Latin American fall and rebound since the COVID-19

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[1]Universidad de Alcalá
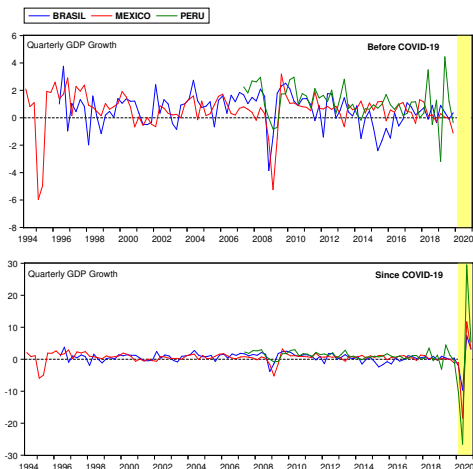[2]Banco de España
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Introduction

▶ The COVID-19 crisis has significantly challenged the measurement of economic conditions around the globe
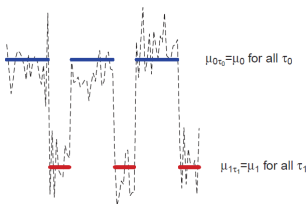
▶ Latin America is not the exception

Introduction

▶ **Context**: During COVID-19 times a continuous reading of the Latin American economy's vital sign is of the utmost importance

▶ **Aim 1**:Tracking turning points in the region under this unstable environment

▶ **Aim 2**: Tracking how deep (buoyant) an unfolding recessions (expansion) in the region can become

▶ **Problem**: The magnitudes of real activity have become more heterogeneous than ever
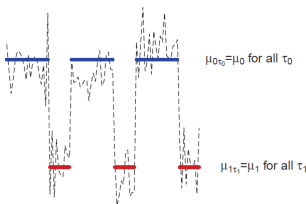 ▶ This significantly complicates economic modelling

Literature

▶ Hamilton (1989): Univariate Markov-switching models where unconditional means μ_{exp} and μ_{rec} are constant over time

▶ Chauvet (1998): Multivariate Markov-switching (**dynamic factor**) models where unconditional means also constant

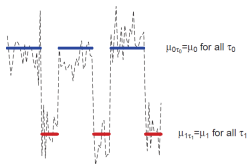$\mu_{0\tau_0} = \mu_0$ for all τ_0

$\mu_{1\tau_1} = \mu_1$ for all τ_1

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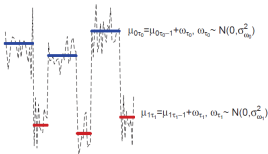$\mu_{0\tau_0} = \mu_0$ for all τ_0

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$$\mu_{0\tau_0} = \mu_0 \text{ for all } \tau_0$$

$$\mu_{1\tau_1} = \mu_1 \text{ for all } \tau_1$$

▶ Eo and Kim (2016): Univariate Markov-switching models where unconditional means are time-varying

$$\mu_{0\tau_0} = \mu_{0\tau_0 - 1} + \omega_{\tau_0}, \ \omega_{\tau_0} \sim N(0, \sigma^2_{\omega_0})$$

$$\mu_{1\tau_1} = \mu_{1\tau_1 - 1} + \omega_{\tau_1}, \ \omega_{\tau_1} \sim N(0, \sigma^2_{\omega_1})$$

▶ Leiva-Leon et al. (2021): Multivariate Markov-switching models where unconditional means are time-varying

What we do

- We employ the framework recently proposed in Leiva-Leon et al. (2021) for the study of LATAM's cyclical position:

  1. Markov-Switching Dynamic Factor Model:
     Accounts for business cycle asymmetries

  2. Mixed Frequency and Ragged Edges:
     Provides high-frequency real-time updates

  3. Flexible Time-varying Means:
     Measures heterogeneous recessions and expansions

- Estimate the proposed nonlinear factor model for the largest LATAM economies, using quarterly GDP and monthly activity indicators

  - Argentina, Brazil, Chile, Colombia, Ecuador, Mexico and Peru.

- These inferences are summarized into a
  Latin **A**merican **W**eakness **I**ndex (LAWI) that provides:
  → timely assessments of LATAM's cyclical position

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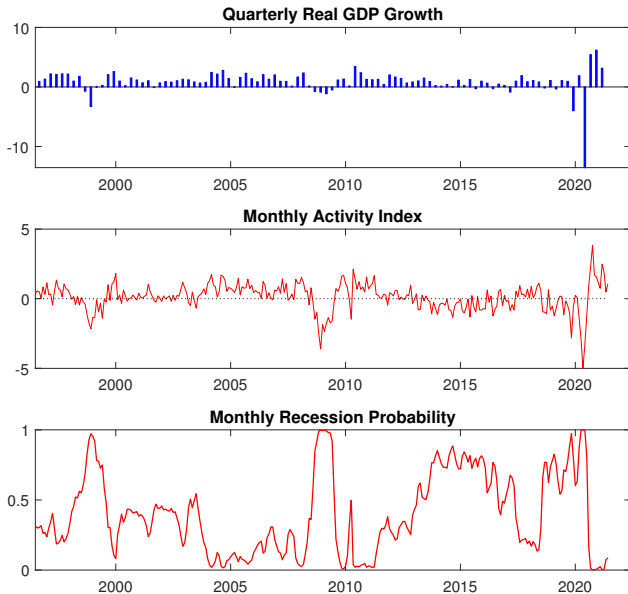 ▶ Argentina, Brazil, Chile, Colombia, Ecuador, Mexico and Peru.

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The Model

- Real activity indicators, $y_{i,t}$, can be expressed as:

$$y_{i,t} = \gamma_i \Theta(f_t) + u_{i,t},$$

- The idiosyncratic components, $u_{i,t}$, are given by

$$u_{i,t} = \psi_{i,1} u_{i,t-1} + ... + \psi_{i,P} u_{i,t-p} + e_{i,t}, \quad e_{i,t} \sim \mathcal{N}(0, \sigma_i^2) \text{ i.i.d.}$$

- The common factor, f_t, follows flexible nonlinear dynamics to accommodate for recessions and expansions of different magnitudes,

$$f_t = \mu_{0,\tau_i}(1 - s_t) + \mu_{1,\tau_i} s_t + e_{f,t}, \quad e_{f,t} \sim \mathcal{N}(0, \sigma_f^2) \text{ i.i.d.},$$

where $s_t \in \{0, 1\}$, with 0 for recessions, and 1 for expansions.

- The regime-dependent means, μ_{1,τ_i} and μ_{0,τ_i}, correspond to the expected value of the factor, f_t, during the τ_{i-th} expansion or the τ_{i-th} recession.

Data

▶ We fit the nonlinear factor model to the seven largest economies in the LATAM region by employing the following quarterly and monthly indicators of activity:

Argentina	Brazil	Chile
Real GDP	Real GDP	Real GDP
Imports of Goods and Services	Imports of Goods and Services	Imports of Goods and Services
Exports of Goods and Services	Exports of Goods and Services	Exports of Goods and Services
Synthetic Construction Index	Industrial production index	Manufacturing Production Index
Monthly economic activity index	Real commercial activity index	construction index
	Monthly economic activity index	Monthly economic activity index

Colombia	Ecuador	Mexico
Real GDP	Real GDP	Real GDP
Imports of Goods and Services	Imports of Goods and Services	Imports of Goods and Services
Exports of Goods and Services	Exports of Goods and Services	Exports of Goods and Services
Manufacturing Production Index	Manufacturing Production Index	Industrial Activity Indicator
Building Permits Index	Global confidence index	Private Consumption Indicator
economic activity index	economic activity index	retail trade sales index
		economic activity index

Peru
Real GDP
Imports of Goods and Services
Exports of Goods and Services
Building Permits Index
Economic activity index

Argentina

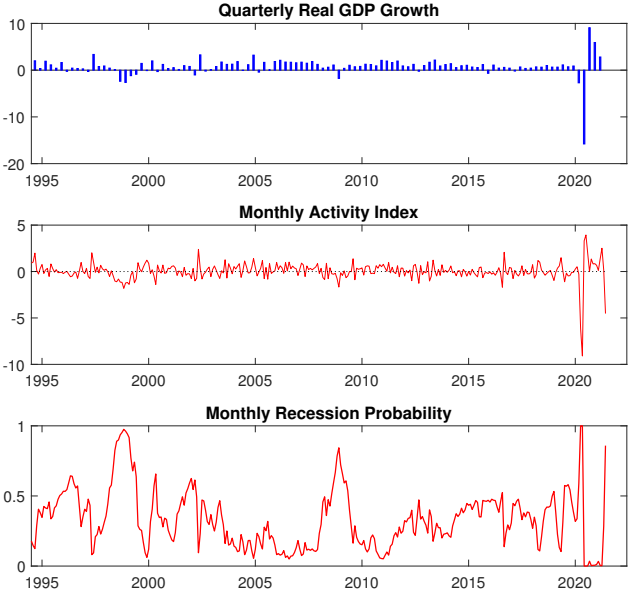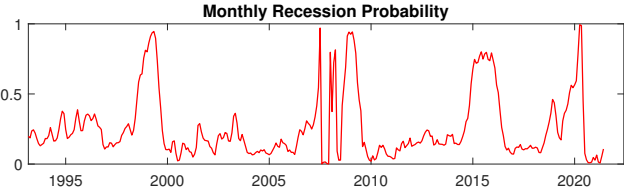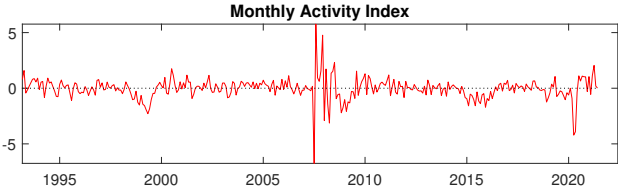Quarterly Real GDP Growth

Monthly Activity Index

Monthly Recession Probability

Brazil

Chile

Colombia

Ecuador

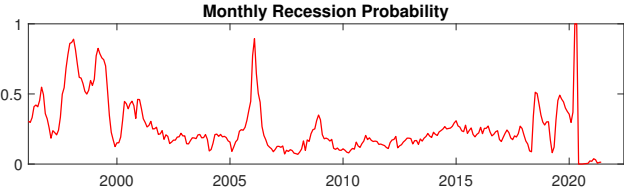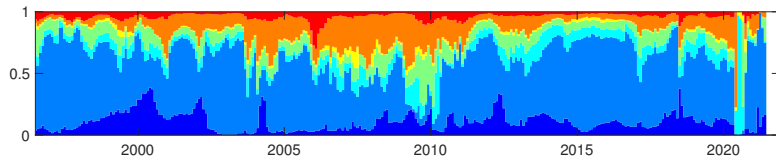# Mexico

Peru

Quarterly Real GDP Growth
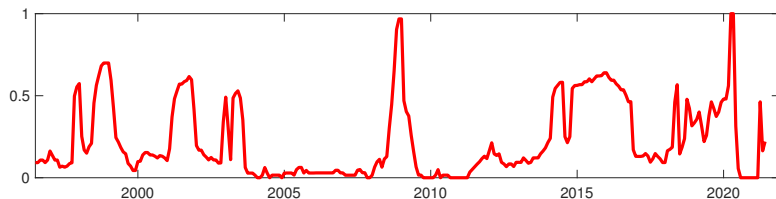
Monthly Activity Index

Monthly Recession Probability
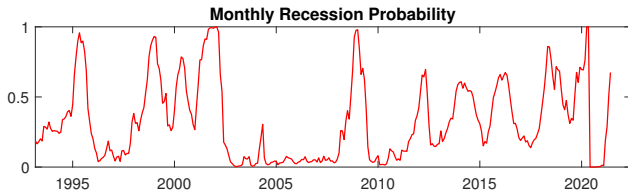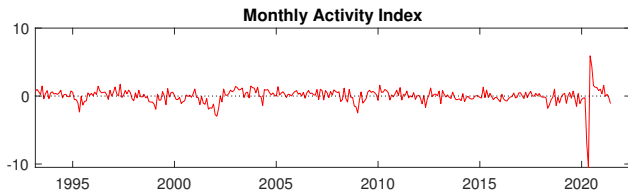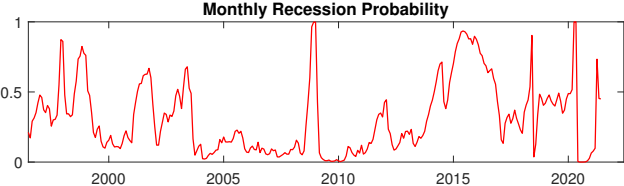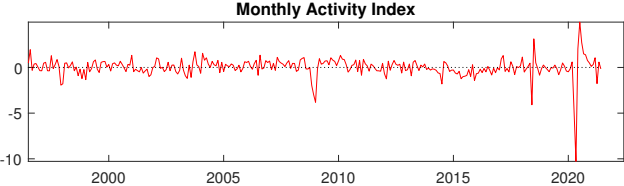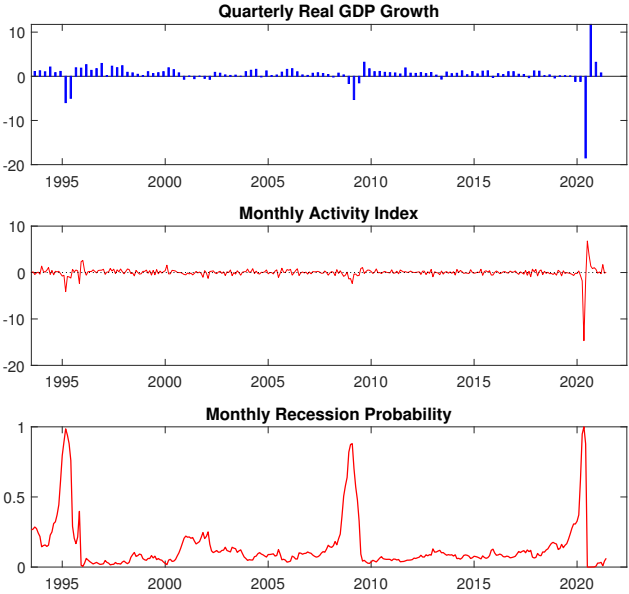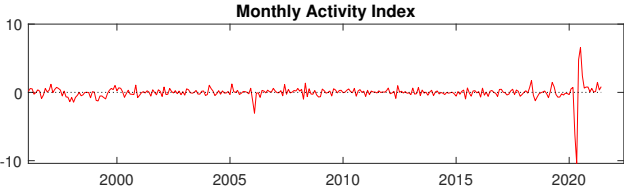
Latin American Weakness Index

- **LAWI**: proportion of the LATAM economy in recession

$$LAWI_t^{(I)} = \sum_{\kappa=1}^{K} \omega_{\kappa,t} s_{\kappa,t}^{(I)},$$

Latin American Weakness Index: Zoom into COVID crisis

▶ The country-specific contributions to the LATAM economic weakness have exhibited significant variations in recent times

▶ Monitoring the internal sources of economic weakness in the region represents is crucial for policy makers
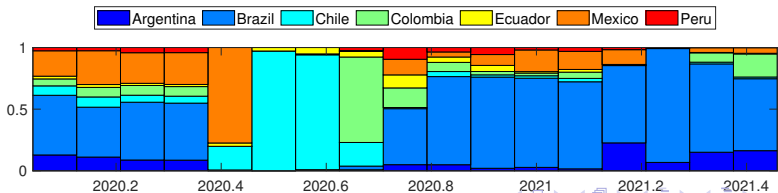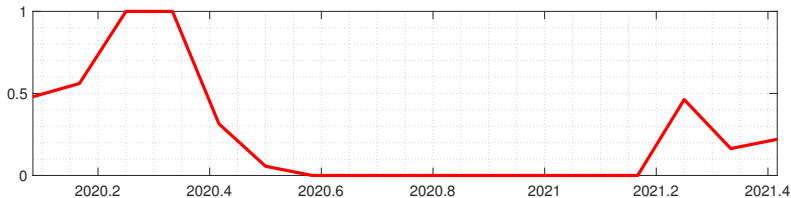
Country-specific "Intensity" of Growth

$$\underbrace{f_t}_{Factor} = \underbrace{(\mu_{0,\tau_i}(1 - s_t) + \mu_{1,\tau_i}s_t)}_{\text{Intensity: } \mu_t} + \underbrace{e_{f,t}}_{Disturbances} \quad , \quad e_{f,t} \sim \mathcal{N}(0, \sigma_f^2)$$
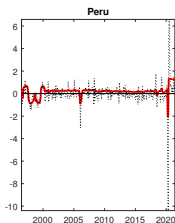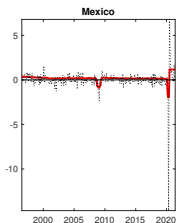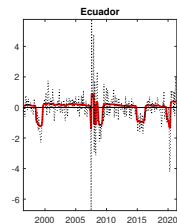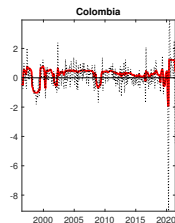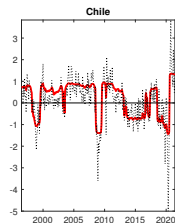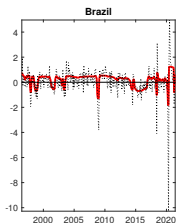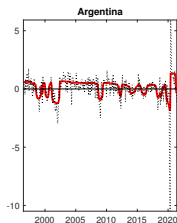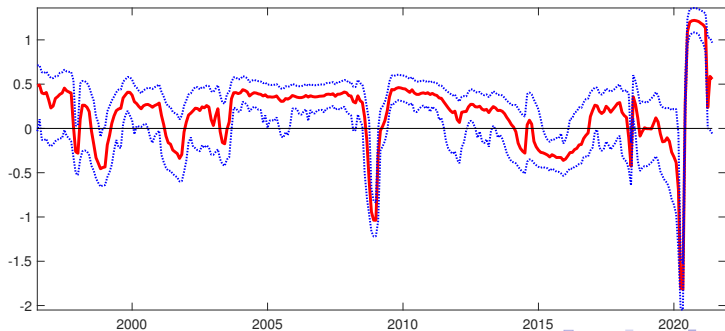
Latin American Intensity Index

▶ For each country, the common factor can be decomposed into

$$\underbrace{f_t}_{Factor} = \underbrace{\textcolor{red}{(\mu_{0,\tau_i}(1-s_t) + \mu_{1,\tau_i}s_t)}}_{\textcolor{red}{Intensity:\ \mu_t}} + \underbrace{e_{f,t}}_{Disturbances}, \quad e_{f,t} \sim \mathcal{N}(0, \sigma_f^2)$$

▶ **LAII**: Growth intensity of the LATAM economy

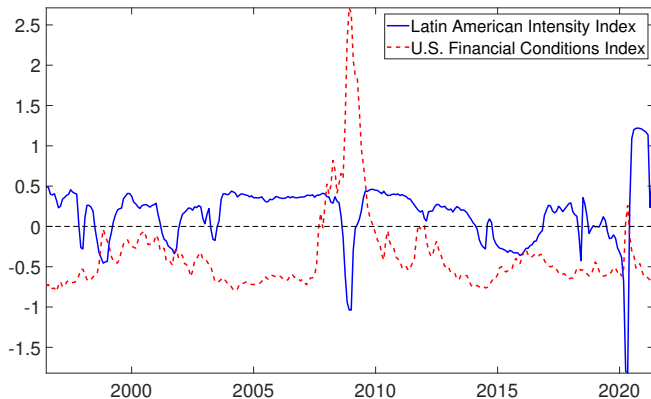$$LAII_t^{(I)} = \sum_{\kappa=1}^{K} \omega_{\kappa,t} \mu_{\kappa,t}^{(I)},$$

Application: Effect of US Financial Conditions on LATAM

▶ What is the time-varying relationship between U.S. financial conditions and LATAM's economic weakness?

$$LAII_t = \alpha_t + \beta_t FCI_t + e_t,$$

▶ where α_t and β_t are assumed to follow random walks

# **Application**: Effect of US Financial Conditions on LATAM

- ▶ The contemporaneous correlation between LATAM real activity and FCI have increased substantially since the COVID crisis.

- ▶ This estimates suggest the increasing importance of U.S. financial conditions for LATAM's economic recovery
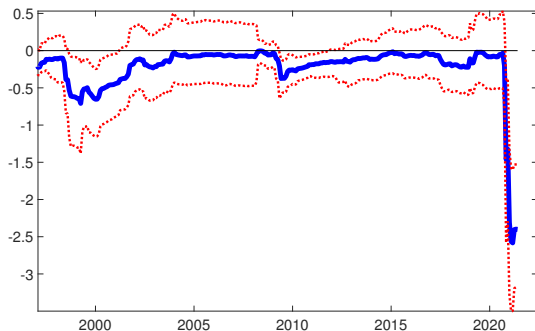
Country-specific "Intensity" of Growth

▶ There is heterogeneity regarding the sensitivity of country-specific weakness to U.S. financial conditions.
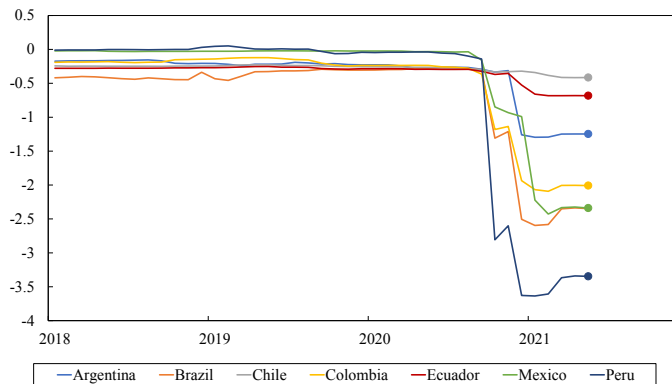
Conclusions

▶ This paper brings new statistical measures for LATAM economies to the table for the use of policy makers

1. Latin American Weakness Index (**LAWI**): measures the share of LATAM region in recession
2. Latin American Intensity Index (**LAII**): measures the intensity of LATAM crisis and recoveries

▶ The framework provides high frequency real-time updates on the cyclical position of LATAM economies as new information is released

▶ We also asses the effect of external developments on the LATAM region, by focusing on the time-varying effect of U.S. financial conditions.

▶ The estimates suggest that sensitivity of LATAM activity to U.S. financial conditions has substantially increased since the COVID-19 crisis.