to analyze labor force participation, we looked at the following indicators: employment growth, labor force participation, and unemployment rate. We also observed what the academic literature told us were three main drivers for participation: age composition, gender equality, and population growth. In the first group we included the percentage of the population aged between 15 and 64, and over 65, as well as the age dependency ratio. To observe female participation and its drivers, we looked at the percentage of female labor force participation, female unemployment rate, female literacy rate, and the World Bank's Women, Business and the Law Index that measures gender legal equality. For population growth, we observed the indicator itself.

All indicators gathered are either from 2018 or from the most recent year available. Most of the labor market indicators are taken from data published by the World Bank or the International Labour Organization, a detailed list can be found in Table 1 of the appendix. Venezuela is excluded from all regressions as it presents outlier values in most of the analyzed variables.

In order to study the association between the labor market variables and ratings for our selected countries, we developed univariate regressions of all the indicators in our labor market dataset on Moody's ratings. We also ran bivariate regressions of the labor market variables on these ratings, controlling for GDP per capita. Finally, we ran multivariate regressions of all labor

market variables on the ratings, controlling for GDP per capita and regulatory quality as a proxy of governance. We included these controls as intuitive measures for intercountry differences.

3. Country ranking

Having found our significant labor market variables that impact country risk, we developed a methodology to rank countries accordingly. With the aim of assigning numerical scores to these countries, we first divided the analysis between our two metrics, LP and LFP.

For labor productivity, we used the indicator that we found to be the most significant, *output per worker*, and the four drivers that also proved to be statistically significant: *% growth of total factor productivity*, *financial inclusion*, *% of employed workers with advanced education*, and *time required to start a business*.

For labor force participation, the indicator that we selected for its significance was *Overall Labor Force Participation*. The five drivers that showed statistical significance were: *population growth*, *Women, Business and Law Index*, *female labor force participation*, *total dependency ratio*, and *population of 65+ as % of total labor force*.

Only twelve of the selected countries had values for all these variables and are therefore the ones that we focused on for the rankings: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Mexico, Peru, and Uruguay.

In order to rank the countries, we first standardized the scores. We calculated the mean, standard deviation, and upper and lower bound for all countries in each variable. We gave a score of 3 to countries that exceeded the upper bound, a score of 1 to the ones below the lower bound and a 2 to the ones in between. We then gave a weight of 50% to the metric's indicator and equal weights to the drivers. With these results, we calculated an overall LP and LFP score for each country.

Finally, we added these weighted scores to calculate a combined LP and LFP result, and ranked them accordingly from least to most risky.

III. Academic Research

Our academic research is organized in terms of our theoretical framework, exploring the links between our two main metrics -labor force participation and labor productivity- to their drivers and, mainly, to Moody's framework.

1. Labor Force Participation

Labor force participation refers to the total number of people who are employed or actively searching for jobs in the reported period. According to our research, labor force participation plays an important role in a country's economic and fiscal strength. An increase in labor force participation would lead to an increase in GDP growth and debt sustainability[2]. As more people participate in the labor force and gain employment, firms are able to expand employment and increase production, improving economic strength. Greater labor force participation is associated with higher tax revenues because the number of employed people increases, and therefore the number of people paying income and payroll taxes, tends to rise (Burk, 2018). An increase in labor force participation is also associated with lower spending on means-tested programs (which provide cash payments or other forms of assistance to people with relatively low income or few assets), and on refundable tax credits.

Research shows that there are several drivers that impact labor force participation:

a. **Gender equality:** The labor participation of women in Latin America and the Caribbean has grown during the past two decades, which has been an important driver for the region's economy. The International Labour Organization (2017)

[2] While the labor force includes both people employed and those actively seeking employment, we focused mainly on the increase in jobs/employment rates.

finds that reducing the gender gap in participation rates by 25 percent would increase global GDP by $5.8 trillion by 2025 (ILO, 2017), improving economic strength. The consequent increase in tax revenues would also improve governments' fiscal strength. Equal gender participation is impacted by two relevant sub-drivers:

i. Legal framework: Hyland et al. (2019) establish a causal impact of more equal laws on higher female labor force participation.
ii. Female education: Female LFP is also highly correlated with education. Gasparini et al. (2015) find that an increase in the access of women to higher education levels leads to higher labor participation.

b. **Population Growth:** Population growth is an important factor in overall economic growth (Daly & Regev, 2017). Peterson (2017) argues that while rapid population growth is likely to be detrimental in the short term in low-income countries, because it leads to large numbers of dependent children, in the long run there is likely to be economic gains as these young people become productive adults. The author also explains that population growth induced by high levels of fertility, as is often the case in low-income countries, can reduce general well-being. In contrast, growth resulting from a decline in mortality rates is generally believed to have more positive impacts on savings and economic growth.

c. **Age Composition:** Labor force participation trends reflect the demographic composition of the population and the potential LFP rates of those different groups. In terms of economic growth, Bloom et al. (2007) establish that increases in the proportion of the working age population can lead to higher rates of economic growth. The IMF has also indicated that there is a link between population aging and weakening fiscal strength, as the country undertakes higher risk due to the increasing pensions and demands for healthcare systems.

2. Labor Productivity

Productivity is measured by how much is produced by a certain amount of labor and a fixed amount of capital.

$$\frac{GDP}{Population} = \frac{GDP}{Hours\ Worked} \quad \frac{Hours\ Worked}{Workers} \quad \frac{Workers}{Population}$$

Productivity has a positive association with a nation's fiscal and economic strength. In terms of economic strength, the increase in productivity could enlarge the economic scale, growth rate and GDP per capita. Following the above equation, an increase in GDP/Hours Worked, which represents the amount of output produced per hour worked (the productivity per hour), could lead to greater GDP per capita with other variables constant (Santacreu, 2015).

The main drivers we focused on for labor productivity are the following:

a. **Education:** Increasing the amount of workforce with higher education would benefit laborers with stronger and more specialized skill sets, which would increase output per worker. McGivney & Winthrop (2016) highlight the importance of matching up the education and labor market on the types of skills and qualifications necessary for boosting productivity. An improvement in education would boost the economy, bolstering economic strength. The OECD estimates that approximately 30 percent of cross-country variation in aggregate labor productivity can be explained by the level of skill used by workers in their jobs, meaning that both stronger proficiency and usage maximization are important for productivity. Another study by Bourguignon et al. (1992) that covers 29 developing countries found estimates of education's contribution to economic growth ranging from less than 1 percent in Mexico to as high as 23 percent in Ghana.

b. **Informality:**

Productivity is typically lower in the informal sector since this sector employs less skilled workers, less capital-intensive technology, and produces at a smaller scale (Levy, 2010). Thus, given the high shares of informal employment in LAC, it is not surprising that labor productivity is many magnitudes lower in all countries in the region (Kugler, 2019). Informality rises when GDP growth is low and decreases as GDP growth accelerates throughout the LAC region. This is consistent with evidence documented in past studies (Loayza & Rigolini, 2011). Relevant sub-drivers of informality are:

i. Gender equality: Female informal workers are more concentrated in types of employment with lower remuneration, less visibility and fewer rights at work. Also, as Otobe (2017) explains, where gender gaps in the labor market are wide, traditional patriarchal gender roles restrict girls' and women's access to education, skills development and employment and income opportunities.

ii. Financial inclusion: typically understood as access to formal financial services such as credit, insurance and secure saving opportunities, it has an impact on economic growth. Cull et al. (2014) observe that financial services have a positive impact on a variety of indicators, including self-employment business activities, household consumption, and well-being, which are all beneficial to economic growth. Also, Govind Hariharan and Marcus Marktanner (2012) estimate within the framework of a simple Solow growth model the impact of financial inclusion on economic growth. The preliminary results indicate that a 10 percent increase in financial inclusion has the potential to increase income per worker on average by 1.34 percent (Hariharan, 2012). Beck, T. and Hoseini, M. (2014) explores the relationship between financial sector

development and the relative importance of formal and informal manufacturing in India, and they find a positive effect of financial depth on the share of formal firms. Together, these results suggest an important role for finance in reducing informality, though with important differences across industries (Beck & Hoseini, 2014).

c. Governance (WGI)

In a study done in India, Dutta et al. (2011) explain that bureaucratic interference and corruption at many stages of economic activities is one of the main reasons behind high participation in informal and unregulated sectors. In another investigation done in Central and Eastern Europe, researchers equate corruption to the informal payments that businesses have to pay to government officials to ease the day-to-day operations. The effects of this "bribe tax" on productivity are compared to the consequences of red tape, which may be understood as having a "time tax" on local businesses. When testing effects in a sample, the bribe tax appears to have a negative impact on firm-level productivity, while the time tax is insignificant. The study concludes that corrupt activities are harmful for productivity (De Rosa et al., 2013).

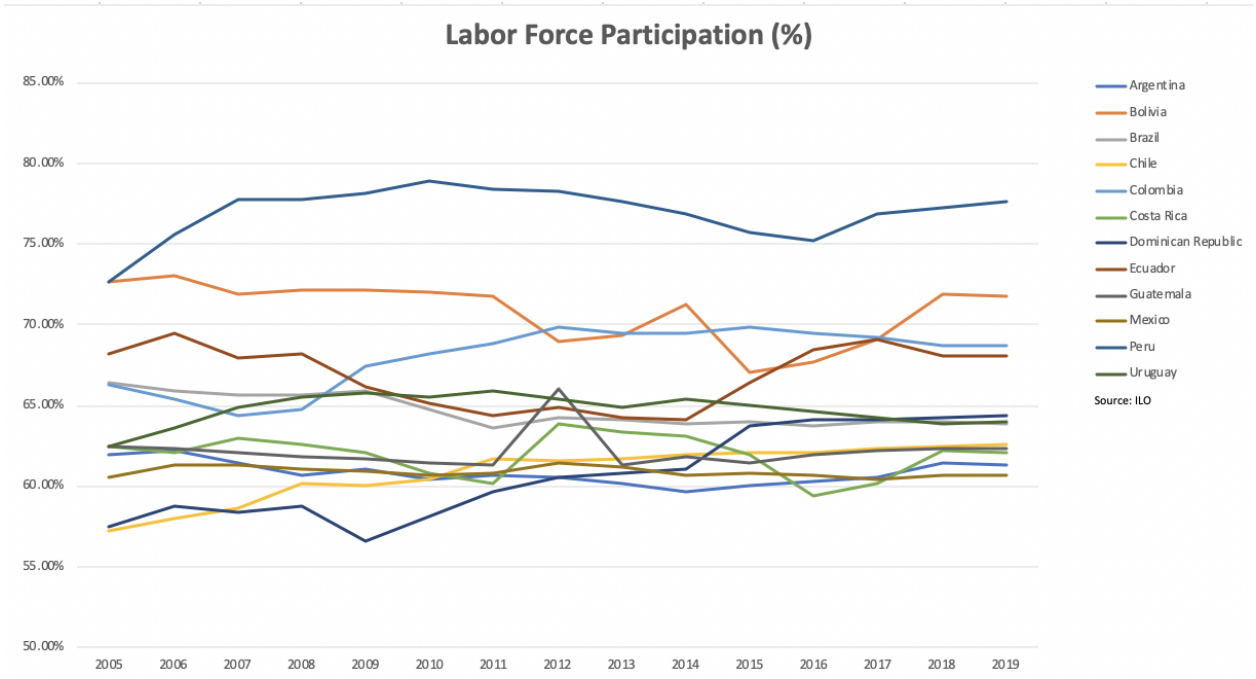
IV. Recent trends in Latin American labor markets

Labor force participation and productivity

The Latin America and the Caribbean region's labor markets have undergone significant changes over the past few decades. Since the late 1990s, strong GDP growth during the commodity boom period led to important gains in employment as labor demand outpaced an increasing labor supply. Average unemployment across the region fell from 10.4 percent in 2000 to a low of 6.1 percent in 2014, and labor informality declined by close to 20 percentage points (David et al., 2019). Nevertheless, Latin America as a whole still faces some challenges, marked by high informal levels, low labor productivity levels, an aging population, gender disparities, and a

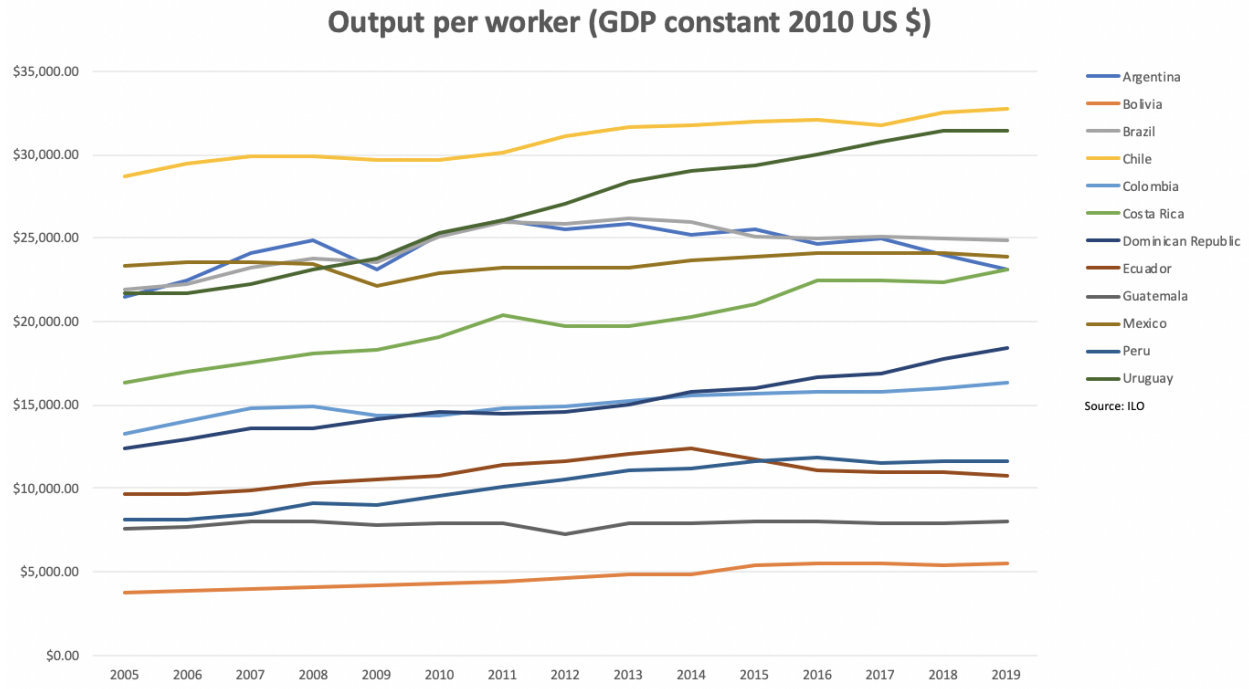
relatively rigid regulatory environment compared to developed regions. Low labor productivity measured by GDP produced by an hour of labor explains 70% of the GDP per capita gap between the LAC region and OECD economies. A modest rise in unemployment pre Covid-19 to 8.1% marked a weak labor outlook that could deteriorate in the upcoming years if economic growth remains weak. Unemployment rate is more pronounced outside Brazil and Mexico, despite rising women's labor participation year-on-year. The situation of the youth in the region is also alarming. In the third quarter of 2019, the regional youth unemployment rate was 19.8%, a figure that is expected to worsen with the current economic crisis.

Figure 2: Labor Force Participation trends in LAC



Source: International Labour Organization (2018)

Figure 3: Output per worker trends in LAC



Source: International Labor Organization (2018)

Age composition and population growth

Demographic trends, especially slow population growth and an aging population structure, have significant impacts on the labor markets. Since the mid 1960s, the rate of growth of the population in the region has been declining consistently. By 1965 the annual rate was 2.7%, but since 2012 it has fallen below 1%. Moreover, in the demographic transition model, Latin America is experiencing the third stage, marked by low mortality rates and a declining fertility rate, resulting in a lower population growth rate (Duryea, & Székely, 2000). Additionally, while the growth of working age population is slowing down[3], the proportion of the elderly is increasing.

[3] In 2018, the average age wais approximately 31 years, and 67.01 percent of the population was between 15 and 64 and 8.44 percent was 65 years old and over

Female Labor Force Participation

In general, women's labor force participation continues to rise at a steady but relatively low rate. Women still have lower labor force participation rates than men, with a gap of more than 20 points in 2018. According to the data released by the International Labour Organization, female's labor force participation rate increased from 49.9 percent in 2012 to 50.3 in 2018, while the employment-to-population rate is 45.3%. Female participation rates are negatively correlated with fertility: as the number of children per woman drops, it becomes easier for women to enter the job market. There is also a connection with education, since participation rates in Latin America increase considerably with education. The average ratio between the participation rates of women in the lowest education category to those in the highest is approximately 1:3 (ILO, 2018).

Formality and Informality

In contrast to other middle and high-income countries in the world, informality in Latin America is high, accounting for over 50 percent of total employment. This indicates that the labor markets in these countries may be characterized by under-employment or hidden unemployment. It is worth noting that informality rates vary throughout the region, with labor informality ranging from around 30 to 70 percent among Latin American countries. Moreover, countries with some of the lowest and most stable unemployment rates (Peru and Mexico) are the ones with the highest level of informality relative to their level of development. Regarding the gender issue, for 11 countries we have data on[4], the average informal employment rate was 50.6%. Further, the proportion of female informal employment was around 53% while the proportion of male informal employment was 49%.

[4] Argentina, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Panama, Paraguay, and Uruguay

Education and Skill Quality

Overall, education progress in Latin America is improving but relatively slowly. Since the 1990s, countries in LAC greatly expanded the proportion of their labor force with above-primary education. The unweighted average share of the working age population that completed secondary education in the 15 countries for which data are available rose from 21 to 29 percent between 1990 and 2010. The weighted average share of workers with completed college education almost doubled, rising from 6 to 11 percent over the same period (World Bank, 2012). The percentages of employed workforce with advanced education in Brazil, Argentina, Colombia, and Peru were 22%, 23.32%, 27.93% and 30.39% respectively by the end of 2018. Notely, the educational gap between women and men has been falling dramatically over the last four decades. Female literacy rates in selected 20 countries were all above 90% in 2018, except Honduras. However, high disparity in education attainment, low education return and low education quality are all still critical challenges in the region.

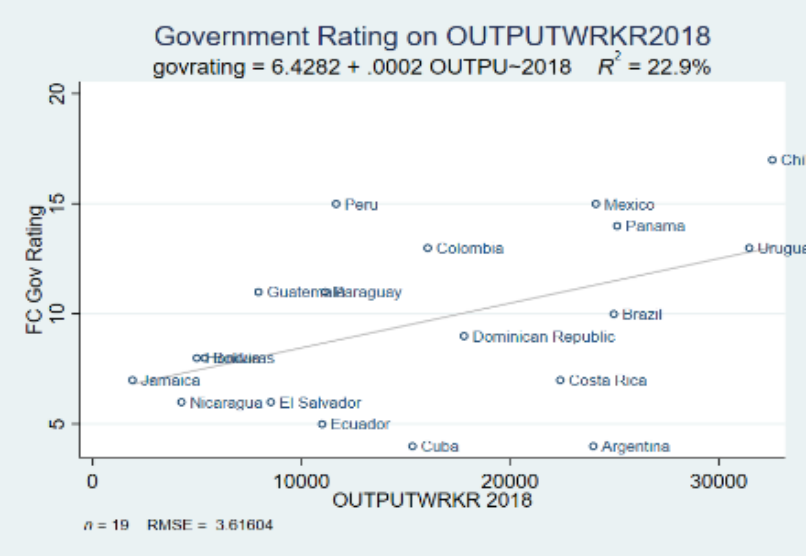
V. Empirical research

Our empirical findings show which of the labor market indicators, found in academic research to be relevant for country risk assessment, prove significant in our regressions on country risk ratings. These results allowed us to observe whether Moody's framework is already accounting for these labor market effects. It also provided us with the significant variables to be used in our country rankings. This section outlines our main findings. A detailed analysis of all our results can be found in Tables 2, 3 and 4 of the appendix.

1. Labor Productivity

Output per Worker proved to be a highly significant productivity indicator for government rating, as well as for economic and institutional strength**.** *Total Factor Productivity*, which could also serve as a proxy, established a statistically significant association with economic strength.

Figure 4: Regression of *output per worker* on Moody's Government Ratings



Source: International Labour Organization (2018)

The regression results for LP drivers were as follows:

a) **Education**: we found *Employed workers with Advanced Education* to be positively associated with the economic and institutional strength of a country. All other levels of education were found insignificant. As established in the above section on academic research, we note that higher education leads to superior skills, resulting in higher economic strength through a positive impact on productivity.

b) **Informality**: *informal employment in the non-agri sector*, whether aggregate or by gender, proved to be significantly associated with a few sub-factors and overall government ratings. The variable loses significance when controlling for regulatory quality, which is a driver of informality. For *vulnerable population as % of employed force* -another informality indicator- the multivariate regressions establish positive and significant associations with all subfactors and government ratings. This contradicts academic literature and could be investigated further.

In terms of informality sub-drivers:

i) *Financial inclusion*: significant and positive correlation with economic and institutional strength in univariate regressions and controlling for GDP per capita. It is significant for government rating only in univariate regressions.

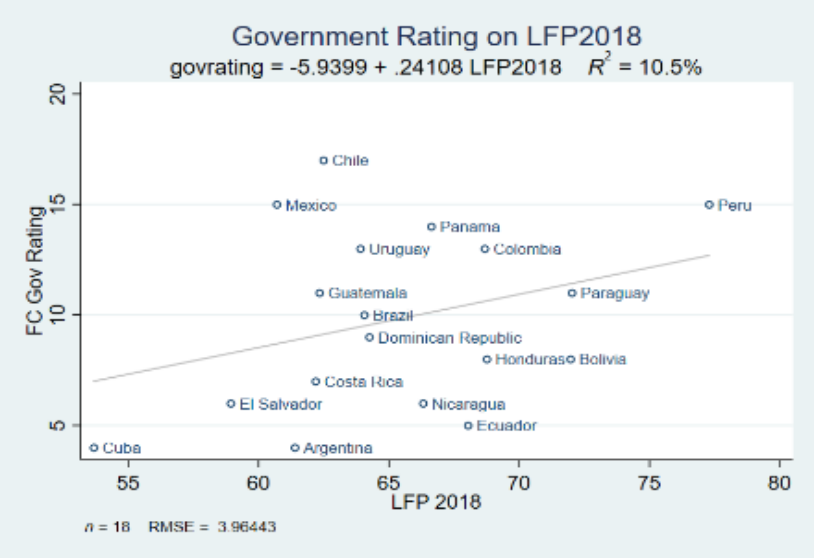
ii) *Number of days to start a business*: negatively associated with government rating, institutional and economic strength in univariate regressions. When controlling for GDP per capita, it is only significant for institutional strength.

iii) Governance: all six *WGI* indicators associate negatively with *informal employment* and positively with *output per employed person*. In this case, we investigated the impact of WGI indicators, as a good measure of institutional quality, on labor market variables. We found strong associations with *gender equality, total factor productivity, unemployment rate*, and *employment growth*.

2. Labor Force Participation

Labor force participation, obtained from the ILO on a country's overall labor force participation rate (% of male and female, ages 15+), associates positively with the overall rating and fiscal strength while unemployment rate is negatively correlated with fiscal strength.

Figure 5: Regression of *labor force participation* on Moody's Government Ratings



Source: International Labour Organization (2018)

The LFP drivers were associated as follows:

a) Age composition: *population ages 65 and above* has a negative and statistically significant association with economic strength and fiscal strength.

b) Gender equality: We found the most robust result for *Women, Business, and the Law Index* which is positively associated with all sub-factors and the overall government rating. As our research suggests, reforming towards legal gender equality improves women's access to work. Secondly, *female unemployment rate* and *female literacy rate* correlate negatively with fiscal strength. Thirdly, *female labor force participation* associates positively only with Institutional strength.

c) Population growth:
   i) The measure of *population growth* showed significant positive association with economic strength.
   ii) The second measure, *total dependency ratio*, which refers to the ratio of individuals aged 0-14 and 65+, per 100 individuals aged 15-64 in an economy, showed significant negative association with institutional strength.

VI. **Ranking of countries in terms of significant variables**

Following the methodology described in Section II, we ranked our selected countries in terms of their productivity, labor force participation, and a combination of drivers of both metrics. Ranking countries allowed us to develop a comparative analysis between countries' labor markets, in line with our clients preferred method. We then contrasted our results with Moody's country ratings.

Table 1 shows the values for each country of the *output per worker* that we used as a proxy of the labor productivity metric, as well as of the different drivers. The last "Productivity" column

shows the overall results of labor productivity when adding the weighted scores for each variable. As can be observed, in terms of LP, Uruguay and Chile show the strongest indicators, followed by Peru and Mexico. Countries that performed poorly in productivity are Argentina, Guatemala, and Bolivia.

Table 1: Labor Productivity Ranking

PRODUCTIVITY													
		DRIVER (12.5%)		DRIVER (12.5%)		DRIVER (12.5%)		DRIVER (12.5%)		*METRIC (50%)*			
		Driver Total Factor Productivity; Productivity		Financial Inclusion; Productivity - Informality		Employed Workforce with Advanced Education; Productivity - Education		*Time req to start a business; Productivity*		Metric: Output Per Worker; Productivity (50% weight)		Productivity - Overall	
Alphabetical #	Country List	% growth of TFP, 2018	Score	Rating, 2019	Score	%, 2018	Score	Days, 2018	Score	$, 2018	Score	Total Score	Rank
1	Argentina	-3.81	1	70	2	23.32	2	11	2	$ 23,958.58	2	1.875	5
2	Bolivia	-1.21	2	57	2	19.58	2	39.5	1	$ 5,348.81	1	1.375	7
3	Brazil	-0.23	2	69	2	22.00	2	20.1	2	$ 24,949.24	2	2.000	4
4	Chile	0.61	2	65	2	18.27	2	6	3	$ 32,537.31	3	2.625	1
5	Colombia	-0.17	2	82	3	27.93	3	11	2	$ 16,033.03	2	2.250	2
6	Costa Rica	-1.22	2	58	2	20.11	2	23	2	$ 22,376.91	2	2.000	4
7	Dominican Republic	1.88	3	54	2	13.52	2	16.5	2	$ 17,770.55	2	2.125	3
8	Ecuador	-1.37	2	53	2	15.39	2	48.5	1	$ 10,971.95	2	1.875	5
9	Guatemala	-0.19	2	41	1	4.06	1	15	2	$ 7,922.66	2	1.750	6
10	Mexico	-0.81	2	74	3	17.54	2	8.4	2	$ 24,087.65	2	2.125	3
11	Peru	0.16	2	80	3	30.39	3	26	2	$ 11,643.76	2	2.250	2
12	Uruguay	-0.56	2	76	3	15.05	2	6.5	2	$ 31,433.70	3	2.625	1

Note: Suriname, Haiti and Venezuela excluded because of outlier values.

Table 2 shows values for the ILO *labor force participation* indicator that we used for our LFP metric variable, as well as values for the significant drivers. The "Participation" column shows the overall results when adding the weighted scores. Table 2 shows the strongest LFP performance for Peru and Bolivia. Mexico and Uruguay in this case show the weakest outcomes.

Table 2: Labor Force Participation Ranking

PARTICIPATION															
		DRIVER (10%)		DRIVER (10%)		DRIVER (10%)		DRIVER (10%)		DRIVER (10%)		METRIC (50%)			
		Population Growth; Participation		WBL Index; Participation Gender		Female LFPR; Participation		Total Dependecy Ratio - Participation		Population 65+ as a % of LF; Participation		Metric: Overall Labor Force Participation; Participation		Participation - Overall	
Alphabetical #	Country List	% growth, 2018	Score	Rating, 2019	Score	% , 2018	Score	%, 2018	Score	%, 2018	Score	%, 2018	Score	Total Score	Rank
1	Argentina	0.91	2	73.13	2	50.82	2	55.77	2	11.12	2	61.39	2	2.00	4
2	Bolivia	1.51	3	82.50	2	63.38	3	60.49	1	7.19	2	71.97	3	2.60	2
3	Brazil	0.72	2	81.88	2	54.36	2	43.48	3	8.92	2	64.05	2	2.10	3
4	Chile	1.04	2	77.50	2	51.61	2	45.95	3	11.53	1	62.49	2	2.00	4
5	Colombia	1.10	2	81.88	2	57.22	2	45.44	3	8.48	2	68.68	2	2.10	3
6	Costa Rica	1.15	2	80.00	2	48.05	2	45.10	3	9.55	2	62.18	2	2.10	3
7	Dominican Republic	1.18	2	86.25	2	51.25	2	53.77	2	7.08	2	64.25	2	2.00	4
8	Ecuador	1.27	2	89.38	3	55.13	2	53.81	2	7.16	2	68.03	2	2.10	3
9	Guatemala	1.75	3	70.63	2	39.92	1	62.30	1	4.81	3	62.33	2	2.00	4
10	Mexico	0.99	2	83.75	2	44.11	1	50.27	2	7.22	2	60.70	2	1.90	5
11	Peru	0.95	2	95.00	3	69.97	3	50.19	2	8.09	2	77.29	3	2.70	1
12	Uruguay	0.27	1	85.63	2	55.42	2	54.85	2	14.81	1	63.90	2	1.80	6

Note: Venezuela excluded because of outlier values.

By combining both metrics, Table 3 shows selected countries ranked in terms of their labor market assessments, from high to low performance in the overall scores. The countries that appear to be better prepared are Peru, Chile, Uruguay, and Colombia. On the other hand, the riskiest countries in our analysis are Bolivia, Ecuador, Argentina, and Guatemala. As we can observe in Table 4, most of our ranking matches the comparative performance when applying pre Covid-19 Moody's ratings to these countries.

Table 3: Productivity + Participation Ranking

PRODUCTIVITY + PARTICIPATION					
		Total Score		Overall	
Alphabetical #	Country List	Productivity	Participation	Overall Score	Ranking
11	Peru	2.25	2.70	4.95	1
4	Chile	2.63	2.00	4.63	2
12	Uruguay	2.63	1.80	4.43	3
5	Colombia	2.25	2.10	4.35	4
7	Dominican Republic	2.13	2.00	4.13	5
3	Brazil	2.00	2.10	4.10	6
6	Costa Rica	2.00	2.10	4.10	6
10	Mexico	2.13	1.90	4.03	7
2	Bolivia	1.38	2.60	3.98	8
8	Ecuador	1.88	2.10	3.98	8
1	Argentina	1.88	2.00	3.88	9
9	Guatemala	1.75	2.00	3.75	10

Table 4: Moody's ratings

MOODY'S RATING						
Alphabetical #	Country List	F1: Economic Strength	F2: Institutions and Governance Strength	F3: Fiscal Strength	FC Gov Rating	Ranking based on FC Gov Rating
4	Chile	baa1	aa3	aa2	A1	1
10	Mexico	a3	ba1	a3	A3	2
11	Peru	baa2	baa2	a1	A3	2
5	Colombia	baa1	baa3	ba1	Baa2	3
12	Uruguay	baa3	baa2	ba2	Baa2	3
9	Guatemala	baa3	b2	baa2	Ba1	4
3	Brazil	baa3	baa3	b1	Ba2	5
7	Dominican Republic	baa2	b1	b3	Ba3	6
2	Bolivia	ba1	b1	ba1	B1	7
6	Costa Rica	baa2	ba2	caa3	B2	8
8	Ecuador	ba3	caa1	baa3	Caa1	9
1	Argentina	ba2	caa1	caa3	Caa2	10

VII. Conclusion

Labor markets have a direct impact on country risk. However, Moody's methodology already accounts for it. Academic literature explains that labor force participation and labor productivity are two key metrics through which this effect occurs. Each of these are also driven by variables such as informality, education, population growth, age composition, and gender equality. Our empirical analysis showed that our two main metrics already associate with Moody's ratings, as well as many of our driver indicators. This shows that the methodology currently used for country risk is already contemplating the effects of labor markets.

When we rank countries according to their labor market outcomes, they have similar scores compared to how these are ranked as per Moody's ratings. This also indicates that the current framework already captures labor markets effects. Peru, Chile, Colombia, and Uruguay show a comparatively good labor market performance and exhibit the best credit ratings. Argentina, Bolivia, and Ecuador on the other hand show weak labor market indicators which coincide with highly risky ratings. The rest of our selected countries show average results for both approaches, except for Mexico that seems to have average labor market outcomes but has one of the best credit ratings in the region.

We also suggest doing further research into some questions that arose from our analysis. Would using panel data for several years (trends) change the associations with the ratings? Would the labor force participation and labor productivity drivers identified help forecast future labor market trends? Would this justify including some of these variables into Moody's framework? Will Covid-19 change the relevant labor market indicators to be considered?

In conclusion, labor market developments impact countries' economic performance and are therefore relevant for sovereign rating assessment, mainly through labor force participation and labor productivity. While Moody's framework already captures these effects, monitoring these trends may help anticipate future risks.

VIII. **References**

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IX. Appendix

Table 1: Indicators, source and year

Metric	Driver	Indicator	Source	Year
Overall	Overall	Capital Input - Total	The Conference Board Total Economy Database	2018
Overall	Overall	Capital Share	The Conference Board Total Economy Database	2018
Overall	Overall	Labor Input - Quality	The Conference Board Total Economy Database	2018
Overall	Overall	Labor Input - Quantity	The Conference Board Total Economy Database	2018
Overall	Overall	Labor Quality Contribution	The Conference Board Total Economy Database	2018
Overall	Overall	Labor Quantity Contribution	The Conference Board Total Economy Database	2018
Overall	Overall	Labor Share	The Conference Board Total Economy Database	2018
Overall	Overall	Per Capita Income growth	The Conference Board Total Economy Database	2018
Overall	Overall	Total Capital Contribution	The Conference Board Total Economy Database	2018
Participation	Age Composition	Population: 65+	https://databank.worldbank.org	2018
Participation	Age Composition	Population: Age 15-64	https://databank.worldbank.org	2018
Participation	Age Composition	Total Dependency Ratio	UN, Department of Economic and Social Affairs	2020
Participation	Gender	Female Labour Force Participation (%)	https://www.ilo.org/	2018
Participation	Gender	Female Unemployment rate (%)	https://www.ilo.org/	2018
Participation	Gender	FemaleLiteracy Rate	https://www.ilo.org/	2018
Participation	Gender	WBL Index	https://wbl.worldbank.org/	2018
Participation	Participation	Employment growth	The Conference Board Total Economy Database	2018
Participation	Participation	Labour Force Participation (%)	https://www.ilo.org//	2018
Participation	Participation	Unemployment rate (%)	https://www.ilo.org//	2018
Participation	Population Growth	Population growth	The Conference Board Total Economy Database	2018
Productivity	Education	Employed Workforce with Advanced Education	https://www.ilo.org//	2018
Productivity	Education	Employed Workforce with Basic Education	https://www.ilo.org//	2018
Productivity	Education	Employed Workforce with Intermediate Education	https://www.ilo.org//	2018
Productivity	Education	Employed Workforce with Less than Basic Education	https://www.ilo.org//	2018
Productivity	Education	Employed Workforce with Not Stated Education	https://www.ilo.org//	2018
Productivity	Informality	Financial Inclusion Score (by Intelligence Unit)	www.eiu.com	2019
Productivity	Informality	Proportion of female informal employment in non-agricultural employment - Harmonized series (%) - Annual	https://www.ilo.org//	2018
Productivity	Informality	Proportion of male informal employment in non-agricultural employment - Harmonized series (%) - Annual	https://www.ilo.org//	2018
Productivity	Informality	Proportion of total informal employment in non-agricultural employment - Harmonized series (%) - Annual	https://www.ilo.org//	2018
Productivity	Informality	Vulnerable employment, total (% of total employment) (modeled ILO estimate)	https://www.ilo.org//	2018
Productivity	Governance	Worldwide Governance Indicators (WGI) Index	https://info.worldbank.org/governance/wgi/	2018
Productivity	Governance	Number of Days to Register a Property	https://databank.worldbank.org	2018
Productivity	Governance	Number of Days to Start a Business	https://databank.worldbank.org	2018
Productivity	Productivity	Annual Growth Rate of Output Per Worker	https://www.ilo.org//	2018
Productivity	Productivity	Output per Employed Person	The Conference Board Total Economy Database	2018
Productivity	Productivity	Output per Employed Person growth	The Conference Board Total Economy Database	2018
Productivity	Productivity	Output per worker (GDP constant 2010 US $)	https://www.ilo.org//	2018
Productivity	Productivity	Total Factor Productivity	The Conference Board Total Economy Database	2018

Table 2: Regression results (except WGI)

Final Regression Results - Summary

1 Univariate
2 Multivariate with GDPperCapita Control
3 Multivariate with GDPperCapita Control and RegulatoryQuality

Metric	Driver	Indicator/Variable Name	STATA NAME	Gov Rating 1	Gov Rating 2	Gov Rating 3	Fiscal Strength 1	Fiscal Strength 2	Fiscal Strength 3	Institutional Strength 1	Institutional Strength 2	Institutional Strength 3	Economic Strength 1	Economic Strength 2	Economic Strength 3
Overall	Overall	Capital Input - Total	CAPIN_TOT2018	0.45677	0.37065	0.65557	0.51680	0.49920	0.68772	-0.02178	-0.13069	0.17911	0.19997	0.20659	0.34445
Overall	Overall	Capital Share	CAP_SH2018	-0.02061	-0.06411	0.07855	0.18438	0.17743	0.32509*	-0.06054	-0.10401	0.08263	-0.13181*	-0.14201	-0.11241
Overall	Overall	Labor Input - Quality	LABORIN_QUAL2018	10.91199*	13.29460**	12.64876**	16.80055**	18.56540***	18.27591***	2.74800	4.53391	3.59519	9.55083***	10.21691***	9.93290***
Overall	Overall	Labor Input - Quantity	LABORIN_QUAN2018	0.60713	1.23132	0.79700	0.00157	0.21294	-0.08927	0.26807	0.78748	0.06681	0.75214	0.94555	0.79760
Overall	Overall	Labor Quality Contribution	LAB_QUAL2018	22.09304*	26.62462**	23.85872**	27.98318**	30.98978**	30.05010**	6.37638	9.82392	5.23868	20.52930***	21.85814***	20.86163***
Overall	Overall	Labor Quantity Contribution	LAB_QUAN2018	0.96279	1.85297	1.01321	-0.44245	-0.19379	-0.82942	0.40658	1.16524	-0.17550	1.35795	1.61048*	1.33017
Overall	Overall	Labor Share	LAB_SH2018	0.02061	0.06411	-0.07855	-0.18438	-0.17743	-0.32509*	0.06054	0.10401	-0.08263	0.13181*	0.14201	0.11241
Overall	Overall	Per Capita Income growth	PERCAP_INCGROW2018	1.02927	1.08216	0.90556	0.86692	0.89222	0.82267	0.65493	0.70293	0.40312	0.60173**	0.60752*	0.53242*
Overall	Overall	Total Capital Contribution	TOT_CAP2018	0.62398	0.44328	1.17293	0.93798*	0.91975	1.47617*	-0.11019	-0.34292	0.41439	0.07693	0.07204	0.38236
Participation	Age Composition	Population: 65+	POP652018	-0.01891	-0.48938	-0.72380	-0.12178	-1.06539*	-1.23202*	0.28775	0.30617	0.06946	-0.02620	-0.33298*	-0.40701*
Participation	Age Composition	Population: Age 15-64	POP15642018	0.20677	0.04050	-0.30990	-0.16439	-0.47154	-0.75773	0.62528	0.57700*	0.26028	0.15429	0.04497	-0.04405
Participation	Gender	Female Labour Force Participation (%)	LPPF2018	0.16801	0.10679	0.11052	0.12367	0.16853	0.17159	0.16653*	0.11287	0.11665*	0.07237	0.00351	0.00484
Participation	Gender	Female Unemployment rate (%)	UNEMPF2018	-0.13408	-0.27853	-0.29016	-0.70070*	-0.80677*	-0.82087*	0.14137	0.02151	0.00601	0.02783	-0.05369	-0.05679
Participation	Gender	FemaleLiteracy Rate	FLIT2018	-0.18861	-0.95638	-1.01160	-0.66628	-1.65349**	-1.70058**	0.05018	-0.38924	-0.43654	0.15153	-0.21159	-0.23935
Participation	Gender	WBL Index	GENEQUAL2018	0.13838	0.14965	0.15737*	0.27256**	0.27614**	0.28314**	0.04416	0.05503	0.06602*	0.12029*	0.12620*	0.13148*
Participation	Participation	Employment growth	EMPGROW2018	0.56687	1.19449	0.75215	-0.04143	0.16310	-0.15033	0.25562	0.78149	0.05275	0.72576	0.92012	0.76886
Participation	Participation	Labour Force Participation (%)	LFP2018	0.24108	0.29096	0.27636*	0.23758	0.45555*	0.44389*	0.13201	0.15820	0.14322	0.08246	0.03834	0.03301
Participation	Participation	Unemployment rate (%)	UNEMP2018	-0.18253	-0.35696	-0.37328	-0.81442*	-0.93770*	-0.95745	0.22259	0.07964	0.05802	-0.00344	-0.10345	-0.10783
Participation	Population Growth	Population growth	POPGROW2018	-0.07712	3.38796	3.29859	1.76119	5.05445	5.00748	-1.57750	0.18034	0.05835	2.15992*	4.49581***	4.45468**
Participation	Population Growth	Total Dependency Ratio	DEP_RATIO2020	-0.11199	0.03509	0.12931	0.12305	0.26682	0.36804	-0.29088**	-0.21728*	-0.10101	-0.01004	0.06707	0.13451
Productivity	Education	Employed Workforce with Advanced Education	EMP_ADED2018	0.19333	0.11046	0.08194	0.08078	0.04187	0.01800	0.17211*	0.09797	0.06671	0.12954*	0.08299	0.07404
Productivity	Education	Employed Workforce with Basic Education	EMP_BASED2018	-0.01635	-0.04996	-0.02752	-0.09513	-0.11395	-0.09725	-0.02369	-0.05408	-0.02963	0.00132	-0.01771	-0.01037
Productivity	Education	Employed Workforce with Intermediate Education	EMP_INED2018	0.08768	0.04562	0.01348	0.15131	0.13864	0.11603	0.09266	0.05592	0.02115	0.02822	0.00252	-0.00851
Productivity	Education	Employed Workforce with Less than Basic Education	EMP_LBAS_ED2018	-0.21411	-0.12845	0.01083	0.01667	-0.02197	0.08250	-0.17229	-0.04857	0.12861	-0.07540	0.00257	0.12496
Productivity	Education	Employed Workforce with Not Stated Education	EMP_UK_ED2018	-3.24693	2.91995	4.28420	-1.47535	0.56553	1.52536	-1.71490	5.92478	7.42381	-3.80837	-0.19972	0.25764
Productivity	Informality	Financial Inclusion Score (by Intelligence Unit)	FinIncl_Score2019	0.14453*	0.10592	0.05903	0.06606	0.05157	0.02673	0.15032**	0.11769**	0.05843	0.12096*	0.10504*	0.08276
Productivity	Informality	Number of Days to Register a Property	daystoregisterprop2018	-0.01222	-0.04178	-0.01076	-0.02808	-0.03948	-0.01436	-0.01161	-0.04058	0.01773	-0.03060	-0.04912*	-0.04108
Productivity	Informality	Number of Days to Start a Business	timeforbsns_2018	-0.08032*	-0.04332	0.01594	-0.05035	-0.04526	0.00248	-0.09824**	-0.06528**	0.02052	-0.05745*	-0.04123	-0.00719
Productivity	Informality	Proportion of female informal employment in non-agricultural employment - Harmonized series (%) - Annual	INFEMP_F_NONAG2018	-0.13004*	0.00519	0.12612	-0.00590	0.21181	0.32956	-0.15109*	-0.13278	-0.00342	-0.06201*	-0.00146	0.04913
Productivity	Informality	Proportion of male informal employment in non-agricultural employment - Harmonized series (%) - Annual	INFEMP_M_NONAG2018	-0.12604	0.00112	0.21237	0.00203	0.13892	0.36390	-0.16822*	-0.13556	0.04738	-0.06359*	-0.01121	0.07057
Productivity	Informality	Proportion of total informal employment in non-agricultural employment - Harmonized series (%) - Annual	INFEMP_NONAG2018	-0.12960	0.00447	0.18164	-0.00109	0.17566	0.36247	-0.16212*	-0.13990	0.02675	-0.06391*	-0.00836	0.06232
Productivity	Informality	Vulnerable employment, total (% of total employment) (modeled ILO estimate)	VUL_EMP2018	0.04789	0.16031**	0.16091**	0.11392	0.25781***	0.25833***	-0.00669	0.06517	0.06605*	0.06179	0.12978***	0.13019***
Productivity	Productivity	Annual Growth Rate of Output Per Worker	GRWRKR2018	0.61340	0.50168	0.15215	0.33256	0.25130	-0.06565	0.61974	0.47118	0.10908	0.41678	0.34435	0.25067
Productivity	Productivity	Output per Employed Person	OUT_EMPPER2018	0.00008	-0.00002	-0.00013	0.00003	-0.00022	-0.00028	0.00008	-0.00017	-0.00032	0.00001	0.00043	0.00038
Productivity	Productivity	Output per Employed Person growth	OUT_EMPPER_GROW2018	1.14116	1.10863	1.03784	1.46662	1.45465	1.42087	0.66288	0.63136	0.53158	0.60097*	0.60052	0.56760
Productivity	Productivity	Output per worker (GDP constant 2010 US $)	OUTPUTWRKR2018	0.00020*	-0.00007	-0.00002	0.00006	-0.00021	-0.00019	0.00022*	0.00008	0.00014	0.00017***	0.00003	0.00005
Productivity	Productivity	Total Factor Productivity	TFP2018	0.58084	1.01903	0.53169	0.46624	0.69513	0.52475	0.76007	1.21159	0.45307	0.60632**	0.73371*	0.66127
			gdpcapita_2018	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
			RegulatoryQuality	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes

Table 3: Regression results for *WGI Index* on Moody's ratings

WGI Index on Ratings - Summary				
Var Name	Government Rating	Economic Strength	Fiscal Strength	Institutional Strength
Voice Accountability	2.53603*	1.54190*	0.35552	3.50716***
Political Stability	1.66414	0.03780	0.15385	2.76271*
Govt Effectiveness	4.08756***	1.71968**	1.47255	4.84015***
Regulatory Quality	4.34425***	2.22296***	2.64113*	4.33326***
Rule of Law	3.10946**	1.20932*	1.56078	3.78865***
Control of Corruption	1.12543	0.23713	0.22123	2.66937**

WGI_Gov Rating	
Voice Accountability	2.53603*
	(1.06139)
Govt Effectiveness	4.08756***
	(1.05429)
Regulatory Quality	4.34425***
	(0.60259)
Rule of Law	3.10946**
	(1.02141)

WGI_Econ Strength	
Voice Accountability	1.54190*
	(0.58242)
Govt Effectiveness	1.71968**
	(0.57429)
Regulatory Quality	2.22296***
	(0.44520)
Rule of Law	1.20932*
	(0.54737)

WGI_Fiscal Strength	
Regulatory Quality	2.64113*
	(1.21432)

WGI_Inst Strength	
Voice Accountability	3.50716***
	(0.57972)
Political Stability	2.76271*
	(1.03587)
Govt Effectiveness	4.84015***
	(0.51875)
Regulatory Quality	4.33326***
	(0.54569)
Rule of Law	3.78865***
	(0.57275)
Control of Corruption	2.66937**
	(0.80938)

Standard errors in parentheses
="* p<0.05 ** p<0.01 *** p<0.001"

Table 4: Regression results for *WGI Index* on labor market indicators

Labor on WGI - Summary										
Var Name	Employment Growth	Labor Force Participation 2018	Unemployment Rate 2018	Total Factor Productivity 2018	Output Per Worker 2018	Output Per Employed Person Growth 2018	Output Per Employed Person 2018	NON-AGR Informal Employment 2018	Gender Equality Index 2018	Labor Income Share in GDP 2017
Voice Accountability	4.62311	1.50174	2.57622**	4.53998	5983.01098	4.66859	12032.88751**	-32.05137***	-3.72522*	1.47244
Political Stability	3.81058	1.69288	0.93863	3.81715	3682.03766	3.85082	10264.75898*	-26.84358**	-4.51784*	-0.10795
Govt Effectiveness	4.85044	0.32784	1.40172	4.65819	7202.50434	4.98126	13240.94495**	-29.08075***	-3.63045	-0.08440
Regulatory Quality	4.70075*	1.60991	0.86348	4.35060*	3997.61282	4.34708	8837.88354**	-20.61556***	-1.45898	2.93091
Rule of Law	3.89958	-0.37762	1.95305*	3.77665	7331.07957	3.91342	11513.91626***	-23.05945***	-3.38714*	1.65290
Control of Corruption	1.99986	-1.66653	1.81653*	2.51103	7539.92306**	2.35056	8538.08395*	-19.64677***	-3.66662*	0.86880

WGI_Emp Growth	
Regulatory Quality	4.70075*
	(2.16274)

WGI_LFP2018	
N/A	-
	-

WGI_UNEMP2018	
Voice Accountability	2.57622**
	(0.79287)
Rule of Law	1.95305*
	(0.81911)
Control of Corruption	1.81653*
	(0.70254)

WGI_TFP2018	
Regulatory Quality	4.35060*
	(1.72241)

WGI_OPW2018	
Control of Corruption	7539.92306**
	(2350.17359)

WGI_OPEPG2018	
N/A	-
	-

WGI_OPEP2018	
Voice Accountability	12032.88751**
	(3394.06398)
Political Stability	10264.75898*
	(3741.35481)
Govt Effectiveness	13240.94495**
	(3967.73894)
Regulatory Quality	8837.88354**
	(2603.16653)
Rule of Law	11513.91626***
	(2663.78660)
Control of Corruption	8538.08395*
	(2904.44042)

WGI_NONAGINF2018	
Voice Accountability	-32.05137***
	(3.41905)
Political Stability	-26.84358**
	(7.58172)
Govt Effectiveness	-29.08075***
	(5.72604)
Regulatory Quality	-20.61556***
	(3.18002)
Rule of Law	-23.05945***
	(2.95079)
Control of Corruption	-19.64677***
	(2.17468)

WGI_GENEQ2018	
Voice Accountability	-3.72522*
	(1.73784)
Political Stability	-4.51784*
	(2.17153)
Rule of Law	-3.38714*
	(1.57102)
Control of Corruption	-3.66662*
	(1.76869)

WGI_LISGDP2017	
N/A	-
	-

Additional Notes on Empirical Results

Note on Multivariate Regressions:

Many productivity indicators lose their significance when we run a multivariate regression. The multivariate regression consists of control variables: GDP per capita and Regulatory Quality. Our rationale for including these variables as control is to incorporate a methodology which is a closest proxy to that using a fixed (country) effect. Given that the control variables that we are using are a close proxy to productivity indicators, empirical results of losing significance are not contrary to our hypothesis.

For instance, advanced education loses its significance when the control variables such as GDP per capita and Regulatory Quality are added to the equation. In order to rationalize this result, we note from our academic research that attaining higher education is highly correlated with securing higher incomes. Hence understandably adding a variable such as GDP per capita as a control alters the results otherwise proved through univariate regression.

Conversely, some LFP indicators become significant only after including controls. This may highlight the omitted variable bias in univariate regressions as controlling for a country's wealth (GDP per capita) and governance quality makes LFP results more robust.

Note on Female Informal Employment:

Our regression outputs indicate that this variable has statistically significant and negative association with economic strength, institutional strength, as well as with government rating. Empirical association with more factors in comparison to male employment illustrate that changes in female informal employment may have a higher influence on the aggregate Moody's ratings. As explained in the academic research, our hypothesis is that rising female labor force participation has more far-reaching macroeconomic effects.

Note on Vulnerable Employment Indicator:

Multivariate regressions establish positive and significant associations of this indicator with all sub factors, namely institutional strength, fiscal strength and economic strength as well as with

the government rating. This was contrary to our intuition and academic research that suggests a negative relationship.

Note on Number of Days to Start a Business:

Number of days to start business is a standard dataset populated by the World Bank Doing Business Project. Lomanna and Gonzalez (2007) investigate the magnitude of burdensome procedures in the LAC region. The researchers demonstrate that the LAC region has the highest number of procedures (12) and days (66) required to start a business[5]. We are able to confirm our hypothesis by running univariate regressions. We note that this indicator had significant and negative associations with institutional strength, economic strength and the government rating. In line with expectations, the significance drops post running multivariate regressions.

Note on WGI:

In our first set of regressions, we found that voice accountability, government effectiveness, regulatory quality, and rule of law are statistically significant with government ratings and economic strength. Regulatory quality is statistically significant to fiscal strength, while all six variables were significant to institutional strength.

For our other series of regression, we also regressed the six governance indicators on some participation and productivity metrics. We found that regulatory quality is associated with employment growth. Meanwhile, voice accountability, rule of law, and the control of corruption are statistically significant at the 99%, 95%, and 90% confidence levels respectively to the unemployment rate of 2018. Only regulatory quality is associated with total factor productivity of 2018. Control of corruption is associated with output per worker of 2018. All six variables are positively associated with output per employed person of 2018 and negatively associated with non-agricultural informal employment of 2018.

Voice accountability, political stability, rule of law, and control of corruption have a significant negative association with the gender equality index of 2018. This is counterintuitive and could be investigated further.

[5] González, A. S., & Lamanna, F. (2007). *Who fears competition from informal firms? Evidence from Latin America*. The World Bank.

Note on Employment Growth:

Using the 2018 data obtained from the Conference Board's Total Economy Database on a country's employment growth in terms of annual change, we found no statistically significant association with any elements of Moody's framework. Running multivariate regressions retained the same results. This warrants further investigation.

Note on Female Literacy:

Using the 2018 data obtained from the World Bank on a country's female literacy rate (% of females, ages 15+), as a proxy to determine a country's female education level, we found no statistically significant association for univariate regressions. However for multivariate, we found robust results for associations with fiscal strength. This is coherent with academic literature that explains that higher women financial literacy leads to effective financial behavior and, at a macro level, it helps support economic stability and stimulate economic activity leading to higher GDP growth.

Note on Total Dependency Ratio:

Total Dependency Ratio refers to the ratio of individuals aged 0-14 and 65+, per 100 individuals aged 15-64 in an economy. This ratio is unique as it helps to indicate the impact of changing demographic transitions on economic growth. Academic research notes that reaping the benefits of demographic dividend depends on availability of productive employment and on the existence of social and productive conditions. This should lead to a high association of total dependency ratio with institutional strength and economic strength. Our empirical results confirm our hypothesis. Using the 2020 projections obtained from the United Nations' Population Division, we found that this indicator had a statistically significant association with Moody's institutional strength ratings.