



Universidad de Valladolid

PROGRAMA DE DOCTORADO EN ECONOMÍA

TESIS DOCTORAL:

OFERTA DE TRABAJO Y DESEMPLEO A NIVEL
MACROECONÓMICO: CINCO ENSAYOS

Presentada por ÁNGEL AUGUSTO MARIDUEÑA LARREA para optar al
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Dirigida por:

Dr. ÁNGEL LUIS MARTÍN ROMÁN

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ESTRUCTURA DE LA TESIS DOCTORAL

Esta tesis doctoral ha sido elaborada bajo la modalidad de compendio de artículos publicados, en estricto cumplimiento con la normativa legal vigente que regula la presentación y defensa de tesis doctorales en la Universidad de Valladolid (Aprobada por el Consejo de Gobierno en sesión de 11 de mayo de 2022, BOCyL núm. 96 de 20 de mayo. Corrección de errores publicada en el BOCyL de 24 de mayo. Modificado por la Comisión Permanente en sesión de 15 de julio de 2024, BOCyL núm. 141 de 22 de julio). En el inciso 1 del artículo 20 del marco normativo previo se establece que: “la tesis doctoral por compendio de publicaciones **constará de artículos científicos, en un mínimo de tres**, que hayan sido aceptados o publicados en un medio de impacto, según los criterios de la ANECA para el ámbito de estudio en el que se presente la tesis, dentro del periodo en el que el estudiante de doctorado haya estado matriculado en el programa de Doctorado, siempre que dichas publicaciones merezcan la consideración de trabajos originales elaborados principalmente por el doctorando o doctoranda”.

Esta tesis se compone de cinco capítulos, tres de los cuales corresponden a artículos publicados en revistas científicas indexadas en la Web of Science (WoS) y con factor de impacto según el Journal Citation Reports (JCR). Los dos capítulos restantes corresponden a investigaciones que al momento de presentar esta tesis se encuentran en proceso de revisión por parte de revistas arbitradas con factor de impacto e indexadas en WoS.

1. Capítulo 1

Maridueña-Larrea, Á., & Martín-Román, Á. (2024a). The unemployment invariance hypothesis and the implications of added and discouraged worker effects in Latin America. *Latin American Economic Review*, 33. DOI: <https://doi.org/10.60758/laer.v33i.213>

Journal Citation Reports (Clarivate): 2023

Factor de Impacto: 0.5 en 2023 y 2.1 en los últimos cinco años.

Categoría: Economics en Social Sciences Citation Index (SSCI).

JCR: 489/600, Q4.

Cabe indicar que a la fecha de envío a evaluación del artículo la revista se encontraba posicionada en el ranking JCR 107/381, Q2.

2. Capítulo 2

Unemployment invariance hypothesis and labour supply: a test for 31 American countries

Esta investigación se encuentra actualmente en proceso de revisión por parte de una revista indexada en la WoS, dentro de la categoría Economics

del SSCI, la cual cuenta con factor de impacto según el JCR y está clasificada en el cuartil Q2.

3. Capítulo 3

Maridueña-Larrea, Á., & Martín-Román, Á. (2025). Female Labor Supply in Latin America and the Business Cycle: Instability and Asymmetry. *Review of Development Economics*.

DOI: <https://doi.org/10.1111/RODE.13231>

Journal Citation Reports (Clarivate): 2023

Factor de Impacto: 2 en 2023 y 2.1 en los últimos cinco años.

Categoría: Economics en SSCI.

JCR: 207/600, Q2.

4. Capítulo 4

Esta investigación se encuentra actualmente en proceso de revisión por parte de una revista indexada en la WoS, dentro de la categoría Economics del SSCI, la cual cuenta con factor de impacto según el JCR y está clasificada en el cuartil Q1. No obstante, en su primera versión se publicó como *working paper* en:

Maridueña-Larrea, Ángel; Martín-Román, Ángel; Porras-Arena, Sylvina (2025): Heterogeneity and spatial dependence in Okun's law: a global view, GLO Discussion Paper, No. 1597, *Global Labor Organization* (GLO), Essen.

Acceso: <https://hdl.handle.net/10419/315055>

5. Capítulo 5

Maridueña-Larrea, Á., & Martín-Román, Á. (2024b). Spatial Dependence in the Cyclical Sensitivity of Labour Supply: An Analysis at the Regional Level in Ecuador. *Economies*, 12(12).

DOI: <https://doi.org/10.3390/economies12120353>

Journal Citation Reports (Clarivate): 2023

Factor de Impacto: 2.1 en 2023 y 2.2 en los últimos cinco años.

Categoría: Economics en Emerging Sources Citation Index (ESCI).

JCR: 200/600, Q2.

SCImago Journal Rank (SJR): 2024

SJR: 0.523 en 2024.

Categoría: Economics, Econometrics and Finance.

SJR: Q2.

En síntesis, esta tesis doctoral cumple con la normativa vigente de la Universidad de Valladolid para tesis por compendio de artículos (Consejo de Gobierno, mayo de 2022; modificado por la Comisión Permanente, julio de 2024) y con el Acuerdo para la Acreditación de la Calidad de las Tesis Doctorales (marzo de 2025). Los capítulos principales del compendio (Capítulos 1, 3 y 5) satisfacen los requisitos

específicos del Programa de Doctorado en Economía. Los Capítulos 1 y 3 están publicados en revistas del SSCI del JCR, en cuartiles Q4 y Q2, respectivamente. El Capítulo 5 está publicado en una revista incluida en el ESCI de WoS, con factor de impacto según el JCR (cuartil Q2) y posicionada también en cuartil Q2 según el SJR.

INTRODUCCIÓN

Motivación y objetivos

Esta tesis aborda la relación entre la tasa de desempleo y la oferta de trabajo a nivel macroeconómico. En este contexto, es importante destacar que la tasa de desempleo es utilizada comúnmente como un indicador aproximado del ciclo económico, por lo que comprender cómo se relaciona con las decisiones de participación laboral constituye uno de los aspectos centrales del análisis macroeconómico actual. No obstante, aunque sigue siendo una medida clave para evaluar la salud del mercado laboral, diversos estudios han enfatizado sus limitaciones para captar plenamente las rigideces y fenómenos subyacentes en los mercados de trabajo, particularmente cuando estos se ven influenciados por variaciones en la participación laboral (Ramos-Veloza et al., 2021).

En este contexto, la hipótesis de invariancia del desempleo (UIH, por sus siglas en inglés) adquiere especial relevancia, dado que propone que, en el largo plazo, la tasa de desempleo tiende a permanecer constante frente a cambios en la oferta laboral, es decir, modificaciones en la tasa de participación no generan efectos persistentes sobre el nivel de desempleo (Layard et al., 1991). Desde esta perspectiva, las políticas económicas que busquen reducir el desempleo únicamente a través de modificaciones en la oferta laboral podrían carecer de efectividad en el largo plazo, sugiriendo la necesidad de explorar con mayor profundidad otras dinámicas fundamentales del mercado laboral.

Sobre la validez de la UIH, no obstante, aún no existen consensos generalizados en la literatura económica. Diversos estudios han arrojado resultados mixtos, impidiendo la consolidación de un consenso claro sobre la naturaleza de esta relación en distintas regiones y países (Kakinaka & Miyamoto, 2012; Layard et al., 1991; Nguyen Van, 2016; Österholm, 2010; Tansel et al., 2016). Esta ambigüedad ha sido parcialmente atribuida a la diversidad de contextos institucionales, normativos y económicos en los que se desarrollan los mercados laborales alrededor del mundo. Además, el uso heterogéneo de técnicas econométricas y fuentes de datos dificulta la comparación directa de resultados entre países, complicando aún más la obtención de conclusiones generales aplicables a distintos escenarios económicos y sociales.

La literatura reconoce que cuando la UIH no se sostiene, se producen algunos fenómenos específicos durante las recesiones, tales como el efecto del trabajador añadido (AWE, por sus siglas en inglés) y el efecto del trabajador desanimado (DWE, discouraged worker effect). El primero, propuesto originalmente por Woytinsky (1940), supone que ciertos miembros del hogar ingresan al mercado laboral durante recesiones, particularmente cuando el proveedor principal pierde su empleo. En contraste, el DWE, introducido por Long (1953, 1958), describe la

situación inversa, en la que individuos dejan de buscar empleo activamente debido a las escasas probabilidades de éxito en un contexto de alto desempleo. Martín-Román (2022) señala que una relación positiva entre tasas de participación y desempleo valida el AWE, mientras que una relación negativa valida el DWE.

En América Latina, los estudios empíricos sobre la UIH han sido escasos y han ofrecido resultados heterogéneos, especialmente cuando se considera la dinámica específica de la participación desagregada por sexo. Cerrutti (2000), Hernández & Romano (2011), Fernandes & De Felício (2005) y Ontaneda Jiménez et al. (2022) proporcionan evidencia del AWE durante períodos recesivos. Sin embargo, esta relación no se mantiene necesariamente estable durante las fases expansivas, como lo muestra Serrano et al. (2019), quienes identifican tendencias divergentes asociadas a una reducción en la participación laboral, fenómeno descrito en la literatura como el efecto del trabajador sustraído (SWE, por sus siglas en inglés). Según Evans (2018), el SWE presenta un patrón similar al AWE, operando específicamente en períodos expansivos.

Adicionalmente, en estos períodos de expansión económica, cuando mejora la probabilidad de obtener empleo, puede ocurrir el denominado efecto del trabajador animado (EWE, por sus siglas en inglés), descrito por Congregado et al. (2014) como el opuesto al DWE, inicialmente propuesto por Long (1953, 1958) y observado típicamente durante recesiones. Esta heterogeneidad de comportamientos en la oferta laboral según la fase del ciclo económico sugiere que la validez empírica de la UIH podría estar condicionada por factores específicos, destacando particularmente la relevancia del género.

Este enfoque resulta especialmente pertinente considerando que la participación laboral femenina en América Latina ha experimentado un incremento significativo en las últimas décadas, alcanzando recientemente niveles cercanos al 52%. En este contexto, profundizar en la sensibilidad cíclica de su oferta de trabajo es crucial para comprender mejor sus implicaciones sobre el desempleo regional, especialmente porque las respuestas del mercado laboral ante el ciclo económico presentan asimetrías e inestabilidades que dificultan una planificación efectiva, reflejando distorsiones significativas según la etapa del ciclo y el contexto institucional de cada país (Congregado et al., 2020; Darby et al., 2001; Parker & Skoufias, 2004). Una comprensión precisa de estas dinámicas es clave y tiene implicaciones directas sobre la reducción de la pobreza y las brechas de género en países en desarrollo como los de América Latina.

La literatura también ha enfatizado que la relación entre crecimiento económico y desempleo, sintetizada por la Ley de Okun (Okun, 1962), tampoco es homogénea entre países ni regiones. Esta relación negativa entre crecimiento del producto y

la tasa de desempleo, aunque robusta en términos generales, exhibe considerables diferencias cuando se comparan países según su nivel de ingreso, desarrollo institucional o ubicación geográfica (Ball et al., 2019; Gordon & Clark, 1984; Perry et al., 1971). Además, Ismihan (2016) argumenta que el coeficiente de Okun debe descomponerse en efectos directos e indirectos del crecimiento económico sobre el desempleo, permitiendo así identificar factores adicionales, como la productividad laboral, las horas trabajadas y las tasas de participación, que pueden jugar un rol crucial al momento de formular políticas económicas orientadas a reducir el desempleo. Esta descomposición también permite evaluar empíricamente si la participación laboral sigue un comportamiento procíclico o contracíclico, proporcionando evidencia clave sobre si prevalecen fenómenos como el AWE o el DWE. Estos estudios recientes también sugieren que el análisis tradicional debe complementarse con metodologías espaciales, dada la evidencia creciente de que los mercados laborales regionales y nacionales no operan aislados, sino interconectados a través de procesos de contagio espacial o spillovers (Fogli & Veldkamp, 2011; Halleck-Vega & Elhorst, 2017).

En este sentido, la utilización de técnicas de econometría espacial para analizar la dependencia espacial de la sensibilidad cíclica de la oferta de trabajo resulta especialmente pertinente, pues permite estudiar cómo las decisiones individuales y colectivas en términos de participación laboral pueden verse condicionadas por las dinámicas laborales de regiones vecinas. Martín-Román et al. (2020), por ejemplo, lograron testar para España la hipótesis del Bandwagon Worker Effect (BWE), que sostiene que las decisiones sobre participación laboral no dependen únicamente de incentivos económicos individuales, sino que también reflejan influencias sociales provenientes del entorno próximo. Desde esta perspectiva espacial, la participación laboral en una región específica podría estar determinada significativamente por las dinámicas observadas en regiones adyacentes, destacando la relevancia de la proximidad geográfica y la interacción social en el mercado laboral. Este aspecto, sin embargo, aún ha sido poco explorado en el contexto latinoamericano, lo que ofrece nuevas oportunidades para la investigación empírica.

Finalmente, abordar estratégicamente estas temáticas no solo permite avanzar en la comprensión académica sobre estos fenómenos, sino que también proporciona herramientas sólidas para el diseño de políticas económicas y laborales adaptadas a las realidades diversas y complejas que enfrentan las economías, particularmente en América Latina y otras regiones emergentes y en desarrollo.

Metodología

La estrategia metodológica adoptada se basa en un amplio conjunto de técnicas econométricas reconocidas en la literatura, particularmente aquellas relacionadas con el análisis de series temporales. Inicialmente, se plantea la necesidad de validar empíricamente la UIH, propuesta originalmente por Layard et al. (1991). Esta validación se lleva a cabo primero para un conjunto selecto de países latinoamericanos y posteriormente se amplía para incluir una muestra representativa del continente americano. La técnica empleada para este propósito es la cointegración aplicada a modelos de vectores autorregresivos con corrección de errores (VARM-VECM), siguiendo metodologías establecidas por autores seminales como Johansen (1991), Hamilton (1994) y Lütkepohl & Kratzig (2004), así como aportes contemporáneos de Emerson (2011), Kakinaka & Miyamoto (2012) y Tansel et al. (2016). Esta técnica permite identificar relaciones de equilibrio de largo plazo entre la participación laboral y la tasa de desempleo, facilitando la validación o refutación empírica de la UIH, así como la identificación de fenómenos específicos como el AWE o el DWE.

Posteriormente, considerando las implicaciones de las diferentes fases del ciclo económico sobre la dinámica laboral, se incorporan técnicas adicionales para analizar la potencial inestabilidad temporal en la relación desempleo-participación a través de regresiones rolling (Knotek, 2007; Su et al., 2016) con distintas ventanas móviles. Complementariamente, se utilizan modelos de regresión threshold (Congregado et al., 2021; Cutanda, 2023; Hansen, 1999), cuyo objetivo radica en identificar regímenes diferenciados según niveles específicos asociados a fases expansivas o recesivas del ciclo económico. Esta aproximación es especialmente efectiva para precisar las condiciones económicas específicas bajo las cuales se manifiestan con mayor intensidad (o no) los efectos AWE o DWE durante las recesiones, así como sus contrapartes, SWE o EWE, en períodos expansivos.

En tercer lugar, considerando el carácter global del mercado laboral, se aborda la relación entre crecimiento económico y desempleo desde la perspectiva de la Ley de Okun (1962), analizando una muestra global de 173 países. Este análisis utiliza la descomposición del coeficiente de Okun propuesta por Ismihan (2016), basada en la versión en primeras diferencias, modelando la variación del desempleo en función del crecimiento del producto. Haciendo uso de varias regresiones auxiliares, esta metodología permite distinguir efectos directos, correspondientes al impacto del producto sobre el desempleo, y efectos indirectos derivados de cambios en la oferta laboral y la productividad laboral. Posteriormente, se introducen técnicas de econometría espacial mediante el cálculo del índice global de Moran propuesto por Moran (1948) para evaluar posibles efectos desborde de

estas relaciones entre países. Estos enfoques permitieron contrastar la validez general de la Ley de Okun, evaluar su variabilidad internacional y determinar la existencia de interdependencias espaciales significativas.

Finalmente, centrándose en el análisis subnacional, se examina en profundidad la dimensión espacial en las relaciones laborales para el caso específico del Ecuador y 23 de sus provincias. Reconociendo que las decisiones laborales no ocurren de forma aislada, sino que están influenciadas por interacciones regionales y sociales, se incorporan explícitamente técnicas de econometría espacial, aplicando índices de dependencia espacial global y local (Anselin, 1995; Moran, 1948) con diversas matrices de ponderación (vecinos más cercanos y por contigüidad). En particular, se testea la hipótesis del BWE, formulada originalmente por Martín-Román et al. (2020). Este enfoque espacial permite captar la dependencia espacial en la sensibilidad cíclica de la oferta laboral entre regiones vecinas, proporcionando evidencia sólida sobre la importancia del contexto geográfico y social en las decisiones de participación laboral.

Esta estructura metodológica, que combina técnicas econométricas avanzadas de series temporales y análisis espaciales, permite no solo validar teorías económicas fundamentales como la UIH y la Ley de Okun, sino también capturar con precisión fenómenos complejos (AWE, DWE, SWE, EWE). Además, posibilita profundizar en la respuesta de la sensibilidad cíclica y espacial de la participación laboral frente a cambios en el ciclo económico. La complementariedad entre capítulos ofrece una comprensión integral del mercado laboral contemporáneo, generando conclusiones pertinentes para el diseño de políticas económicas, particularmente relevantes en contextos latinoamericanos dada su especificidad empírica e implicaciones políticas.

Financiación

La formación del doctorando ha sido financiada por la Universidad Estatal de Milagro (UNEMI) del Ecuador, mediante una beca destinada al fortalecimiento del personal académico de la institución. Este apoyo económico hizo posible la realización de diversas estancias de investigación en España a lo largo del período doctoral, así como la financiación de los costos por procesamiento de artículos (APCs) correspondientes a una de las tres publicaciones incluidas en el compendio, concretamente la publicada en la revista *Economies* (capítulo 5).

Adicionalmente, con el respaldo institucional de la Universidad de Valladolid, se logró cubrir los APCs de la publicación en *Review of Development Economics* (capítulo 3), una revista de acceso híbrido. Gracias a un acuerdo entre la UVa y

la editorial Wiley, dicho artículo —inicialmente publicado bajo suscripción— fue posteriormente habilitado en modalidad de acceso abierto.

Contenido de la tesis doctoral

Los capítulos que integran esta investigación doctoral abordan de forma precisa y complementaria las distintas temáticas planteadas en la introducción general, proporcionando evidencia empírica sobre la relación entre el ciclo, el desempleo y la participación laboral, con diferentes metodologías estadísticas, distintos marcos conceptuales y en una variedad de entornos geográficos.

El **CAPÍTULO 1** responde directamente a la necesidad de validar empíricamente la UIH, propuesta originalmente por Layard et al. (1991), en un contexto regional para seis países latinoamericanos. Utilizando técnicas de cointegración desarrolladas por Johansen (1991) para un conjunto de series de tiempo con periodicidad trimestral durante el periodo 2006-2019, este estudio indaga si existe una relación de equilibrio de largo plazo entre la participación laboral y el desempleo para 6 países latinoamericanos considerando tanto datos agregados como desagregados por género. Esta aproximación permite identificar si cambios en la tasa de desempleo se encuentran aislados de los movimientos de la participación laboral o si por el contrario provocan un AWE o DWE, fenómenos ampliamente discutidos por Woytinsky (1940) y Long (1953, 1958). De esta manera, contribuimos con nueva evidencia que permite contrastar resultados de investigaciones previas en la región latinoamericana, tales como la de Cerrutti (2000), Hernández & Romano (2011), Ontaneda Jiménez et al. (2022) y Fernandes & De Felício (2005), Serrano et al. (2019).

El **CAPÍTULO 2** amplía sustancialmente este análisis en dos dimensiones clave. Primero, extiende considerablemente el horizonte temporal (1991–2023), lo cual es crucial para examinar fenómenos estructurales de largo plazo que requieren abarcar múltiples ciclos económicos. Segundo, incrementa significativamente la cobertura geográfica, al considerar una muestra amplia y heterogénea de 31 países americanos, incluyendo economías desarrolladas y en desarrollo, proporcionando así una perspectiva comparativa inédita en la literatura sobre la UIH. A partir de una base homogénea del Banco Mundial, el estudio clasifica países según si validan o no la UIH, examinando adicionalmente cuál de los efectos (AWE o DWE) predomina en los casos donde dicha hipótesis no se sostiene. Al hacerlo, aporta resultados novedosos que enfatizan la heterogeneidad de las economías estudiadas y resalta la importancia de tomar en cuenta particularidades institucionales para el diseño de políticas laborales efectivas (Layard et al., 1991; Maridueña-Larrea & Martín-Román, 2024).

Considerando el importante impulso que ha tenido la participación laboral femenina en la última década, el **CAPÍTULO 3** examina la sensibilidad cíclica de la participación laboral femenina frente a cambios en el desempleo masculino. Usando análisis de series temporales trimestrales para seis países latinoamericanos, se investiga la estabilidad y simetría de los efectos AWE, DWE y sus contrapartes (SWE/EWE), destacando la existencia de patrones tanto procíclicos como contracíclicos, dependientes del país y del momento del ciclo económico. Este capítulo muestra cómo las respuestas laborales femeninas presentan fuertes asimetrías y variaciones a lo largo del tiempo, ofreciendo así aportes críticos para políticas orientadas a la reducción efectiva de la brecha de género en América Latina.

El **CAPÍTULO 4** expande el análisis más allá de América Latina y aborda directamente la necesidad de explorar la heterogeneidad regional y espacial en la relación entre crecimiento económico y desempleo, sintetizada por la Ley de Okun (1962). En línea con estudios previos como los de Perry et al. (1971), Gordon & Clark (1984), e Ismihan (2016), se descompone el coeficiente de Okun para una amplia muestra de 173 países, identificando efectos directos e indirectos sobre el desempleo y evaluando la presencia de dependencia espacial global. Esta aproximación metodológica permite no solo detectar diferencias significativas según niveles de ingreso y región, sino también reconocer patrones espaciales que deben ser considerados en la formulación de políticas económicas orientadas a combatir el desempleo (Ball et al., 2019; Porras-Arena et al., 2024). De igual forma, permite ahondar sobre el predominio del AWE o el DWE como parte del aporte de la participación laboral en la descomposición del coeficiente de Okun.

Finalmente, el **CAPÍTULO 5** concreta la integración del enfoque espacial propuesto por Martín-Román et al. (2020) a un nivel subnacional en América Latina. Este capítulo analiza cómo decisiones de participación laboral son influenciadas no solo por variables económicas locales, sino también por la dinámica laboral en regiones vecinas, aplicando la hipótesis del BWE. Utilizando técnicas de econometría espacial (Fogli & Veldkamp, 2011; Halleck-Vega & Elhorst, 2017) en datos mensuales de las provincias ecuatorianas entre 2021 y 2024, se explora la extensión geográfica y social del fenómeno, proporcionando evidencia novedosa sobre cómo factores sociales y espaciales configuran las decisiones individuales y colectivas en el mercado laboral. Este estudio aporta un marco analítico para considerar las externalidades espaciales en el diseño de políticas laborales regionales.

Por último, cada uno de estos capítulos responde a dimensiones específicas planteadas en la introducción general, ofreciendo conjuntamente una visión sobre la compleja interacción entre la participación laboral y los ciclos económicos. La

variedad de contextos analizados, desde lo global hasta lo local, desde lo agregado hasta lo desagregado por género, y desde técnicas tradicionales hasta métodos de econometría espacial, permiten una comprensión multidimensional del mercado laboral contemporáneo, ofreciendo un marco de referencia pertinente para la formulación y aplicación de políticas públicas informadas y eficaces.

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CAPÍTULO 1: The unemployment invariance hypothesis and the implications of added and discouraged worker effects in Latin America

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RESEARCH ARTICLE

The unemployment invariance hypothesis and the implications of added and discouraged worker effects in Latin America

Ángel Maridueña-Larrea^{*,†}

Ángel Martín-Román[‡]

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Abstract

This research explores the long-term equilibrium relationship between unemployment and labour force participation rates for six selected countries in Latin America at both aggregate and gender-disaggregated levels. Cointegration analysis focused on the study of time series is used to validate the unemployment invariance hypothesis and explore added and discouraged worker effects in depth. The results suggest mixed dynamics for the aggregate model; however, a clear gender bias is revealed towards the added worker effect for women, while the discouraged worker effect is confirmed for men. The validity of the unemployment invariance hypothesis in several countries appears to reflect some rigidities that prevent the improvement of nations' labour markets, exposing issues that economic policies must strategically address.

Keywords: cointegration; added worker effect; discouraged worker effect; unemployment invariance; unemployment rate; labour force participation rate.

JEL codes: E24, C10, J64, J68.

^{*}Facultad de Ciencias Sociales, Educación Comercial y Derecho, Universidad Estatal de Milagro, Ecuador, email: amaridueenal@unemi.edu.ec

[†]Facultad de Ciencias Económicas y Empresariales, Universidad de Valladolid, Av. Valle de Esqueva, 6, 47011 Valladolid, Spain.

[‡]Facultad de CC. Sociales, Jurídicas y de la Comunicación, Universidad de Valladolid, Plaza de la Universidad, 1, 40005 Segovia, Spain, email: almartin@uva.es

CAPÍTULO 2: Unemployment invariance hypothesis and labour supply: a test for 31 American countries

Esta investigación se encuentra actualmente en proceso de revisión por parte de una revista indexada en la WoS, dentro de la categoría Economics del SSCI, la cual cuenta con factor de impacto según el JCR y está clasificada en el cuartil Q2.

Unemployment invariance hypothesis and labour supply: a test for 31 American countries

Ángel Maridueña-Larrea

Universidad Estatal de Milagro (Ecuador)

<https://orcid.org/0000-0002-8961-2331>

Ángel Martín-Román

Universidad de Valladolid (Spain)

<https://orcid.org/0000-0002-4777-4324>

Abstract

This study examines the empirical validity of the Unemployment Invariance Hypothesis (UIH) using a sample of 31 American countries and annual data from 1991 to 2023. While previous literature often focused on single-country analyses, an existing study for Latin America covers only six countries and relies on short time spans, limiting their ability to capture full economic cycles. This paper expands both the temporal and geographical scope, enabling more accurate cross-country comparisons. The results generally reject the UIH, with significant implications for economic policy in both cases—whether the hypothesis is accepted or not. In countries where UIH is rejected, the discouraged worker effect (DWE) tends to outweigh the added worker effect (AWE). These findings highlight the need for country-specific labor policies, which can be better designed based on the estimates presented.

Keywords: Cointegration; Added worker effect; Discouraged worker effect; Unemployment invariance; Unemployment rate; Labour force participation rate.

JEL Codes: E24, C10, J64, J68

Correspondence to Ángel L. Martín-Román.

Ángel Maridueña-Larrea. Facultad de Ciencias Sociales Educación Comercial y Derecho, Universidad Estatal de Milagro. Ecuador. E-mail: amariduenal@unemi.edu.ec

Ángel Maridueña-Larrea. Centro de Estudios Económicos para el Desarrollo del Ecuador, Ecuador. Registro SENESCYT REG-RED-25-0271. E-mail: ceede@ceedecuador.com

Ángel L. Martín-Román. Dpto. Análisis Económico, Facultad de Ciencias Sociales jurídicas y de la Comunicación. Universidad de Valladolid. Spain. E-mail: almartin@uva.es

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1. Introduction

One version of the so-called Unemployment Invariance Hypothesis (UIH), originally proposed by Layard et al. (1991), asserts that the long-term unemployment rate is independent of observed changes in labor supply. Although this hypothesis has been debated by Layard et al. (1991), it has been highly relevant in the macroeconomic and labor economics literature, as it argues that conventional economic policies aimed at modifying the labor force have limited or no effects on long-term unemployment. On the other hand, if this hypothesis does not hold, it becomes necessary to delve into specific labor market phenomena, such as the added worker effect (Woytinsky, 1940) or the discouraged worker effect (Long, 1953, 1958), and to examine whether changes in the unemployment rate and the labor force participation rate are directly or inversely related.

Most empirical research on the UIH yields mixed results regarding its validation. This represents a limitation that has hindered the generalization of findings and restricted the applicability of the conclusions across diverse economic and social contexts. Moreover, the existing literature shows significant gaps, as many of the available studies rely on different datasets and time periods, which complicates cross-country comparisons and the generalization of economic policy measures. Addressing this gap is crucial for understanding how different institutional and socioeconomic contexts may influence the validity of the UIH and, consequently, determine which labor policies are most effective for each country.

The main objective of this study is to estimate whether the UIH holds in a broad and diverse sample of 31 countries across the Americas. To this end, we use a homogeneous database developed by the World Bank within a common time frame—from 1991 to 2023—which allows for a more legitimate comparison between the economies of the countries analyzed. In a first step, we classify the countries into two groups: those in which the UIH holds and those in which it does not—something that already has significant implications for economic policy. In a second step, for the countries where the UIH is not verified, we determine whether the Added Worker Effect (AWE) or the Discouraged Worker Effect (DWE) predominates, in order to provide guidance for policymakers in those countries.

Our contribution to the existing literature occurs along several dimensions. On the one hand, we simultaneously conducted a test of the UIH for 31 countries. To date, few studies have undertaken such a broad cross-country comparison. Moreover, the American continent has not been extensively studied. A notable exception is the analysis by Maridueña-Larrea & Martín-Román (2024a), who examined the hypothesis for Latin America using quarterly data from 2006 to 2019. One key contribution of our study is substantially extending the time horizon (1991 to 2023). This is important because, when studying long-term cyclical phenomena, it is necessary to rely on a long time series that includes enough years of both economic expansion and periods of recession or slowed growth. Additionally, we significantly expand the geographical coverage – since Maridueña-Larrea & Martín-Román (2024a) only analysed six countries – by including both developed and developing economies, which represents a novelty in the literature, as there are no existing studies that have addressed the UIH using such a large and heterogeneous sample.

To address this objective, the study will employ the cointegration econometric methodology proposed by Johansen (1991), a technique widely used to identify stable long-term relationships in time series analysis. This methodology has been extensively applied to test the UIH as well as to discern the predominance of the AWE or DWE. It will allow us to obtain results on regional heterogeneity in labor market responses to changes in the economic cycle, providing specific guidance for public policies tailored to different national realities.

The findings of this research reveal the significant heterogeneity in labor market responses to changes in the unemployment rate, offering partial support for the UIH in the Americas. Notable differences are observed in both the validation of the hypothesis and the magnitude of the discouraged worker effect (DWE) and the added worker effect (AWE), indicating that labor market dynamics are strongly shaped by country-specific structural factors. Moreover, the results show that long-term effects—especially in the post-pandemic context—can substantially alter the relevance of the UIH, underscoring the need for methodological approaches that incorporate varying time horizons and data frequencies.

The paper is structured into seven sections, including this introduction. Section 2 reviews the existing literature on the topic. Section 3 outlines the theoretical framework underpinning the research objectives. Section 4 describes the methodology used to test the UIH and its related effects. Section 5 details the dataset, the countries selected for the analysis period, and the characteristics of the series used for modelling. Section 6 presents the results obtained, and finally, Section 7 provides the conclusions and policy recommendations derived from the findings.

2. Literature review

One version of the UIH, originally proposed by Layard et al. (1991), argues that, in the long run, fluctuations in the labor force are independent of changes in the unemployment rate, implying the joint absence of both the AWE and DWE effects. However, various studies have shown that this hypothesis does not always hold empirically, giving rise to an extensive debate about the specific conditions under which these effects emerge (Karanassou & Snower, 2004; Phelps, 1994; Rowthorn, 1999).

On the other hand, the unemployment rate is one of the most commonly used indicators to assess labor market conditions (Nemore et al., 2021). However, its ability to fully reflect labor market dynamics may be limited when significant changes in the labor force participation rate occur simultaneously, giving rise to the AWE and DWE phenomena¹.

The AWE, initially proposed by Woytinsky (1940), describes the increase in labor force participation when household members enter the labor market in response to the job loss of the primary earner. In contrast, the DWE, identified by Long (1953, 1958), reflects the reduction in the labor force participation rate when unfavourable labor market conditions lead potential workers to stop actively seeking employment during recessionary periods.

¹ For a recent and formal view of these phenomena see Martín-Román (2022).

Maridueña-Larrea & Martín-Román (2024a) argue that the empirical validation of the UIH is crucial from an economic policy perspective. If the hypothesis is confirmed (i.e., there is no long-run relationship between the two variables), interventions aimed at modifying labor supply would have no effect on long-term unemployment. Conversely, the presence of a long-term relationship between unemployment and labor force participation would prompt an investigation into whether the AWE or DWE predominates, providing valuable insights for the design of effective and well-targeted policies.

The theoretical proposal of the UIH has sparked intense academic debate, driving numerous empirical studies that assess its validity across different economic and geographical contexts. In this regard, the literature reviewed clearly reveals a wide range of findings that highlight the complexity of the phenomenon. Specifically, there is a clear trend toward the widespread rejection of the UIH, implying that in most countries analysed, there is a significant relationship between the activity rate and the unemployment rate, leading to the presence of either the AWE or the DWE.

In Table 1, we identified 11 studies that have tested the UIH for advanced economies globally since at least 2004.² The hypothesis was accepted in only 2 cases, while it was rejected in the remaining 9. Of these 9 cases, 6 proceeded to analyse complementary effects on labor force participation dynamics, revealing a clear predominance of the DWE (in 4 out of 6 studies).

Support for the DWE is found in Österholm (2010) for Sweden, Kakinaka & Miyamoto (2012) for Japan³, Tansel & Ozdemir (2018) for Canada, and Paternes Meloni (2024) for OECD countries, employing a panel of time series data. On the other hand, evidence leaning toward the AWE is presented by Emerson (2011) for the United States, as well as by Nemore et al. (2021) for Italy. In the United Kingdom (Karanassou & Snower, 2004) and South Korea (Yilanci & Ozgur, 2024), although the UIH was also rejected, no specification was made regarding the presence of either the DWE or AWE at the aggregate level.

When data are disaggregated by gender in these economies, the literature reveals that the rejection of the UIH presents clearly differentiated patterns by sex. For example, studies conducted in Sweden, Japan, Canada, and various OECD countries show a consistent rejection of the UIH among men, with a marked predominance of the DWE, whereas for women, the results exhibit a more balanced distribution between the AWE and the DWE.

On the other hand, Table 1 also includes empirical evidence from emerging and developing countries, compiling seven studies that have examined the validity of the UIH. Although the number of studies identified for these economies is lower than that for advanced economies (11 studies in total), it is worth noting that the number of individual

² The International Monetary Fund (IMF) classifies economies into two main groups in its World Economic Outlook (WEO) report: (1) advanced economies and (2) emerging and developing economies. For further reference, see: <https://www.imf.org/en/Publications/WEO/weo-database/2025/april/groups-and-aggregates>

³ Liu (2014) also rejected UIH in this country, although the author did not specify which effect predominated.

countries assessed in emerging and developing contexts slightly exceeds that of advanced economies—11 countries versus 10, respectively—when considering only those studies that focus on a single country.

Unlike the clear bias toward rejection of the UIH in developed economies, results in emerging and developing countries are more balanced, with five cases accepting and six rejecting the hypothesis based on aggregated data. It is worth noting that empirical analysis of the UIH in these countries began approximately twelve years later than in advanced economies, with 2016 marking the starting point according to the reviewed literature. Among the studies that supported the UIH are Oțoiu & Țițan (2016) in Romania, Tansel et al. (2016) in Turkey, Cheratian et al. (2022) in Iran (only for the female sample), and Khan et al. (2024) in Pakistan. In the Latin American context, Maridueña-Larrea & Martín-Román (2024a) also confirm the validity of the hypothesis for countries such as Brazil and Mexico.

Among the six cases that rejected the UIH in emerging and developing economies, there is a clear tendency toward the presence of the DWE. Individually, Congregado et al. (2021) did so for Poland, as did Maridueña-Larrea & Martín-Román (2024a) for Chile and Uruguay. Using a panel of 52 African countries, Raifu & Adeboje (2022) provided evidence for five regions across the continent. This result is consistent with previously reported evidence for advanced economies, where the DWE also predominates. However, when analyzing data disaggregated by gender, it is notable that among men, the UIH is mostly supported (with Poland, the African countries, and Chile being the exceptions). In contrast, for women, there was no clear consensus regarding the validity of the UIH, as the hypothesis was rejected in six cases but supported in the remaining six.

The reviewed literature offers a comprehensive and nuanced perspective on the UIH. In advanced economies, studies rejecting the hypothesis clearly predominate, revealing labor dynamics that are sensitive to economic fluctuations and a significant presence of specific effects such as the DWE or AWE, depending on the particular context and gender differentiation. In contrast, in emerging and developing economies, the results are more heterogeneous, with no clear trend regarding the overall acceptance or rejection of the UIH. Although at an aggregate level there is some similarity with advanced economies in terms of the predominance of the DWE, a gender-disaggregated analysis reveals distinct patterns, especially toward the acceptance of the UIH among men, but with mixed results for women. This complexity highlights the importance of each country's specific institutional and economic context, underscoring the need for deeper and more differentiated analyses to design effective labor policies, as suggested by Maridueña-Larrea & Martín-Román (2025).

From a methodological standpoint, the reviewed studies have applied various techniques, mainly conditioned by data availability and the time horizon analysed, with monthly or quarterly frequencies being the most common. A recurring methodological approach used to capture long-term dynamics and assess the existence of equilibrium relationships between unemployment and labor force participation is the cointegration technique proposed by Johansen (1991). Our research also follows this approach to obtain results. In this way, our findings are largely comparable with those of the studies reviewed in Table 1.

Special mention should be made of the work by Maridueña-Larrea & Martín-Román (2024a). In that article, the UIH is studied for a small group of Latin American countries, and as such, it can be considered a clear precursor to the present research. However, the current article overcomes two clear limitations of the previously cited study. First, it significantly expands the spatial scope by considering 31 economies—with very different levels of development—instead of the 6 analysed by Maridueña-Larrea & Martín-Román (2024a). This is particularly important for a study that aims to be positioned within the field of comparative economics. Second, and even more importantly, the temporal scope is substantially extended.⁴ This is especially relevant when studying long-term phenomena such as the UIH. Furthermore, when examining cyclical phenomena like the AWE and DWE, it is necessary to have data covering complete economic cycles, and time horizons spanning several decades are highly recommended. Additionally, this study also includes some years following the COVID-19 crisis, thus providing very recent evidence.

⁴ In the article by Maridueña-Larrea & Martín-Román (2024a), the country with the longest time span is Peru, with 14 years (from 2006 to 2019), while the countries with the shortest time span are Brazil and Chile, with only 8 years (from 2012 to 2019). In this paper, time series covering 33 years are used.

Table 1. Evidence from the Literature on the UIH and the AWE and DWE

Authors	Country	Period	UIH Validity		
			Aggregate data	Male data	Female data
Advanced Economies					
Karanassou & Snower (2004)	United Kingdom	1964-1997	Rejected	n.a.	n.a.
Österholm (2010)	Sweden	1970M1-2007M4	Rejected: DWE	Rejected: DWE	Rejected: DWE
Emerson (2011)	United States	1948M1-2010M2	Rejected: AWE	Rejected: DWE	Rejected: AWE
Kakinaka & Miyamoto (2012)	Japan	1980M1-2010M10	Rejected: DWE	Rejected: DWE	Accepted
Liu (2014)	Japan	1983Q1-2010Q4	Rejected	n.a.	n.a.
Nguyen Van (2016)	Australia	1978M2-2014M12	Accepted	Accepted	Accepted
Tansel & Ozdemir (2018)	Canada	1976M1-2015M12	Rejected: DWE	Rejected: AWE	Rejected: DWE
Altuzarra et al. (2019)	Spain	1978Q2-2016Q4	Accepted	Accepted	Rejected: DWE
Nemore et al. (2021)	Italy	1998M1-2019M7	Rejected: AWE	Rejected: AWE	Rejected: AWE
Yilanci & Ozgur (2024)	South Korea	1999M6-2023M1	Rejected	Rejected: DWE	Accepted
Paternesi Meloni (2024)	OECD countries	1960-2019	Rejected: DWE	n.a.	n.a.
Emerging and Developing Economies					
Oțoiu & Țițan (2016)	Romania	1996Q1–2012Q4	Accepted	Accepted	Accepted
Tansel et al. (2016)	Turkey	1988Q3-2013Q4	Accepted	Accepted	Accepted
Congregado et al. (2021)	Poland	1995Q1-2016Q4	Rejected: DWE	Rejected: DWE	Rejected: DWE
Raifu & Adeboje (2022)	African countries	1991-2018	Rejected: DWE	Rejected: DWE	Rejected: DWE
Cheratian et al. (2022)	Iran	2005Q2-2019Q1	n.a.	n.a.	Accepted
	Brazil	2012Q1–2019Q4	Accepted	Accepted	Rejected: AWE
Maridueña-Larrea & Martín-Román (2024a)	Chile	2012Q2–2019Q4	Rejected: DWE	Rejected: DWE	Rejected: AWE
	Ecuador	2010Q4–2019Q4	Rejected: AWE	Accepted	Accepted
	Mexico	2011Q4–2019Q4	Accepted	n.a.	Accepted
	Peru	2006Q3–2019Q1	Rejected: AWE	Accepted	Rejected: DWE
	Uruguay	2008Q1–2019Q4	Rejected: DWE	Accepted	Rejected: AWE
Khan et al. (2024)	Pakistan	1990-2021	Accepted	Accepted	Accepted

Notes: AWE = added worker effect; DWE = discouraged worker effect; n.a= not applicable.

3. Theoretical framework

To illustrate the UIH, we follow the so-called basic Layard-Nickell-Jackman (LNJ) model (Layard et al., 1991), as adapted by Karanassou & Snower (2004), and further modified here to explicitly address the research question of this article. Within this theoretical framework, equilibrium in the labour market results from what has been termed the “battle of the mark-ups.”

First, the price-setting (PS) function states that the mark-up of prices (P_t) over expected wages (W_t^e) depends negatively on the unemployment rate (u_t), as shown in **Equation (1a)** – or alternatively **Equation (1b)** – where α_0 and α_1 are positive coefficients. According to the standard theoretical setting, all variables (except the unemployment rate) are expressed in logarithmic form:

$$\mathbf{PS: } P_t - W_t^e = \alpha_0 - \alpha_1 u_t \quad (1a)$$

$$\mathbf{PS: } W_t^e - P_t = \alpha_1 u_t - \alpha_0 \quad (1b)$$

The economic rationale behind the negative relationship between this mark-up and the unemployment rate is straightforward. It mirrors the reasoning behind the downward-sloping labour demand curve in a neoclassical framework: diminishing returns to labour.

On the other hand, the wage-setting (WS) function reflects, for instance, collective bargaining agreements, and establishes that the mark-up of (log) wages (W_t) over expected (log) prices (P_t^e) depends negatively on the unemployment rate, as shown in **Equation (2)**. Again, β_0 and β_1 are positive coefficients.

$$\mathbf{WS: } W_t - P_t^e = \beta_0 - \beta_1 u_t \quad (2)$$

The rationale underlying the form of **Equation (2)** is quite well established today. It appears in textbooks such as Blanchard (2009), as well as in the macroeconomic literature on collective bargaining (e.g., Cabo & Martín-Román, 2019). When the unemployment rate rises, the bargaining power of unions weakens relative to that of employers.

Finally, in the long run, expectations align with actual wages and prices, so that $W_t^e = W_t$ and $P_t^e = P_t$. Solving the system formed by **Equations (1b)** and **(2)**, the long-run equilibrium unemployment rate (u_t^*) is obtained, as shown in **Equation (3)**:

$$u_t^* = \frac{\alpha_0 + \beta_0}{\alpha_1 + \beta_1} \quad (3)$$

Now, let us build on the framework developed by Karanassou & Snower (2004), which explicitly incorporates the labour force into the analysis.⁵ Accordingly, **Equation (1b)** becomes **Equation (4)**, and **Equation (2)** becomes **Equation (5)**:

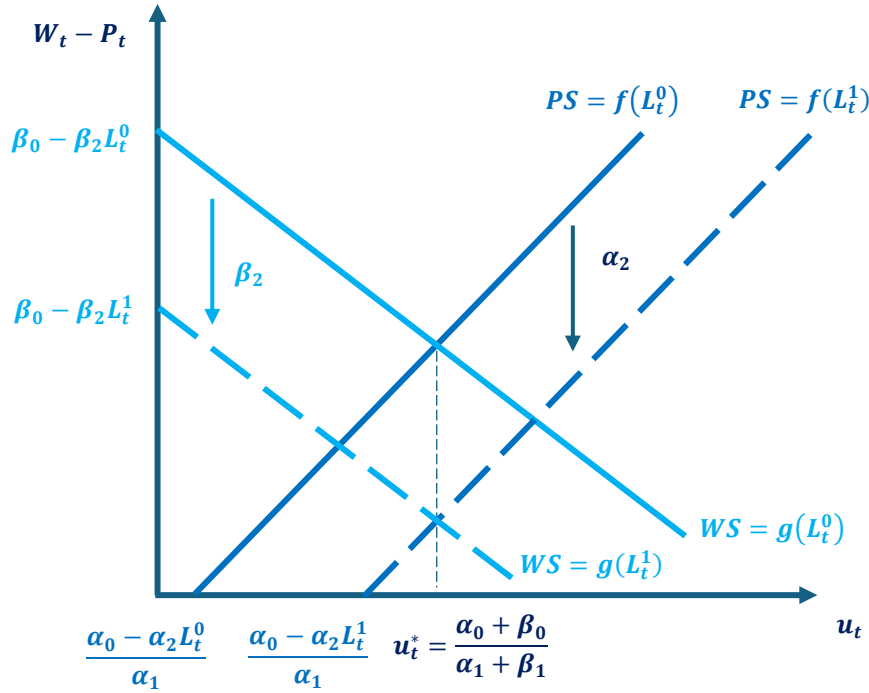
⁵ For the sake of simplicity, we do not consider the capital stock here, as it is not relevant to our empirical analysis.

$$PS': W_t - P_t = \alpha_1 u_t - \alpha_0 - \alpha_2 L_t \quad (4)$$

$$WS': W_t - P_t = \beta_0 - \beta_1 u_t - \beta_2 L_t \quad (5)$$

It is worth noting that **Equations (4) and (5)** describe how the aforementioned mark-ups are affected by changes in the labour force, given a certain unemployment rate⁶. As before, α_2 and β_2 are positive coefficients.

Figure 1. Unemployment Invariance Hypothesis (UIH)



Source: Own elaboration.

Figure 1 illustrates the labour market equilibrium associated with this theoretical framework. The vertical axis displays the difference between wages and prices, while the unemployment rate is shown on the horizontal axis. This graphical device provides an alternative to representing equilibrium in the real wage–employment space⁷.

⁶ It is important to emphasize that **Equations (4) and (5)** model the effect of the labour force on the mark-up of (log) wages over (log) prices, given a certain unemployment rate level. This approach is justified because the unemployment rate can be approximated by the difference between the log of the labour force and the log of employment: $u_t \approx L_t - E_t$. Consequently, the labour force is implicitly included in the definition of the unemployment rate. The graphical implications of this assumption are illustrated in **Figure 1**.

⁷ In any case, it is also widely used. See Blanchard (2009) for a textbook explanation of the correspondence between the two graphical representations.

Let us consider, for instance, an increase in the labour force (i.e., $L_t^1 > L_t^0$ in **Figure 1**)⁸. The negative effect on the wage–price differential in **Equation (4)** leads to a downward shift of the PS curve. The economic rationale is that when the labour force expands, given a constant unemployment rate, firms’ search costs decrease, which in turn pushes the PS curve downward. On the other hand, the rise in the labour force also shifts the WS curve downward. As established in **Equation (5)**, given a constant unemployment rate, a larger pool of job seekers weakens the relative bargaining power of unions, thus causing the shift.

Solving the system composed of **Equations (4) and (5)** yields the equilibrium condition for this extended labour market model. Accordingly, the long-run unemployment rate is given by **Equation (6)**:

$$u_t^* = \frac{\alpha_0 + \beta_0}{\alpha_1 + \beta_1} + \frac{\alpha_2 - \beta_2}{\alpha_1 + \beta_1} L_t \quad (6)$$

From **Equation (6)**, it follows that if $\alpha_2 = \beta_2$, the UIH holds. In other words, when this condition is satisfied, changes in the labour force do not affect the long-run equilibrium unemployment rate. Graphically, the UIH is represented in **Figure 1** as an equivalent downward shift of both the PS and WS curves. Whether this condition is met is an empirical question, which the remainder of the paper aims to explore in detail.

4. Methodology

This research employs a time series econometric approach based on the cointegration analysis proposed by Johansen (1991), to assess the existence of a long-run equilibrium relationships between the labour force participation rate and the unemployment rate across each of the 31 countries in the Americas. The application of this methodology enables an empirical verification of whether the UIH holds in these countries, aligning with prior studies such as those by Österholm (2010), Nguyen Van (2016) or Maridueña-Larrea & Martín-Román (2024a).

To conduct the analysis, a Vector Autoregressive Model (VARM) is specified, originally introduced by Sims (1980) and widely used in time series analysis (Zivot & Wang, 2003). First, the appropriate lag order is determined using information criteria and significance test. Once the optimal specification is established, Johansen’s trace and maximum eigenvalue cointegration tests are applied to assess both the presence and the number of long-run relationships. If cointegration is confirmed, the model is reformulated as a Vector Error Correction Model (VECM), which allows for a joint analysis of both the long-run equilibrium convergence and the short-run adjustment dynamics of the variables (Alizade, 2024; Fanchette et al., 2020).

The VECM can thus be considered a restricted version of the VARM, as it imposes that the endogenous variables maintain long-run equilibrium relationships (Mellander et al., 1992). In addition, the model explicitly captures the short-run

⁸ Assuming a constant working-age population, it is straightforward to translate changes in the labour force into variations in the labour force participation rate.

adjustments that correct transitory deviations from equilibrium. As such, it is well suited for the study of non-stationary series that evolve jointly through cointegration, providing a comprehensive framework for interpreting economic dynamics. Specifically, the VECM is specified as follows, in line with Altuzarra et al. (2019)⁹:

$$\Delta y_t = \alpha \beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (7)$$

where y_t is a $(K \times 1)$ vector of variables integrated of order one, $I(1)$. The matrices $\alpha \beta'$ are $(K \times r)$ parameter matrices with rank $r < K$. $\Gamma_1, \dots, \Gamma_{p-1}$ are $(K \times K)$ coefficient matrices, and ε_t is a $(K \times 1)$ vector of innovations that are independently and identically distributed. If the unemployment rate and the labour force participation rate in each country exhibit a long-run equilibrium relationship—that is, they are cointegrated—the matrix Π will have a rank equal to one. This implies the existence of two (2×1) vectors, $\alpha \beta'$ each of rank one, such that $\Pi = \alpha \beta' + \beta' y_t$ is stationary. In this context, α reflects the short-run adjustment effects within the VECM, while β serves as the cointegration vector that captures the long-run equilibrium relationship between the variables. The sign and magnitude of the parameters in β will provide insights into the predominance of the DWE or the AWE across the American region.

The results of this process will be presented in sections 5.2 and 6, and will include: 1) verifying the integration order of the series; 2) if all series are found to be $I(1)$ in levels and $I(0)$ in first differences, the stability of the model will be tested, followed by the application of Johansen's cointegration test to determine the cointegration rank r among the variables. If no cointegration relationship is found, the UIH will be accepted. However, if at least one cointegrating vector is identified, 3) the cointegration vector will be estimated to quantify the magnitude of the AWE or DWE in the 31 economies analysed.

5. Data

5.1. Series to be used

The variables used in this study were obtained from the World Bank database. They are annual in frequency and cover the period from 1991 to 2023. The variables considered are detailed below:

$$\text{Labour force participation rate (LFP)} \equiv \frac{\text{Labour force}}{\text{Working age population}}$$

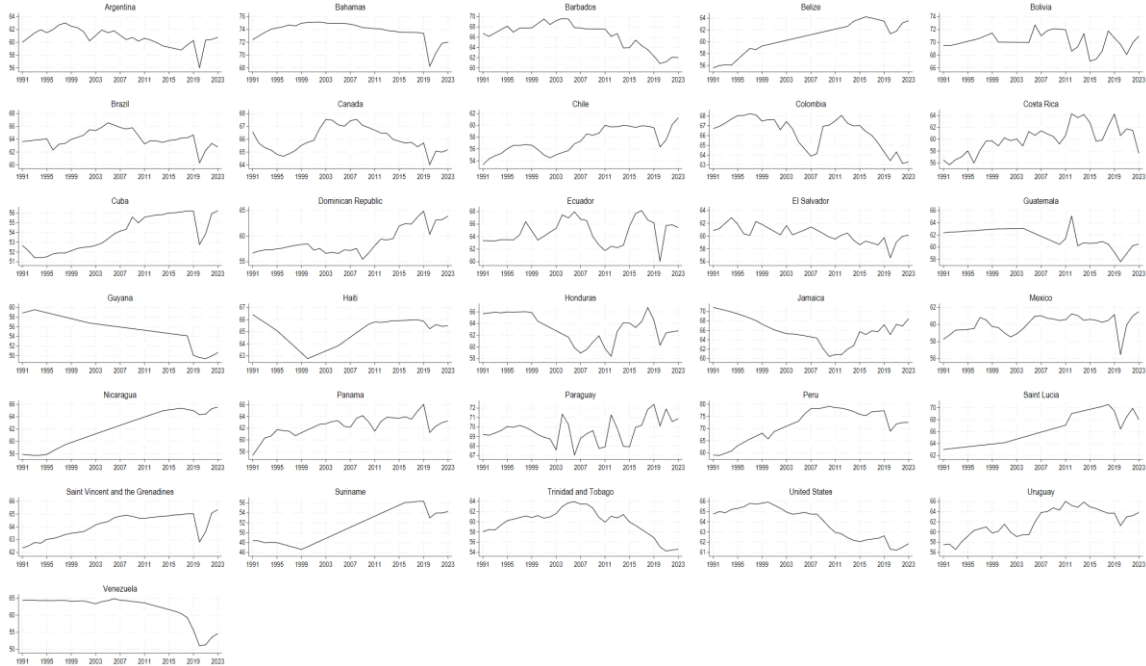
$$\text{Unemployment rate (UR)} \equiv \frac{\text{Unemployed population}}{\text{Labour force}}$$

⁹ An alternative formulation can be found in Lütkepohl & Kratzig (2004) or in Hamilton (1994).

The use of annual data offers two key methodological advantages. First, the time series in this study consist of 33 observations, which are sufficient to estimate cointegration relationships when the model incorporates error correction terms, as demonstrated by Johansen (2002). Second, it avoids the mandatory seasonal adjustment required for monthly or quarterly data—a process that, if performed using inappropriate criteria, may bias estimators, particularly in economies with strong seasonal components. By dispensing with this adjustment, the analysis gains econometric robustness and internal consistency, capturing long-run fluctuations between labour force participation and unemployment more cleanly.

Based on this information, Figures 2 and 3 illustrate the temporal evolution of the unemployment rate and the labour force participation rate for each of the 31 economies in the Americas over the 1991–2023 period. Additionally, to enable a comparative analysis of the average level of each indicator, Figure 4 presents a georeferenced representation of the annual average of both variables across the entire study period.¹⁰

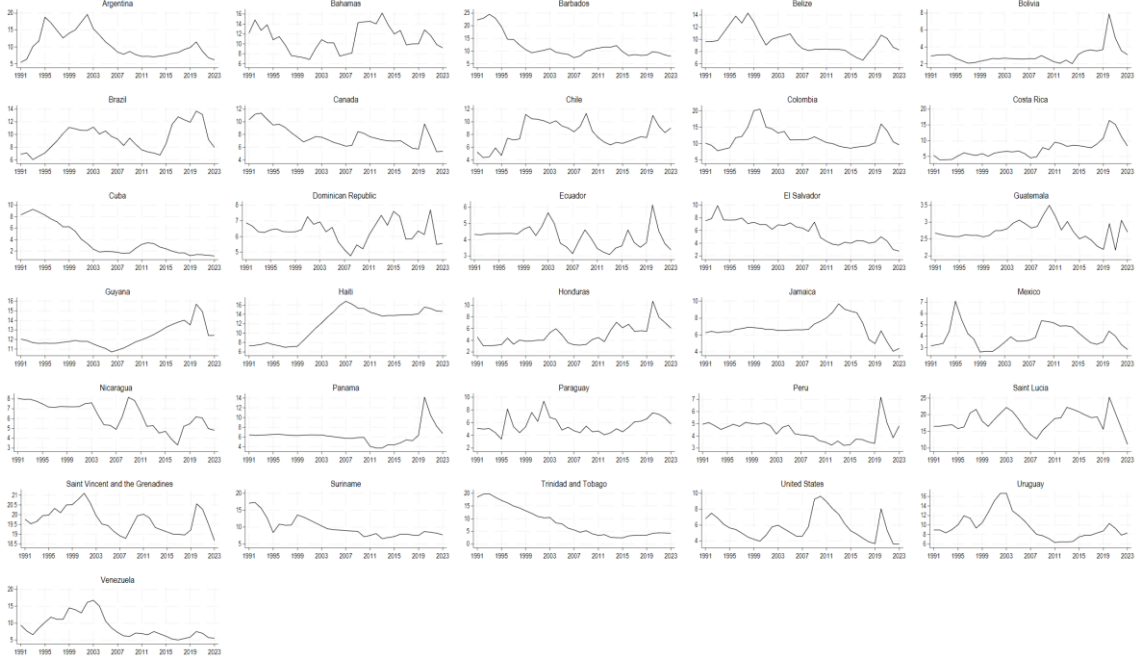
Figure 2. Labour force participation rate: selected countries (1991:2023)



Source: World Bank. Own elaboration

¹⁰ Coordinates for georeferencing were taken from the World Bank, for further reference see: <https://datacatalog.worldbank.org/search/dataset/0038272/World-Bank-Official-Boundaries>

Figure 3. Unemployment rate: selected countries (1991:2023)



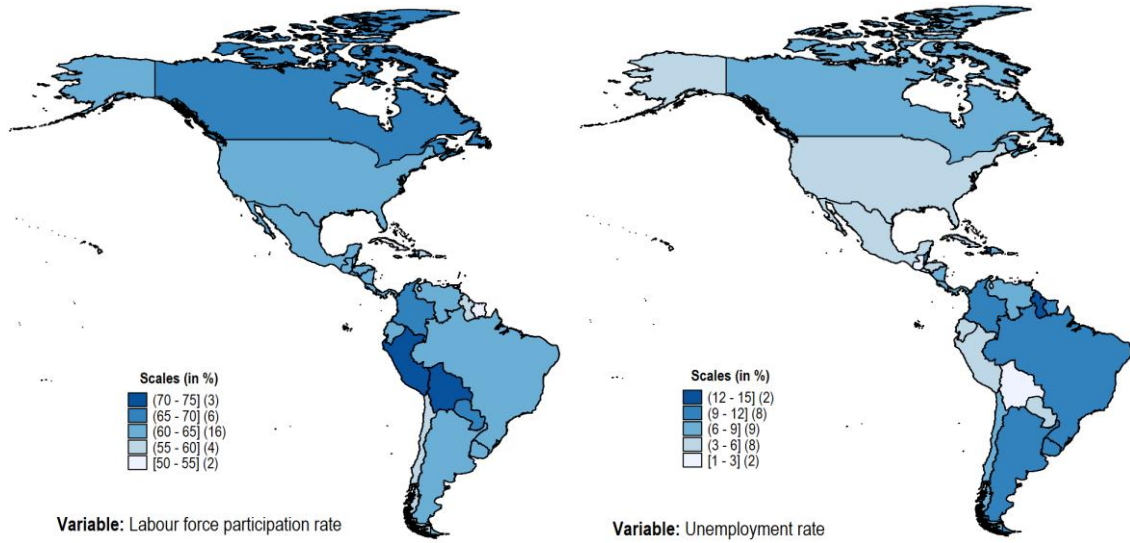
Source: World Bank. Own elaboration

In the case of the unemployment rate, the lowest figures correspond to Guatemala (approximately 2.7%) and Bolivia (around 3%), while the highest values are observed in Saint Vincent and the Grenadines (close to 19.7%) and Saint Lucia (approximately 18.2%). Between these extremes, countries such as Colombia, Argentina, and Uruguay report rates above 8%, whereas others, such as Ecuador and El Salvador, fall within an intermediate range of 4% to 6%.

As for the labour force participation rate, the lowest average is found in Suriname (around 52%), while the Bahamas presents one of the highest values (close to 74%). Economies such as Peru and Bolivia also exceed 70%, whereas others, including Cuba and Chile, are situated around 54% and 58%, respectively. Most of the remaining countries report participation rates ranging between 60% and 66%.

The comparison of both indicators suggests heterogeneous labour market dynamics across the region. Some countries display relatively low unemployment rates combined with moderate or high participation levels, while others exhibit higher unemployment levels, with participation rates ranging from around 60% to over 70%. Overall, this information illustrates the diversity of labour market conditions across the Americas and provides a descriptive overview of how both variables are distributed across the 31 economies analysed.

Figure 4. Labour force participation and unemployment rates in the Americas
(average for the period 1991–2023)



Source: World Bank. Own elaboration

5.2. Properties of the series

Given that the time series variables used in this study may be affected by issues of spurious regression, it is necessary to examine their order of integration through unit root tests. To strengthen the robustness of the analysis and considering potential structural shifts in economic series caused by the COVID-19 pandemic, a clearly differentiated two-stage procedure is proposed.

Although labour market rates may initially be assumed to be stationary—given that they are naturally bounded between zero and one—the literature indicates that this condition does not necessarily guarantee stationarity. In particular, two theoretical frameworks provide a solid conceptual foundation for considering that variables such as the unemployment rate—and, by extension, the labour force participation rate—may follow non-stationary processes over certain periods.

The first is the well-known Hysteresis Hypothesis (HH), put forward by Blanchard & Summers (1987, 1991) and Lindbeck & Snower (1988), which argues that unemployment may exhibit persistence due to rigidities in the labour market, generating unit root processes. This theory was originally anticipated by Phelps (1972) and later supported empirically by several studies in OECD countries (Caporale & Gil-Alana, 2014; Marques et al., 2017) and in Latin America (Ball et al., 2013), including specific cases such as Colombia (Iregui & Otero, 2003), Brazil and Chile (Gomes & da Silva, 2008) and México (Trejo García et al., 2017).

The second framework is the Chain Reaction Theory (CRT), developed by Karanassou & Snower (1997, 1998), which suggests that prolonged adjustment processes in response to economic shocks may explain the apparent non-stationarity observed in certain variables, even when they are theoretically expected to be stationary (Martín-Román et al., 2023). Accordingly, in the first stage of the analysis—corresponding to the

pre-pandemic period (1991–2019)—three conventional unit root tests are applied: Augmented Dickey–Fuller (ADF), Phillips–Perron (PP), and Kwiatkowski–Phillips–Schmidt–Shin (KPSS). Subsequently, in the second stage, covering the full period (1991–2023), this set of tests is complemented with the structural break unit root test proposed by Zivot & Andrews (1992). The inclusion of this test responds to the methodological need to capture structural changes caused by exceptional events, such as the COVID-19 pandemic in 2020. Failure to account for such shifts may compromise the statistical power of conventional tests in the presence of highly persistent unemployment processes (Cuestas et al., 2011).

This two-stage comparative analysis allows for the evaluation of whether the integration properties identified previously remain valid once structural breaks are considered. It enables not only the detection of unit roots in economic series, but also an assessment of the temporal stability of the results. Methodologically, the ADF, PP, and Zivot & Andrews (ZA) tests adopt the null hypothesis of a unit root, while the KPSS test assumes stationarity as the null. Based on the results of each test, it is determined whether the series are stationary in levels or require differencing to achieve stationarity. The detailed results are presented in Appendix A, Tables 1A and 2A.

Following the application of the ADF, PP, and KPSS tests to the pre-pandemic period (1991–2019), it is observed that in most countries both the labour force participation rate and the unemployment rate are integrated of order one ($I(1)$) in levels and stationary in first differences. Although full agreement among the three tests was not always reached, at least one of them supported the presence of a unit root in levels and stationarity in first differences in almost all economies. The main exception is El Salvador, where all three tests indicated that both rates were stationary in levels, which led to its exclusion from the cointegration analysis during the first stage. As a result, 30 of the 31 countries were retained for the cointegration analysis for the period 1991–2019.

In the second stage (1991–2023), which incorporates the years 2020 through 2023—marked by the COVID-19 pandemic—the ZA structural break test is included to control for potential abrupt changes in the series. Under this scheme, 21 of the original 31 countries maintained the $I(1)$ condition in levels, confirming stationarity in first differences. Among the 10 excluded cases, El Salvador again exhibited stationarity in levels, even with the structural break test. Of the remaining nine countries, six (Barbados, Brazil, Costa Rica, Cuba, Nicaragua, and Saint Vincent and the Grenadines) showed a unit root in levels for the unemployment rate series; in Chile and Trinidad and Tobago, the same was true for the labour force participation rate. Jamaica displayed non-stationarity in both series—even in first differences—leading to its exclusion at this stage as well.

Consequently, a mixed cointegration analysis is proposed: one that provides results for the 30 countries validated during the 1991–2019 period, and another for the 21 countries that confirm an integration order of $I(1)$ in levels and $I(0)$ in first differences over the full period 1991–2023. This comparative approach allows for the examination of how results evolve for the same economy before and after the impact of the pandemic, while also avoiding the exclusion of demographically significant countries in the region, such as Brazil and Chile, whose series were suitable for cointegration analysis only during

the pre-pandemic stage. In doing so, the study aims to deepen the understanding of the behaviour of the unemployment rate and labour force participation rate in the Americas, offering a perspective that captures both structural stability prior to the pandemic and the effects that followed this global shock.

6. Results

6.1. Baseline results

Once the integration order of the series was determined for the two periods of analysis (pre-pandemic: 1991–2019; and the full cycle: 1991–2023), a VAR model was estimated to analyse the relationship between the unemployment rate and the labour force participation rate in each country.¹¹ A specific dummy variable for the year 2020 was included to capture the exogenous impact associated with the pandemic and to prevent this atypical event from distorting the estimated dynamics of the variables.

After confirming certain stability conditions, the VECM was estimated. This model incorporates the cointegrated variables and allows for the examination of potential long-run equilibrium relationships among them. The cointegration rank (r) was determined using Johansen's cointegration test, whose robustness was enhanced by incorporating the critical values proposed not only by Mackinnon et al. (1999) but also those by Osterwald-Lenum (1992) or both the trace and maximum eigenvalue tests. Additionally, following the recommendation of Lettau & Ludvigson (2001), a constant term was included in the cointegration equation.

This methodological process—from identifying the integration order to selecting the optimal cointegration rank—provided the foundation for the subsequent analyses. The detailed results of the cointegration test are presented in Appendix B, Table 1B. A summary of the main findings regarding the validity of the UIH is presented below.

Table 2 reports the results of the cointegration test applied to each country to assess the validity of the UIH. Among the 30 countries analysed, only 21 satisfied the required stationarity conditions in both study periods (1991–2019 and 1991–2023), thus constituting the final sample eligible for this cointegration-based approach. Within this group, nine countries accepted the UIH in both periods, while in three others, the hypothesis was consistently rejected.

When comparing these findings with previous evidence (Table 1), notable discrepancies emerge in cases such as the United States, Ecuador, and Peru. While Emerson (2011) and Maridueña-Larrea & Martín-Román (2024a) rejected the UIH for these economies (using different frequencies and periods), the present study finds support for the hypothesis, suggesting that the extended time span and the use of annual data may capture long-run dynamics and structural changes that are not always observable in shorter or higher-frequency samples. On the other hand, the results are consistent with

¹¹ To rule out potential specification issues, tests for autocorrelation (Lagrange Multiplier), heteroskedasticity (White's joint test), and normality (Jarque–Bera statistic) were performed. The results confirmed the absence of serial correlation at the 5% level, as well as homoskedasticity and normally distributed residuals.

the literature for countries such as Canada (Tansel & Ozdemir, 2018) and Uruguay (Maridueña-Larrea & Martín-Román, 2024a), confirming the rejection of the UIH and, consequently, the possible presence of AWE or DWE in their labour market behaviour.

In the remaining nine cases, results vary depending on the selected time frame. For instance, Guatemala and Mexico support the UIH for the full cycle (1991–2023) but reject it for the 1991–2019 period. The opposite occurs in countries such as Argentina, Bolivia, Guyana, Honduras, Panama, Saint Lucia, and Suriname, where the UIH holds during the 1991–2019 interval but is rejected once the sample is extended through 2023. This pattern suggests that, following the pandemic, some economies experienced labour market distortions associated with this exceptional event.

From a policy-making perspective, this could be attributed to the difficulty of effectively correcting long-run imbalances in an environment that remains unstable. Conversely, some countries may have implemented structural reforms or active labour market policies aimed at mitigating or reversing the effects of the crisis. As a result, when considering the full cycle, new AWE or DWE dynamics may emerge that were not evident prior to 2020.

Table 2. Results of the cointegration analysis: confirmation of the UIH (21 countries with consistent integration between 1991–2019 and 1991–2023)

1991–2023 1991–2019	Rejection of the UIH	Acceptance of the UIH
	Rejection of the UIH	Acceptance of the UIH
Rejection of the UIH	Belize, Canada, Uruguay.	Guatemala, Mexico.
Acceptance of the UIH	Argentina, Bolivia, Guayana, Honduras, Panama, Saint Lucia, Suriname.	Bahamas, Colombia, Ecuador, United States, Haiti, Paraguay, Peru, Dominican Republic, Venezuela.

Table 3 presents the results of the cointegration analysis for the sample of countries that meet the required stationarity conditions during the 1991–2019 period. Out of a total of nine countries, the UIH is accepted in five and rejected in four. Our findings continue to reveal discrepancies for certain Latin American economies. For instance, when comparing our results with the previous literature (Table 1), we observe that the UIH was previously rejected for Chile using quarterly data, whereas in our analysis, based on annual data, it is accepted. Nonetheless, our results are consistent with prior studies for countries such as Brazil, where the UIH is consistently rejected regardless of whether quarterly or annual data are used.

Overall, it can be stated that, out of the 30 countries included in the analysed sample, the UIH is rejected in 16 cases (9 during 1991–2019 and 7 during 1991–2023), while it is accepted in 14 countries. These findings are consistent with the literature reviewed in Section 2, which shows a predominance of studies rejecting the UIH.

Table 3. Results of the cointegration analysis: confirmation of the UIH (9 countries eligible only for the 1991–2019 period)

Period	Rejection of the UIH	Acceptance of the UIH
1991–2019	Barbados, Costa Rica, Saint Vincent and the Grenadines, Trinidad and Tobago.	Brazil, Chile, Cuba, Jamaica, Nicaragua

Based on the results rejecting the UIH, Table 4 classifies the countries according to the sign of their cointegration vector and the selected reference period.¹² Out of a total of 16 countries, only six exhibit an AWE pattern, while ten display evidence consistent with the DWE. Therefore, the findings suggest a predominance of the DWE across the Americas, although this pattern appears to be highly dependent on the specific period chosen for the analysis.

Table 4. Effects derived from the rejection of the UIH (16 countries between 1991–2019 and 1991–2023)

Effects	Countries coinciding between 1991–2019 and 1991–2023			Only in 1991–2019
	Both periods	Only in 1991–2019	Only in 1991–2023	
AWE	-	Mexico	Argentina, Guyana, Honduras	Barbados, Costa Rica
DWE	Belize, Canada, Uruguay	Guatemala	Bolivia, Panama, Santa Lucia, Suriname	Saint Vincent and the Grenadines, Trinidad and Tobago.

Figure 5 illustrates the evolution of the cointegration vectors for the 10 countries that reject the UIH and exhibit a DWE. The left panel shows that the magnitude of these vectors is heterogeneous among countries that rejected the UIH in both periods of analysis. These effects range from mild in Canada to more pronounced in Uruguay and Belize, where, on average, a one-percentage-point increase in the unemployment rate is associated with a decrease in the labour force participation rate of 0.05%, 0.74%, and 1.06%, respectively¹³.

The right panel displays the countries that rejected the UIH in at least one of the two periods. The DWE exceeds 3% in terms of its impact on the participation rate per percentage point increase in unemployment in economies such as Guatemala (6.64), Panama (5.55), Bolivia (3.58), and Saint Lucia (3.05). In the remaining countries—Suriname, Trinidad and Tobago, and Saint Vincent and the Grenadines—the effect ranges from 0.25% to 1.75% in absolute value.

¹² For further reference, see Appendix B, Tables 2B and 3B.

¹³ It is worth noting that the cointegration vector remained relatively stable across periods (1991–2019 and 1991–2023).

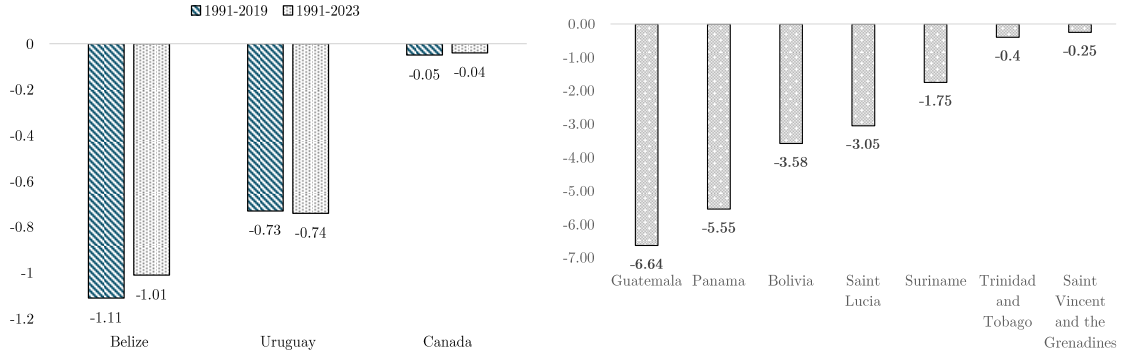
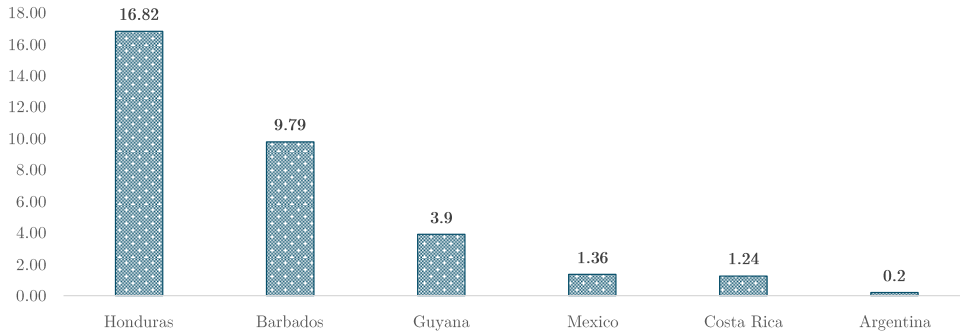
Figure 5. Cointegration vectors: countries with rejection of the UIH and a DWE


Figure 6, in turn, presents the cointegration vectors for the countries that exhibited an AWE. Honduras and Barbados show the highest values (16.82 and 9.79, respectively), suggesting a strong labour supply response to increases in unemployment. In contrast, Mexico (1.36), Costa Rica (1.24), and Argentina (0.2) display much more moderate coefficients. Thus, the variations in the magnitude of the AWE—similar to those of the DWE—not only reflect high heterogeneity, but also the economic and institutional configuration of each country. These findings highlight the importance of designing targeted policies to strengthen labour markets, as noted by Maridueña-Larrea & Martín-Román (2024b).

Figure 6. Cointegration vectors: countries with rejection of the UIH and AWE


Overall, the findings reveal substantial heterogeneity in labour market responses across the region, underscoring the importance of examining multiple time horizons (pre- and post-pandemic periods) and data frequencies. While the majority of countries analysed do not support the UIH, distinct patterns consistent with either the DWE or AWE emerge, with considerable variation in their magnitude. These differences reflect not only the structural and institutional features of each economy but also the way in which economic agents adjust to changes in the unemployment rate.

6.2. Robustness analysis

Given the variability observed in the cointegration vectors of the 16 countries analysed, it is essential to subject these results to additional testing to validate the identified dynamics. Although the annual series used (33 observations for 1991–2023 and 29 for

1991–2019) are sufficient to estimate long-run relationships under Johansen (2002) approach and span a complete economic cycle, their moderate length may introduce bias into the results. To strengthen our conclusions, we apply the methodology proposed by Hjalmarsson & Österholm (2010), which involves imposing restrictions on the cointegration relationships to confirm their validity.

According to these authors, Johansen’s tests may be biased when the variables possess near-unit roots (rather than exact unit roots), increasing the risk of detecting spurious relationships. To mitigate this issue, two restrictions are imposed on the estimated cointegration vectors: $\beta = (1 \ 0)$ and $\beta = (0 \ 1)$. If both restrictions are rejected, the cointegrated relationship is considered valid. Otherwise, it is inferred that the supposed cointegration is driven by the stationarity of a single variable—labour force participation in the first case, or unemployment in the second—without strong evidence of a long-run linkage. The results of this procedure are presented in Appendix B, Table 4B.

The imposition of restrictions on the estimated cointegration relationships was rejected, thereby reaffirming the results in half of the countries where the UIH was not confirmed. However, in the cases of Canada, Guatemala, Guyana, Honduras, Panama, Saint Lucia, Suriname y Saint Vicent and the Grenadines, the results should be interpreted with caution, as the observed long-run relationship may be driven by a single stationary variable.

7. Conclusions and policy recommendations

The research findings clearly highlight the complexity and heterogeneity of labour market behaviour in the relationship between labour force participation and unemployment rates, partially validating the UIH in the Americas. The observed diversity in the acceptance or rejection of the UIH, as well as the marked differences in the magnitude of the DWE and AWE effects, illustrate how labour market dynamics across the region are far from uniform and depend heavily on the specific institutional, economic, and social characteristics of each country.

From an analytical standpoint, the results underscore the methodological importance of adopting extended time horizons and varying data frequencies in economic analysis, as such approaches allow for a better identification and understanding of the structural nature of the observed effects. In particular, the contrast with previous evidence for countries such as the United States, Ecuador, Chile, and Peru suggests that annual data and longer periods provide additional insights capable of detecting effects that often go unnoticed in analyses based on short or high-frequency series. Moreover, the finding that some countries changed their validation or rejection of the UIH once the post-pandemic period was considered highlights the need to recognize and assess the persistent impacts of exogenous shocks on long-term labour trajectories.

Finally, the robustness checks emphasize the need to interpret cointegration relationships cautiously, especially in countries where results may be driven by the stationarity of a single variable. These findings suggest the importance of future studies that delve into additional econometric techniques and expand the scope of available datasets to produce even more robust and country-specific conclusions.

From a policy perspective, the identification of a predominantly DWE in the region signals the urgent need to strengthen mechanisms that promote active job search during periods of economic slowdown. For countries experiencing pronounced impacts—such as Bolivia, Belize, Suriname, and Uruguay—priority should be given to reinforcing job intermediation services, training and reskilling programs, and conditional social protection measures tied to active job-seeking. Such initiatives could help reduce labour market discouragement, reactivate participation, and foster a more sustainable and equitable economic recovery.

In countries where the AWE prevails, it becomes essential to address the potential precariousness resulting from a surge of additional workers entering the labour market. For these economies, it is crucial to implement policies that ensure not only the quantitative expansion of employment but also its quality. In this regard, policies aimed at enhancing labour formalization, contract stability, and adequate working conditions are key to constructively harnessing the added worker effect.

In addition to the policy recommendations already outlined, the findings of this study point to several complementary lines of action that could be highly relevant for policymakers across the region. First, it is essential to develop high-frequency labor market monitoring systems capable of detecting early shifts in labor force participation linked to fluctuations in unemployment. These early-warning mechanisms would enable timely interventions, particularly during economic downturns, when the DWE or the AWE may intensify rapidly.

Furthermore, given the evident differentiation of these effects across gender and other demographic variables, it is advisable to move toward more targeted labor policies. For instance, in contexts where AWE is more pronounced among women, the expansion of public childcare services, equitable parental leave policies, and measures to promote shared caregiving responsibilities can help prevent female labor market entry from occurring under conditions of informality or precarity.

Additionally, the results of this research call for a rethinking of counter-cyclical macroeconomic policies. In countries where the UIH does not hold, stimulus measures that explicitly consider the structural linkages between unemployment and labor force participation may be more effective in fostering both job recovery and labor reactivation. Incorporating the UIH framework into the design of fiscal and monetary policies could enhance the coherence and impact of economic responses to downturns.

Finally, it is crucial to institutionalize regular ex post evaluations of labor policy outcomes. This would allow for a systematic assessment of their effectiveness in reducing labor market discouragement or preventing job quality deterioration. In contexts of high economic volatility, such evaluations become even more vital, as labor dynamics may undergo structural changes that require agile and empirically grounded policy responses.

Appendix A

Table 1A. Unit root tests (1991|1992: 2019)

Country	LFP						UR					
	Levels			Differences			Levels			Differences		
	ADF	PP	KPSS	ADF	PP	KPSS	ADF	PP	KPSS	ADF	PP	KPSS
Argentina	-3.25	-3.25	0.15**	-4.43***	-4.39***	0.18	-2.71	-2.72	0.14*	-3.93***	-3.94***	0.19
Bahamas	-5.48***	-6.31***	0.25***	-3.20***	-3.23***	0.75***	-1.96	-2.05	0.13*	-5.91***	-5.86***	0.08
Barbados	-1.24	-0.69	0.26***	-5.75***	-5.76***	0.48	-1.32	-1.46	0.21**	-3.16***	-3.17***	0.22
Belize	-0.91	-1.05	0.17**	-2.62**	-2.58**	0.29	-2.3	-2.39	0.09	-3.90***	-3.91***	0.1
Bolivia	-3.31	-3.26	0.11	-6.60***	-6.99***	0.07	-1.55	-1.63	0.14*	-4.98***	-4.99***	0.2
Brazil	-1.59	-1.75	0.17**	-5.14***	-5.14***	0.11	-1.37	-1.76	0.12*	-3.55***	-3.58***	0.1
Canada	-1.13	-1.6	0.19**	-3.64***	-3.62***	0.15	-1.78	-1.84	0.18**	-4.10***	-4.10***	0.08
Chile	-1.47	-2	0.1	-3.54***	-3.49***	0.12	-1.83	-1.75	0.22***	-6.18***	-6.18***	0.2
Colombia	-1.68	-2.1	0.07	-3.98***	-3.97***	0.13	-1.7	-1.87	0.15**	-3.99***	-3.97***	0.1
Costa Rica	-3.23	-3.1	0.08	-5.04***	-5.03***	0.04	-3.1	-3.17	0.07	-5.20***	-5.20***	0.13
Cuba	-3.84	-3.76	0.16**	-4.91***	-4.92***	0.29	-0.82	-1.29	0.22***	-2.21**	-2.23**	0.17
Ecuador	-1.83	-2.18	0.08	-3.83***	-3.84***	0.06	-2.86	-2.78	0.08	-4.65***	-4.62***	0.05
El Salvador	-4.21***	-4.17***	0.09	-5.42***	-5.56***	0.06	-4.19***	-4.20***	0.09	-7.48***	-7.70***	0.08
United States	-2.23	-2.21	0.20**	-2.58**	-2.56**	0.27	-1.19	-1.72	0.11	-3.00***	-3.11***	0.1
Guatemala	-4.15***	-4.07***	0.15**	-7.60***	-8.40***	0.15	-0.89	-0.75	0.20**	-4.62***	-4.59***	0.28
Guyana	-1.5	-1.3	0.08	0.41	0.52	0.32	-1.16	-1.39	0.23***	-1.87*	-1.94*	0.34
Haiti	-2.74	-2.23	0.22***	-1.55	-1.59	0.48	-0.45	-1.23	0.18**	-1.85*	-1.90*	0.19
Honduras	-1.28	-1.15	0.21**	-4.44***	-4.35***	0.2	-2.99	-3.13	0.08	-5.72***	-5.75***	0.08
Jamaica	0.27	-0.06	0.20**	-3.54***	-3.63***	0.4	0.33	-0.95	0.08	-2.73***	-2.69***	0.24
Mexico	-2.45	-2.66	0.06	-3.70***	-3.63***	0.07	-2.12	-2.32	0.08	-4.33***	-4.31***	0.08
Nicaragua	0.33	-1.24	0.15**	-0.83	-0.98	0.23	-2.43	-2.56	0.05	-3.95***	-3.92***	0.05
Panama	-3.89	-3.97***	0.12*	-4.15***	-4.08***	0.14	-1.04	-1.46	0.1	-4.05***	-4.08***	0.17
Paraguay	-3.27	-3.08	0.14*	-6.00***	-6.54***	0.15	-3.59	-3.64	0.11	-8.42***	-9.10***	0.08
Peru	-0.54	-0.65	0.23***	-3.54***	-3.55***	0.36	-2.76	-2.72	0.13*	-5.96***	-6.18***	0.1
Dominican Republic	-0.24	0.18	0.23***	-4.51***	-4.52***	0.43	-2.35	-2.5	0.08	-5.47***	-5.47***	0.07
Saint Vicent and the Grenadines	-0.75	-0.91	0.24***	-2.80***	-2.69***	0.46	-1.83	-2.12	0.1	-3.39***	-3.47***	0.08
Saint Lucia	-1.9	-1.95	0.22***	-3.14***	-3.13***	0.15	-1.9	-2.17	0.06	-3.33***	-3.31***	0.09
Suriname	-3.02	-2.51	0.22***	-1.34	-1.28	0.47	-2.68	-2.62	0.09	-4.58***	-4.58***	0.16
Trinidad and Tobago	-0.37	-0.45	0.25***	-3.39***	-3.42***	0.5	0.13	0.12	0.23***	-3.26***	-3.28***	0.35
Uruguay	-1.62	-1.86	0.09	-4.69***	-4.70***	0.13	-1.51	-1.79	0.16**	-3.10***	-3.13***	0.12
Venezuela	4.3	4.56	0.23***	1.53	2.4	0.6	-1.55	-1.71	0.17**	-3.76***	-3.73***	0.13

Notes: ADF and PP tests are based on the critical values of Mackinnon (1994). The KPSS test is based on the critical values of KPSS. Null Hypothesis (H_0): In the case of the ADF and PP tests, the null hypothesis states that the series contains a unit root, whereas for the KPSS test, the null hypothesis assumes stationarity. *, ** and *** indicate that the null hypothesis is rejected at 10%, 5% and 1% levels, respectively. Figures without * indicate that the null hypothesis is accepted, at least at 1%, 5% or 10% levels. The ADF, PP, and KPSS tests were estimated at levels, incorporating both a constant and a trend. In contrast, in their differenced versions, the ADF and PP tests were conducted without including either a constant or a trend, while the KPSS test included at least one constant.

Table 2A. Unit root tests (1991|1992: 2023)

País	LFP								UR							
	Levels				First differences				Levels				First differences			
	ADF	PP	KPSS	ZA	ADF	PP	KPSS	ZA	ADF	PP	KPSS	ZA	ADF	PP	KPSS	ZA
Argentina	-4.34***	-4.28***	0.11	-4.72	-8.56***	-9.52***	0.13	-8.77***	-2.84	-2.86	0.11	-4.25	-4.24***	-4.19***	0.21	-5.07**
Bahamas	-3.03	-2.92	0.21**	-4.02	-6.53***	-6.92***	0.24	-5.91***	-2.13	-2.2	0.1	-4.52	-6.23***	-6.21***	0.08	-7.03***
Barbados	-1.87	-1.72	0.23***	-4.48	-5.90***	-5.90***	0.33	-6.72***	-1.53	-1.65	0.18**	-4.92	-3.43***	-3.43***	0.21	-4.52
Belize	-1.67	-1.76	0.17**	-2.87	-3.89***	-3.86***	0.2	-4.65*	-2.22	-2.44	0.1	-4.22	-4.15***	-4.09***	0.09	-6.57***
Bolivia	-3.62	-3.52	0.11	-5.07	-6.69***	-7.60***	0.08	-6.05***	-3.28	-3.19	0.14*	-3.74	-6.67***	-7.15***	0.07	-6.10***
Brazil	-2.47	-2.41	0.18**	-4.36	-7.17***	-7.51***	0.14	-7.34***	-1.49	-1.88	0.08	-3.13	-3.85***	-3.77***	0.12	-4.13
Canada	-1.4	-1.57	0.19**	-5.03	-6.29***	-6.25***	0.13	-7.05***	-2.87	-2.73	0.16**	-4.44	-5.78***	-6.03***	0.08	-5.52***
Chile	-2.25	-2.46	0.07	-3.66	-4.23***	-4.14***	0.07	-4.37	-2.26	-2.19	0.15*	-3.75	-6.87***	-6.89***	0.12	-7.53***
Colombia	-1.87	-2.17	0.08	-4.75	-4.87***	-4.92***	0.13	-6.77***	-2.01	-2.15	0.1	-4.07	-4.56***	-4.48***	0.09	-5.44***
Costa Rica	-2.38	-2.22	0.17**	-4.45	-5.84***	-5.90***	0.25	-6.05***	-2.79	-2.83	0.1	-4.81	-4.13***	-4.00***	0.06	-4.45
Cuba	-2.84	-2.88	0.12*	-3.94	-5.65***	-5.77***	0.1	-5.49***	-0.78	-1.25	0.19**	-4.57	-2.58**	-2.64**	0.17	-4.19
Ecuador	-2.98	-3.05	0.06	-3.99	-6.50***	-6.56***	0.05	-6.52***	-3.37	-3.23	0.09	-5.09	-5.74***	-6.15***	0.07	-6.44***
El Salvador	-4.64***	-4.52***	0.09	-5.16	-7.36***	-8.73***	0.09	-5.92***	-4.18***	-4.19***	0.07	-5.62***	-7.38***	-7.67***	0.12	-7.90***
United States	-2.48	-2.49	0.17**	-2.74	-4.08***	-4.10***	0.22	-4.86**	-2.15	-2.27	0.1	-4.04	-5.19***	-5.18***	0.08	-5.91***
Guatemala	-4.02***	-3.92	0.14*	-4.57	-7.41***	-8.36***	0.08	-4.75*	-3.35	-3.43	0.15**	-2.91	-10.09***	-10.41***	0.08	-11.51***
Guyana	-2.25	-2.42	0.13*	-3.08	-4.29***	-4.31***	0.11	-4.76*	-2.19	-2.2	0.17**	-2.8	-5.42***	-5.45***	0.11	-6.11***
Haiti	-2.55	-2.31	0.15**	-2.96	-2.71***	-2.63**	0.31	-5.22**	-0.62	-1.3	0.16**	-3.5	-2.49**	-2.49**	0.15	-4.78*
Honduras	-1.99	-1.88	0.17**	-3.24	-5.13***	-5.23***	0.13	-7.07***	-3.78	-3.75	0.12*	-4.95	-6.95***	-7.46***	0.08	-5.06**
Jamaica	-0.43	-0.4	0.21**	-6.25***	-5.66***	-5.77***	0.43	-4	-0.83	-1.01	0.14*	-4.2	-4.45***	-4.39***	0.25	-4.28
Mexico	-4.05***	-4.00***	0.09	-4.57	-7.61***	-8.26***	0.07	-7.48***	-2.24	-2.43	0.07	-4.19	-4.59***	-4.53***	0.1	-4.71*
Nicaragua	-0.59	-1.14	0.18**	-5.49	-2.04**	-1.98**	0.17	-4.66*	-2.55	-2.75	0.05	-5.02	-4.25***	-4.17***	0.04	-4.42
Panama	-4.08***	-4.08***	0.17**	-4.85	-6.30***	-7.01***	0.28	-6.35***	-2.69	-2.69	0.13*	-4	-5.95***	-6.12***	0.07	-5.14**
Paraguay	-4.03***	-3.97***	0.16**	-5.51	-7.11***	-9.10***	0.09	-7.28***	-3.61	-3.66	0.1	-5.42	-8.74***	-9.54***	0.07	-9.08***
Peru	-0.91	-0.59	0.22***	-4.72	-5.77***	-5.76***	0.44	-5.41***	-3.51	-3.53	0.14*	-3.37	-7.48***	-9.04***	0.13	-7.50***
Dominican Republic	-2.14	-1.99	0.19**	-4.5	-7.44***	-7.53***	0.18	-8.45***	-3.14	-3.21	0.07	-4.08	-7.44***	-7.50***	0.06	-8.03***
Saint Vicent and the Grenadines	-2.7	-2.62	0.19**	-3.71	-5.40***	-5.49***	0.1	-5.47***	-2.12	-2.36	0.07	-4.54	-3.54***	-3.43***	0.08	-3.96
Saint Lucia	-2.09	-2.06	0.1	-2.97	-5.27***	-5.22***	0.17	-8.01***	-2.38	-2.35	0.06	-2.89	-5.38***	-5.36***	0.16	-4.74*
Suriname	-1.53	-1.83	0.12	-2.32	-4.89***	-4.99***	0.16	-6.44***	-2.71	-2.66	0.14*	-3.11	-4.95***	-4.96***	0.18	-5.82***
Trinidad and Tobago	-1.01	-1.06	0.23***	-3.98	-3.50***	-3.50***	0.49	-4.42	0.31	0.3	0.23***	-5.23	-3.50***	-3.64***	0.44	-6.74***
Uruguay	-1.76	-1.86	0.14*	-3.81	-5.64***	-5.64***	0.13	-6.41***	-1.63	-1.92	0.11	-3.77	-3.56***	-3.49***	0.1	-4.88**
Venezuela	-1.29	-1.5	0.20**	-4.16	-2.81***	-2.76***	0.2	-5.81***	-1.69	-1.88	0.12	-5.5	-4.08***	-4.03***	0.11	-5.25**

Notes: ADF and PP tests are based on the critical values of Mackinnon (1994). The KPSS test is based on the critical values of KPSS. ZA = Zivot-Andrews test. Null Hypothesis (H_0): In the case of the ADF, ZA and PP tests, the null hypothesis states that the series contains a unit root, whereas for the KPSS test, the null hypothesis assumes stationarity. *, ** and *** indicate that the null hypothesis is rejected at 10%, 5% and 1% levels, respectively. Figures without * indicate that the null hypothesis is accepted, at least at 1%, 5% or 10% levels. The ADF, PP, ZA and KPSS tests were estimated at levels, incorporating both a constant and a trend. In contrast, in their differenced versions, the ADF and PP tests were conducted without including either a constant or a trend, while the KPSS and ZA test included at least one constant.

Appendix B

Table 1B: Cointegration test results

Country	No. of cointegration relations	1991: 2019							1991: 2023						
		Lags VAR	J_{trace}	5% critical value J_{trace}		J_{max}	5% critical value J_{max}		Lags VAR	J_{trace}	5% critical value J_{trace}		J_{max}	5% critical value J_{max}	
			Trace statistic	M-H-M	O-L	Max statistic	M-H-M	O-L		Trace statistic	M-H-M	O-L	Max statistic	M-H-M	O-L
Argentina	$H_0: r=0$ $H_0: r=1$	5	8.83 2.39	15.50 3.84	15.41 3.76	6.45 2.39	14.27 3.84	14.07 3.76	5	33.17 3.05*	15.50 3.84	15.41 3.76	30.12 3.05*	14.27 3.84	14.07 3.76
Bahamas	$H_0: r=0$ $H_0: r=1$	5	13.55 0.28	15.50 3.84	15.41 3.76	13.27 0.28	14.27 3.84	14.07 3.76	5	28.44 4.18	15.50 3.84	15.41 3.76	24.26 4.18	14.27 3.84	14.07 3.76
Barbados	$H_0: r=0$ $H_0: r=1$	4	18.55 1.60*	15.50 3.84	15.41 3.76	16.95 1.60*	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Belize	$H_0: r=0$ $H_0: r=1$	5	20.60 2.98*	15.50 3.84	15.41 3.76	17.62 2.98*	14.27 3.84	14.07 3.76	5	18.55 3.64*	15.50 3.84	15.41 3.76	14.90 3.64*	14.27 3.84	14.07 3.76
Bolivia	$H_0: r=0$ $H_0: r=1$	4	16.75 5.74	15.50 3.84	15.41 3.76	11.01 5.74	14.27 3.84	14.07 3.76	4	43.71 3.61*	15.50 3.84	15.41 3.76	40.11 3.61*	14.27 3.84	14.07 3.76
Brazil	$H_0: r=0$ $H_0: r=1$	3	30.06 7.32	15.50 3.84	15.41 3.76	22.74 7.32	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Canada	$H_0: r=0$ $H_0: r=1$	5	21.49 0.64*	15.50 3.84	15.41 3.76	20.85 0.64*	14.27 3.84	14.07 3.76	5	37.63 0.97*	15.50 3.84	15.41 3.76	36.66 0.97*	14.27 3.84	14.07 3.76
Chile	$H_0: r=0$ $H_0: r=1$	4	12.96 4.51	15.50 3.84	15.41 3.76	8.45 4.51	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Colombia	$H_0: r=0$ $H_0: r=1$	2	8.73 3.26	15.50 3.84	15.41 3.76	5.47 3.26	14.27 3.84	14.07 3.76	2	12.76 2.42	15.50 3.84	15.41 3.76	10.34 2.42	14.27 3.84	14.07 3.76
Costa Rica	$H_0: r=0$ $H_0: r=1$	2	16.55 0.70*	15.50 3.84	15.41 3.76	15.83 0.70*	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Cuba	$H_0: r=0$ $H_0: r=1$	2	13.10 0.54	15.50 3.84	15.41 3.76	12.56 0.54	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Ecuador	$H_0: r=0$ $H_0: r=1$	3	13.74 4.62	15.50 3.84	15.41 3.76	9.12 4.63	14.27 3.84	14.07 3.76	3	16.31 6.68	15.50 3.84	15.41 3.76	9.63 6.68	14.27 3.84	14.07 3.76
United States	$H_0: r=0$ $H_0: r=1$	4	11.35 1.77	15.50 3.84	15.41 3.76	9.58 1.77	14.27 3.84	14.07 3.76	4	21.66 5.08	15.50 3.84	15.41 3.76	16.58 5.08	14.27 3.84	14.07 3.76

Country	No. of cointegration relations	1991: 2019							1991: 2023						
		Lags VAR	J_{trace}	5% critical value J_{trace}		J_{max}	5% critical value J_{max}		Lags VAR	J_{trace}	5% critical value J_{trace}		J_{max}	5% critical value J_{max}	
			Trace statistic	M-H-M	O-L	Max statistic	M-H-M	O-L		Trace statistic	M-H-M	O-L	Max statistic	M-H-M	O-L
Guatemala	$H_0: r=0$ $H_0: r=1$	6	16.60 0.61*	15.50 3.84	15.41 3.76	15.99 0.61*	14.27 3.84	14.07 3.76	6	7.86 0.48	15.50 3.84	15.41 3.76	7.39 0.48	14.27 3.84	14.07 3.76
Guyana	$H_0: r=0$ $H_0: r=1$	4	10.25 0.14	15.50 3.84	15.41 3.76	10.11 0.14	14.27 3.84	14.07 3.76	4	17.19 0.16*	15.50 3.84	15.41 3.76	17.03 0.16*	14.27 3.84	14.07 3.76
Haiti	$H_0: r=0$ $H_0: r=1$	2	15.34 4.64	15.50 3.84	15.41 3.76	10.71 4.64	14.27 3.84	14.07 3.76	2	39.98 7.33	15.50 3.84	15.41 3.76	32.64 7.33	14.27 3.84	14.07 3.76
Honduras	$H_0: r=0$ $H_0: r=1$	5	8.65 3.57	15.50 3.84	15.41 3.76	5.12 3.57	14.27 3.84	14.07 3.76	5	20.00 3.53*	15.50 3.84	15.41 3.76	16.47 3.53*	14.27 3.84	14.07 3.76
Jamaica	$H_0: r=0$ $H_0: r=1$	2	24.47 4.04	15.50 3.84	15.41 3.76	20.44 4.03	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Mexico	$H_0: r=0$ $H_0: r=1$	5	35.05 1.30*	15.50 3.84	15.41 3.76	33.76 1.30*	14.27 3.84	14.07 3.76	5	43.42 6.94	15.50 3.84	15.41 3.76	36.48 6.94	14.27 3.84	14.07 3.76
Nicaragua	$H_0: r=0$ $H_0: r=1$	3	20.96 6.43	15.50 3.84	15.41 3.76	14.53 6.43	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Panama	$H_0: r=0$ $H_0: r=1$	3	12.46 4.35	15.50 3.84	15.41 3.76	8.11 4.35	14.27 3.84	14.07 3.76	3	35.89 2.25*	15.50 3.84	15.41 3.76	33.64 2.25*	14.27 3.84	14.07 3.76
Paraguay	$H_0: r=0$ $H_0: r=1$	6	17.15 3.72*	15.50 3.84	15.41 3.76	13.43 3.76	14.27 3.84	14.07 3.76	6	12.80 5.76	15.50 3.84	15.41 3.76	7.04 5.76	14.27 3.84	14.07 3.76
Peru	$H_0: r=0$ $H_0: r=1$	6	28.33 9.36	15.50 3.84	15.41 3.76	18.97 9.36	14.27 3.84	14.07 3.76	6	33.77 7.21	15.50 3.84	15.41 3.76	26.55 7.21	14.27 3.84	14.07 3.76
Dominican Republic	$H_0: r=0$ $H_0: r=1$	2	8.98 1.39	15.50 3.84	15.41 3.76	7.59 1.39	14.27 3.84	14.07 3.76	2	10.84 4.30	15.50 3.84	15.41 3.76	6.54 4.30	14.27 3.84	14.07 3.76
Saint Vincent and the Grenadines	$H_0: r=0$ $H_0: r=1$	1	18.83 3.17*	15.50 3.84	15.41 3.76	15.66 3.17*	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -
Saint Lucia	$H_0: r=0$ $H_0: r=1$	5	10.59 0.03	15.50 3.84	15.41 3.76	10.56 0.03	14.27 3.84	14.07 3.76	5	19.17 1.74*	15.50 3.84	15.41 3.76	17.43 1.74*	14.27 3.84	14.07 3.76
Suriname	$H_0: r=0$ $H_0: r=1$	5	40.27 9.24	15.50 3.84	15.41 3.76	31.02 9.24	14.27 3.84	14.07 3.76	5	24.18 2.95*	15.50 3.84	15.41 3.76	21.23 2.95*	14.27 3.84	14.07 3.76
Trinidad and Tobago	$H_0: r=0$ $H_0: r=1$	4	17.18 1.99*	15.50 3.84	15.41 3.76	15.19 1.99*	14.27 3.84	14.07 3.76	-	- -	- -	- -	- -	- -	- -

Country	No. of cointegration relations	1991: 2019							1991: 2023						
		Lags VAR	J_{trace}	5% critical value J_{trace}		J_{max}	5% critical value J_{max}		Lags VAR	J_{trace}	5% critical value J_{trace}		J_{max}	5% critical value J_{max}	
			Trace statistic	M-H-M	O-L	Max statistic	M-H-M	O-L		Trace statistic	M-H-M	O-L	Max statistic	M-H-M	O-L
Uruguay	$H_0: r=0$	3	19.25	15.50	15.41	15.99	14.27	14.07	3	20.79	15.50	15.41	17.85	14.27	14.07
	$H_0: r=1$		3.26*	3.84	3.76	3.26*	3.84	3.76		2.94*	3.84	3.76	2.94*	3.84	3.76
Venezuela	$H_0: r=0$	5	16.45	15.50	15.41	11.59	14.27	14.07	8	29.84	15.50	15.41	25.82	14.27	14.07
	$H_0: r=1$		4.86	3.84	3.76	4.86	3.84	3.76		4.02	3.84	3.76	4.02	3.84	3.76

Notes:

The * indicates that this estimator has selected the number of cointegrating equations corresponding to this row of the table.

J_{max} and J_{trace} are the test statistics from Johansen's maximum eigenvalue and trace tests respectively.

The lags in the VAR were selected based on statistics that minimize information criteria. LR: sequential modified LR test statistic, FPE: Final prediction error, AIC: Akaike, SC: Schwarz, HQ: Hannan-Quinn.

M-H-M= MacKinnon et al. (1999).

O-L= Osterwald-Lenum (1992).

Table 2B. Results regarding the unemployment invariance hypothesis and added or discouraged worker effects

Country	Aggregated model (1991-2019)	Aggregated model (1991-2023)
Argentina Effect	Accepted -	Rejected Added worker
Bahamas Effect	Accepted -	Accepted -
Barbados Effect	Rejected Added worker	n/a n/a
Belize Effect	Rejected Discouraged worker	Rejected Discouraged worker
Bolivia Effect	Accepted -	Rejected Discouraged worker
Brazil Effect	Accepted -	n/a n/a
Canada Effect	Rejected Discouraged worker	Rejected Discouraged worker
Chile Effect	Accepted -	n/a n/a
Colombia Effect	Accepted -	Accepted -
Costa Rica Effect	Rejected Added worker	n/a n/a
Cuba Effect	Accepted -	n/a n/a
Ecuador Effect	Accepted -	Accepted -
United States Effect	Accepted -	Accepted -
Guatemala Effect	Rejected Discouraged worker	Accepted -
Guyana Effect	Accepted -	Rejected Added worker
Haiti Effect	Accepted -	Accepted -
Honduras Effect	Accepted -	Rejected Added worker
Jamaica Effect	Accepted -	n/a n/a
Mexico Effect	Rejected Added worker	Accepted -
Nicaragua Effect	Accepted -	n/a n/a
Panama Effect	Accepted -	Rejected Discouraged worker
Paraguay Effect	Accepted -	Accepted -

Country	Aggregated model (1991-2019)	Aggregated model (1991-2023)
Peru	Accepted	Accepted
Effect	-	-
Dominican Republic	Accepted	Accepted
Effect	-	-
Saint Vincent and the Grenadines	Rejected	n/a
Effect	Discouraged worker	n/a
Saint Lucia	Accepted	Rejected
Effect	-	Discouraged worker
Suriname	Accepted	Rejected
Effect	-	Discouraged worker
Trinidad and Tobago	Rejected	n/a
Effect	Discouraged worker	n/a
Uruguay	Rejected	Rejected
Effect	Discouraged worker	Discouraged worker
Venezuela	Accepted	Accepted
Effect	-	-

Notes: n/a = not available.

Table 3B. Cointegration vectors

Country	Variable	Aggregated model (1991-2019)	Aggregated model (1991-2023)
Argentina	Labour force participation rate	n/c	1
	Unemployment rate	n/c	-0.20
	Standard error	n/c	(0.0393)
Bahamas	Labour force participation rate	n/c	n/a
	Unemployment rate	n/c	n/a
	Standard error	n/c	n/a
Barbados	Labour force participation rate	1	n/a
	Unemployment rate	-8.79	n/a
	Standard error	(2.1805)	n/a
Belize	Labour force participation rate	1	1
	Unemployment rate	1.11	1.01
	Standard error	(0.0989)	(0.1344)
Bolivia	Labour force participation rate	n/c	1
	Unemployment rate	n/c	3.58
	Standard error	n/c	(0.5476)
Brazil	Labour force participation rate	n/c	n/a
	Unemployment rate	n/c	n/a
	Standard error	n/c	n/a
Canada	Labour force participation rate	1	1
	Unemployment rate	0.05	0.04
	Standard error	(0.1303)	(0.1175)
Chile	Labour force participation rate	n/c	n/a
	Unemployment rate	n/c	n/a
	Standard error	n/c	n/a
Colombia	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c

Country	Variable	Aggregated model (1991-2019)	Aggregated model (1991-2023)
Costa Rica	Labour force participation rate	1	n/a
	Unemployment rate	-1.24	n/a
	Standard error	(0.2169)	n/a
Cuba	Labour force participation rate	n/c	n/a
	Unemployment rate	n/c	n/a
	Standard error	n/c	n/a
Ecuador	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c
United States	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c
Guatemala	Labour force participation rate	1	n/c
	Unemployment rate	6.64	n/c
	Standard error	(1.2363)	n/c
Guyana	Labour force participation rate	n/c	1
	Unemployment rate	n/c	-3.90
	Standard error	n/c	(1.1558)
Haiti	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c
Honduras	Labour force participation rate	n/c	1
	Unemployment rate	n/c	-16.82
	Standard error	n/c	(4.6643)
Jamaica	Labour force participation rate	n/c	n/a
	Unemployment rate	n/c	n/a
	Standard error	n/c	n/a
Mexico	Labour force participation rate	1	n/c
	Unemployment rate	-1.36	n/c
	Standard error	(0.1887)	n/c
Nicaragua	Labour force participation rate	n/c	n/a
	Unemployment rate	n/c	n/a
	Standard error	n/c	n/a
Panama	Labour force participation rate	n/c	1
	Unemployment rate	n/c	5.55
	Standard error	n/c	(0.7724)
Paraguay	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c
Peru	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c
Dominican Republic	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c
Saint Vincent and the Grenadines	Labour force participation rate	1	n/a
	Unemployment rate	0.25	n/a
	Standard error	(0.2906)	n/a
Saint Lucia	Labour force participation rate	n/c	1
	Unemployment rate	n/c	3.05

Country	Variable	Aggregated model (1991-2019)	Aggregated model (1991-2023)
	Standard error	n/c	(1.0639)
Suriname	Labour force participation rate	n/c	1
	Unemployment rate	n/c	1.75
	Standard error	n/c	(0.2004)
Trinidad and Tobago	Labour force participation rate	1	n/a
	Unemployment rate	0.40	n/a
	Standard error	(0.0774)	n/a
Uruguay	Labour force participation rate	1	1
	Unemployment rate	0.73	0.74
	Standard error	(0.1791)	(0.1691)
Venezuela	Labour force participation rate	n/c	n/c
	Unemployment rate	n/c	n/c
	Standard error	n/c	n/c

Note: n/a = not available, n/c= not cointegrated.

Table 4B. Likelihood ratio testing for restrictive conditions in cointegrated VAR models

Country	Restriction	Aggregated model (1992-2019)	Aggregated model (1992-2023)
Argentina	$\beta=(1\ 0)'$	n/c	24.85***
	$\beta=(0\ 1)'$	n/c	10.73***
Bahamas	$\beta=(1\ 0)'$	n/c	n/a
	$\beta=(0\ 1)'$	n/c	n/a
Barbados	$\beta=(1\ 0)'$	0.05	n/a
	$\beta=(0\ 1)'$	14.99***	n/a
Belize	$\beta=(1\ 0)'$	14.64***	10.99***
	$\beta=(0\ 1)'$	13.61***	8.42***
Bolivia	$\beta=(1\ 0)'$	n/c	14.48***
	$\beta=(0\ 1)'$	n/c	29.84***
Brazil	$\beta=(1\ 0)'$	n/c	n/a
	$\beta=(0\ 1)'$	n/c	n/a
Canada	$\beta=(1\ 0)'$	15.67***	31.07***
	$\beta=(0\ 1)'$	0.16	0.17
Chile	$\beta=(1\ 0)'$	n/c	n/a
	$\beta=(0\ 1)'$	n/c	n/a
Colombia	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c
Costa Rica	$\beta=(1\ 0)'$	14.76***	n/a
	$\beta=(0\ 1)'$	12.08***	n/a
Cuba	$\beta=(1\ 0)'$	n/c	n/a
	$\beta=(0\ 1)'$	n/c	n/a
Ecuador	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c
United States	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c
Guatemala	$\beta=(1\ 0)'$	1.60	n/c
	$\beta=(0\ 1)'$	7.31***	n/c
Guyana	$\beta=(1\ 0)'$	n/c	0.61
	$\beta=(0\ 1)'$	n/c	8.04***
Haiti	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c

Country	Restriction	Aggregated model (1992-2019)	Aggregated model (1992-2023)
Honduras	$\beta=(1\ 0)'$	n/c	0.23
	$\beta=(0\ 1)'$	n/c	12.32***
Jamaica	$\beta=(1\ 0)'$	n/c	n/a
	$\beta=(0\ 1)'$	n/c	n/a
Mexico	$\beta=(1\ 0)'$	21.97***	n/c
	$\beta=(0\ 1)'$	30.94***	n/c
Nicaragua	$\beta=(1\ 0)'$	n/c	n/a
	$\beta=(0\ 1)'$	n/c	n/a
Panama	$\beta=(1\ 0)'$	n/c	0.96
	$\beta=(0\ 1)'$	n/c	30.41***
Paraguay	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c
Peru	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c
Dominican Republic	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c
Saint Vincent and the Grenadines	$\beta=(1\ 0)'$	10.56***	n/a
	$\beta=(0\ 1)'$	0.40	n/a
Saint Lucia	$\beta=(1\ 0)'$	n/c	2.15
	$\beta=(0\ 1)'$	n/c	7.54***
Suriname	$\beta=(1\ 0)'$	n/c	18.20***
	$\beta=(0\ 1)'$	n/c	14.63***
Trinidad and Tobago	$\beta=(1\ 0)'$	7.70***	n/a
	$\beta=(0\ 1)'$	13.17***	n/a
Uruguay	$\beta=(1\ 0)'$	12.61***	14.75***
	$\beta=(0\ 1)'$	7.77***	9.28***
Venezuela	$\beta=(1\ 0)'$	n/c	n/c
	$\beta=(0\ 1)'$	n/c	n/c

Notes: *** and * indicate significance at the 1% and 10% level, respectively. n/a = not available, n/c= not cointegrated.

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CAPÍTULO 3: Female labour supply in Latin America and the business cycle: instability and asymmetry

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REGULAR ARTICLE

Female Labor Supply in Latin America and the Business Cycle: Instability and Asymmetry¹

Ángel Maridueña-Larrea^{1,2} | Ángel Martín-Román³

¹Facultad de Ciencias Sociales, Educación Comercial y Derecho, Universidad Estatal de Milagro, Milagro, Provincia del Guayas, Ecuador | ²Facultad de Ciencias Económicas y Empresariales, Universidad de Valladolid, Valladolid, Spain | ³Facultad de CC. Sociales, Jurídicas y de la Comunicación, Universidad de Valladolid, Segovia, Spain

Correspondence: Ángel Martín-Román (almartin@uva.es)

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Keywords: added worker effect | discouraged worker effect | economic cycle | labor force participation rate | unemployment rate

ABSTRACT

This study measures the responsiveness of female labor supply at the extensive margin to business cycle changes in Latin America. The results provide new evidence on the stability and cyclical asymmetry of the traditional added and discouraged worker effects (i.e., AWE and DWE, respectively). It is shown that these effects are not stable and react differently to business cycle variations and even strengthen from a certain threshold. The estimated cross-country and through-time differences in the AWE and DWE, and in their counterparts in the expansionary cyclical phases, that is, the subtracted and encouraged worker effects (i.e., SWE and EWE, respectively) have direct implications for the design of economic policies, particularly those aiming at reducing gender differences in labor force participation in a region in which female workers are still underrepresented.

JEL Classification: E24, C10, J64, J68

1 | Introduction

The cyclical behavior of labor force participation (LFP) is a widely researched topic in the field of labor economics, which has recently gained relevance due to the increasing integration of women into the global labor market. In Latin America, in the 1990s, approximately 40% of working-age women were in the labor force. In the last 20 years, this proportion has increased by just over 10 percentage points (p.p.) to 52%. This trend has been observed in most Latin American countries, although with variations in intensity. However, while more than half of working-age women are participating in the labor market, this trend has shown less dynamism since the 2010s, which could anticipate possible distortions in the face of changes in the region's economic cycle.

Some studies have focused on how unemployment affects LFP across economic cycles, identifying the Discouraged Worker

Effect (DWE) and its counterpart Encouraged Worker Effect (EWE) hypotheses for procyclical LFP and the Added Worker Effect (AWE) together with the Subtracted Worker Effect (SWE) for countercyclical LFP². The literature indicates that if DWE/EWE prevails over AWE/SWE, LFP exhibits a procyclical pattern, pointing out the necessity for accurate assessments to inform policy decisions. Although research in developed countries presents varied outcomes for women, evidence from Latin America, albeit scarce, suggests a tendency toward the countercyclical influence of AWE and SWE, underlining the complex interplay of labor market behavior and the importance of developing context-specific economic policies.

This research aims to measure the responsiveness of female labor supply at the extensive margin (i.e., labor participation) to changes in male unemployment rates (which are the cyclical indicators of the labor market used in this research) in Latin America. It is worth pointing out, though, that the most

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CAPÍTULO 4: Heterogeneity and spatial dependence in Okun's law: a global view

Esta investigación se encuentra actualmente en proceso de revisión por parte de una revista indexada en la WoS, dentro de la categoría Economics del SSCI, la cual cuenta con factor de impacto según el JCR y está clasificada en el cuartil Q1. Cabe señalar que una versión inicial de esta investigación fue difundida como documento de trabajo en:

Maridueña-Larrea, Ángel; Martín-Román, Ángel; Porras-Arena, Sylvina (2025): Heterogeneity and spatial dependence in Okun's law: a global view, GLO Discussion Paper, No. 1597, *Global Labor Organization* (GLO), Essen.

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Maridueña-Larrea, Ángel; Martín-Román, Ángel; Porras-Arena, Sylvina

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Heterogeneity and spatial dependence in Okun's law: a global view

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CAPÍTULO 5: Spatial Dependence in the Cyclical Sensitivity of Labour Supply: An Analysis at the Regional Level in Ecuador

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Article

Spatial Dependence in the Cyclical Sensitivity of Labour Supply: An Analysis at the Regional Level in Ecuador

Ángel Maridueña-Larrea ^{1,2} and Ángel Martín-Román ^{3,*}

¹ Facultad de CC. Sociales, Educación Comercial y Derecho, Universidad Estatal de Milagro, Av. Principal vía al km 26 km 1.5, Milagro 091706, Ecuador; amariduenal@unemi.edu.ec

² Facultad de Ciencias Económicas y Empresariales, Universidad de Valladolid, Av. Valle de Esgueva, 6, 47011 Valladolid, Spain

³ Facultad de CC. Sociales, Jurídicas y de la Comunicación, Universidad de Valladolid, Plaza de la Universidad, 1, 40005 Segovia, Spain

* Correspondence: almartin@uva.es

Abstract: The labour supply has historically been subject to influence from the economic cycle. On the other hand, there is a paucity of research in the Latin American region examining the impact of social factors on labour participation in diverse contexts. This study examines the spatial dependence of the cyclical sensitivity of labour supply in 23 provinces of Ecuador. A time series analysis was conducted to calculate the cyclical sensitivities of labour supply, and spatial econometric techniques were applied to assess spatial dependence using monthly data for the period 2021 to 2024. We found evidence of a positive and significant spatial dependence in the cyclical sensitivity of labour supply. Our findings suggest that labour decisions in one province are influenced by those in neighbouring provinces, thereby providing a framework for the design of public policies that take into account these interdependencies.

Keywords: added worker effect; discouraged worker effect; bandwagon worker effect; labour participation rate; spatial dependence; business cycle

JEL Classification: C23; D03; E32; J21; R23



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1. Introduction

Historically, labour supply has been conditioned by fluctuations in the business cycle. Since the publication of seminal studies such as those by Woytinsky (1940) and Long (1953), certain patterns in the labour market have been observed as a result of this interrelationship, giving rise to the classic added worker and discouraged worker effects (i.e., AWE and DWE, respectively). The economic literature has devoted considerable attention to these effects. However, research on the possible influence of social factors is comparatively limited. The aim of this paper is to contribute to the existing body of knowledge on this topic.

A study by Martín-Román et al. (2020) illustrates that, as labour supply is a demand for leisure, the well-known microeconomic theory of the bandwagon effect (Leibenstein 1950), which refers to the demand for products, can be applied to comprehend specific labour market dynamics. Consequently, these authors integrate social effects as a significant factor influencing labour supply decisions. Furthermore, these social effects can be examined through the use of spatial econometric techniques, as demonstrated by Halleck-Vega and Elhorst (2017); Fogli and Veldkamp (2011).

Martín-Román et al. (2020) developed a conceptual framework linking social effects with cyclical labour market dynamics. Using estimates of the cyclical sensitivity of labour supply in 50 Spanish provinces, they formulated and validated the bandwagon worker effect (BWE) hypothesis. This hypothesis describes how an individual's job search decisions are influenced by the decisions of their environment, generating a positive spatial

CONCLUSIONES

La investigación desarrollada en esta tesis doctoral proporciona una perspectiva multidimensional sobre las interacciones complejas existentes entre el ciclo económico, el desempleo y la participación laboral, tanto a nivel agregado como desagregado por sexo, en diversos contextos geográficos y económicos. Los resultados obtenidos destacan la importancia de considerar cuidadosamente fenómenos específicos del mercado laboral, como la UIH, los AWE y DWE, la heterogeneidad y asimetría en la oferta laboral femenina, así como las dependencias espaciales subyacentes en las relaciones macroeconómicas, particularmente la ley de Okun y la sensibilidad cíclica regional.

Una conclusión transversal del **CAPÍTULO 1** es que la validez de la UIH varía significativamente entre economías, dependiendo de factores institucionales, sociales y económicos específicos de cada país. Se resalta que la relación de largo plazo entre participación laboral y desempleo no es uniforme, identificando países que validan la UIH—donde las políticas enfocadas exclusivamente en modificar la oferta laboral resultarían poco efectivas para alterar el desempleo estructural—y otros donde esta hipótesis es rechazada, sugiriendo un margen importante para intervenciones en el mercado laboral orientadas a mitigar fenómenos como el AWE y el DWE. La desagregación por género también aporta matices importantes; se observa una predominancia clara del AWE entre las mujeres en varios países, lo que implica que las mujeres ingresan al mercado laboral mayoritariamente en fases recesivas para compensar pérdidas de ingreso familiar. En contraste, la ausencia de relaciones de cointegración para otros subgrupos poblacionales limita considerablemente el alcance potencial de políticas laborales específicas.

El **CAPÍTULO 2** utiliza datos anuales de la tasa de desempleo y la participación laboral con un horizonte temporal más extenso (1991-2023), y complementa estos hallazgos, destacando cómo la frecuencia y duración de los datos pueden afectar la detección de la UIH y sus distorsiones asociadas. Este análisis revela adicionalmente la importancia de considerar eventos exógenos como la pandemia de COVID-19, que pueden modificar estructuralmente la dinámica laboral en el largo plazo, cambiando incluso la validación o rechazo inicial de la UIH en ciertas economías. Asimismo, enfatiza la necesidad de cautela metodológica al interpretar relaciones de cointegración, subrayando la importancia de validar resultados mediante técnicas econométricas adicionales y pruebas de robustez.

Desde la perspectiva de la política económica, los capítulos previos resaltan que la implementación efectiva de intervenciones laborales debe ajustarse

cuidadosamente al contexto nacional específico, reconociendo diferencias en magnitud y predominancia del AWE y DWE. En las recesiones, en economías con predominancia del efecto desanimado, se recomienda fortalecer la intermediación laboral, programas de recalificación y medidas de protección social condicionadas a la búsqueda activa de empleo. Por otro lado, en contextos donde prevalece el efecto del trabajador añadido, resulta crítico no solo fomentar la generación cuantitativa de empleos, sino también garantizar la calidad y formalidad laboral, con especial énfasis en políticas que respalden la participación laboral femenina mediante servicios de cuidado infantil, licencias parentales equitativas y condiciones laborales dignas.

Finalmente, ambos trabajos concuerdan en la necesidad de desarrollar sistemas de monitoreo laboral de alta frecuencia y en la importancia de incorporar la perspectiva UIH en el diseño de políticas macroeconómicas contracíclicas, destacando que las respuestas de política pública más efectivas serán aquellas que consideren explícitamente la interacción estructural entre participación laboral y desempleo, maximizando así el bienestar social en contextos económicos volátiles y complejos como los latinoamericanos.

Al desagregar la dinámica del ciclo económico por fases expansivas y recesivas, el **CAPÍTULO 3** revela que los resultados obtenidos sobre la participación laboral femenina en América Latina subrayan fuertemente la inestabilidad y asimetría en su comportamiento cíclico, poniendo en evidencia la necesidad de adaptar las políticas laborales a contextos específicos y coyunturales. Durante períodos de recesión, como los observados en Ecuador y México, donde predomina el AWE, la implementación de programas de empleo y redes de protección social se torna prioritaria para compensar pérdidas en los ingresos familiares. En períodos expansivos, por el contrario, como se observa en países como Chile y Uruguay, las políticas deberían centrarse en el desarrollo profesional continuo y la reducción de las brechas salariales de género. Especial atención merece el caso peruano, donde el SWE subraya la importancia de mantener políticas constantes que aseguren la permanencia femenina en el mercado laboral, especialmente mediante mecanismos que faciliten la conciliación trabajo-familia y promuevan condiciones laborales atractivas en contextos de expansión económica.

Desde una perspectiva mundial, el **CAPÍTULO 4** reveló que la evaluación y descomposición del coeficiente de Okun aportó evidencia sobre efectos heterogéneos y dependencia espacial entre países, destacando la importancia de considerar factores específicos al formular políticas orientadas a potenciar el mercado de trabajo. Los resultados indican que la respuesta del desempleo ante variaciones del producto económico no es homogénea, mostrando claras diferencias entre países y regiones que se explican, en gran medida, por factores

específicos como la productividad laboral y la sensibilidad cíclica de la participación laboral.

En este contexto, la participación laboral mostró patrones cíclicos diferenciados, siendo procíclica en 105 países y contracíclica en 68. Este hallazgo refuerza la relevancia empírica de fenómenos como el AWE y el SWE en períodos recesivos y expansivos respectivamente, así como del DWE y el EWE en distintas fases del ciclo económico. Por lo tanto, cobra especial importancia la formulación de políticas económicas dirigidas específicamente a mitigar estas dinámicas laborales según la fase del ciclo.

Adicionalmente, la significativa dependencia espacial observada subraya la necesidad de una mayor coordinación regional e internacional en las políticas económicas, especialmente en áreas caracterizadas por fuertes interacciones comerciales y proximidad geográfica. Finalmente, la relevancia central atribuida a la productividad laboral en la relación crecimiento-desempleo enfatiza la necesidad de implementar políticas orientadas a la innovación tecnológica y al desarrollo del capital humano, con el fin último de establecer bases sólidas para un crecimiento económico sostenible, generador de empleo y socialmente inclusivo.

El análisis espacial realizado a nivel regional en Ecuador confirma la presencia del efecto bandwagon (BWE), validando que las decisiones individuales y colectivas de participación laboral están significativamente condicionadas por dinámicas regionales y sociales cercanas. Los resultados del **CAPÍTULO 5** indican que políticas laborales eficaces deben necesariamente considerar la dimensión espacial del mercado laboral. Se recomienda implementar políticas integradas que promuevan el desarrollo económico simultáneo de provincias vecinas, reforzando infraestructura de comunicación y transporte para mejorar la movilidad laboral y económica entre regiones cercanas. Asimismo, establecer programas de empleo y formación laboral adaptados a necesidades específicas regionales y con enfoque en la influencia de áreas contiguas permitiría maximizar el impacto positivo de las intervenciones públicas.

Finalmente, esta tesis doctoral ofrece un conjunto articulado de resultados empíricos que demuestran la importancia fundamental de considerar cuidadosamente la heterogeneidad, el género, los efectos sociales y la dimensión espacial en el diseño de políticas laborales y macroeconómicas eficaces. La evidencia obtenida, aplicable tanto a nivel local como global, establece un marco analítico y conceptual claro que proporciona directrices valiosas para enfrentar los desafíos contemporáneos del mercado laboral, contribuyendo así al bienestar económico y social en diversas regiones del mundo, especialmente en economías en desarrollo como las latinoamericanas.