Steven J. Green School of International & Public Affairs
Department of Economics

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Hakan Yilmazkuday

Department of Economics
Florida International University
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11200 SW 8th Street, Miami, Florida 33199
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Hakan Yilmazkuday†

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Abstract

Using monthly headline inflation data covering 184 countries for the period between January 1971 and December 2020, this paper investigates the role of standard gravity variables on inflation convergence across country pairs. The convergence analysis by unit root tests is based on ten-year rolling windows to control for potential structural changes over time, whereas the corresponding results are connected to the standard gravity variables in the preceding year to investigate the drivers of inflation convergence and its speed. Regarding the existence of inflation convergence, empirical results show that having a common currency, a free trade agreement, proximity, a common border, or a colonial relationship between countries increases the probability of inflation convergence. Regarding the speed of inflation convergence, the very same gravity variables are shown to reduce the half-life of convergence. In both cases, the effects of having a common currency are shown to dominate those of other gravity variables.

JEL Classification: C32, E31, F45

Key Words: Inflation Convergence; Half-Life; Gravity Variables

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†Department of Economics, Florida International University, Miami, FL 33199, USA; Tel: +1-305-348-2316; Fax: +1-305-348-1524; E-mail: hyilmazk@fiu.edu

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Abstract

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1 Introduction

Inflation differentials across countries can be observed due to exchange rate fluctuations and trade costs according to the relative purchasing power parity (RPPP) and deviations from it (e.g., see Dutton (1993), Wu and Chen (1998)). When the uncovered interest parity (UIP) is further combined with RPPP, they can also be connected to interest rate (and thus monetary policy) differentials across countries (e.g., see Chung and Crowder (2004), Ferreira and León-Ledesma (2007)). As exchange rate fluctuations and trade costs can result in welfare costs (e.g., see Obstfeld and Rogoff (2003), Anderson and Van Wincoop (2004)), whereas monetary policy coordination can result in welfare gains (e.g., see Cavallari (2004), Liu and Shi (2010)), inflation convergence across countries is an indicator of welfare improvement that can be achieved through international policies. It is implied that understanding the drivers of inflation convergence may help policy makers conduct better policies to improve welfare.

This paper investigates the drivers of inflation convergence across countries. The convergence analysis is based on unit root tests at the country-pair level, where the standard gravity variables used in international trade studies (to proxy for trade costs) are considered as potential drivers. Ten-year rolling windows using monthly data are considered to control for potential structural changes over time (e.g., see Hegwood and Nath (2013) for the importance of structural changes for convergence). Once inflation convergence is determined for any country pair, the corresponding speed of convergence is estimated by half-life measures.

The key innovation in this paper is to connect (in a secondary analysis) the pooled version of inflation convergence results (across country pairs and ten-year windows) to the standard gravity variables in the preceding year that are effective in explaining not only international trade (of goods and services) as in studies such as by Eaton and Kortum (2002), Anderson and Van Wincoop (2003) or Kimura and Lee (2006) but also international finance (bilateral asset holdings) as in studies such as by Okawa and Van Wincoop (2012). As country-and-time specific factors are shown to be effective in explaining inflation convergence in studies such as by Westbrook (1998), Haug, MacKinnon, and Michelis (2000), Dobrinsky (2006), Mumtaz and Surico (2012), Liu and Lee (2021) or Liu and Lee (2021), they are controlled for during the secondary analysis of this paper to mainly focus on the role of gravity variables on inflation convergence. Together with having an investigation based on rolling windows, these country-and-time specific factors can also control for any changes in the data collection methodology of countries over time.

The motivation behind considering the standard gravity variables as well as country-and-time specific factors in explaining inflation convergence comes from a simple theoretical model combining the two well-known arbitrage conditions, namely the uncovered interest parity and the relative purchasing power parity, which is similar to studies such as by Dutton (1993), Wu and Chen (1998), Chung and Crowder (2004) or Ferreira and León-Ledesma (2007). Specifically, it is shown that future (expected) inflation differentials between any two countries depend on the current country-specific nominal interest rates (e.g., reflecting monetary policy, exchange rate regime, or business cycles of countries) as well as the deviations from the relative purchasing power parity that can be captured by the standard gravity variables as in studies such as by Crucini and Yilmazkuday (2014).

The inflation convergence results based on ten-year windows for the monthly period between January 1971 and December 2020 covering 184 countries suggest that certain country pairs have experienced inflation convergence for each and every ten-year window, whereas certain others have not experienced any inflation convergence in any of the ten-year windows. Conditional on having convergence, the results also suggest that there is significant evidence for heterogeneity across country pairs regarding their speed of convergence (based on half-lives).

The heterogeneity across country pairs regarding their inflation convergence and the corresponding half-lives is further investigated in secondary analyses by estimating the effects of standard gravity variables in the current year on the inflation convergence and its speed within the next ten years. The corresponding results suggest that robust to the consideration of country-and-time fixed effects, having a common currency, a free trade agreement, proximity, a common border, or a colonial relationship between countries increases the probability of inflation convergence. For the speed of convergence (conditional on convergence), the very same gravity variables are shown to reduce the half-life of inflation convergence across countries. When the effects of alternative gravity variables are compared in terms of their magnitude, the effects of having a common currency are shown to dominate those of others.

This paper contributes to the existing literature in several dimensions. First, the monthly sample period for inflation convergence between January 1971 and December 2020 covering 184 countries doubles the number of observations over the next-largest publicly available source as indicated by Ha, Kose, and Ohnsorge (2021). Second, considering ten-year rolling windows for inflation convergence between country pairs controls for potential structural changes between them over time (as in Hegwood and Nath (2013)), whereas several studies in the literature consider a single sample period that is subject to problems due to nonlinearities over time. Third, connecting the inflation convergence results of country pairs to the corresponding standard gravity variables of the preceding period is new to this paper, whereas the literature has only connected such results to country-specific characteristics as in studies such as by Westbrook (1998), Haug, MacKinnon, and Michelis (2000), Dobrinsky (2006), Mumtaz and Surico (2012), Liu and Lee (2021) or Liu and Lee (2021). It is important to emphasize that this paper controls for these factors by using country-and-time fixed effects as the main focus is on the role of gravity variables. Having these fixed effects is also essential for the identification of the effects of gravity variables as discussed in studies such as by Fally (2015).

The rest of the paper is organized as follows. The next section describes the empirical methodology. Section 3 introduces the data set. Section 4 depicts the empirical results. Section 5 provides a discussion of the empirical results by connecting them to the existing literature. Section 6 concludes.

2 Empirical Methodology

We are interested in investigating the existence of inflation convergence as well as the corresponding speed of convergence across country pairs. For this convergence investigation, standard unit root tests are employed. Estimations of unit root tests for each country pair are achieved for ten-year rolling windows using monthly data to control for potential structural changes over time (e.g., see Hegwood and Nath (2013) for the importance of structural changes for convergence). Ten-year monthly rolling windows start at January of each year; accordingly, as our monthly data cover the period between 1971:M1 and 2020:M12 (to be discussed further, below), the first ten-year window covers the monthly period between 1971:M1 and 1980:M12, the second ten-year window covers the monthly period between 1972:M1 and 1981:M12, and so forth, whereas the last ten-year window covers the monthly period between 2011:M1 and 2020:M12. Hence, in total, there are 41 ten-year monthly windows.

Once the existence of inflation convergence and the corresponding speed of convergence are identified for each country pair and each ten-year window, based on a simple theoretical motivation, these results are pooled together to be further connected to the (partly time-varying) standard gravity variables (e.g., having a common currency, a free trade agreement, etc.) in the preceding year. As an example, if the convergence investigation for any two countries is based on the first ten-year window (i.e., the monthly period between 1971:M1 and 1980:M12), we consider the gravity variables of 1970 to investigate their effects on future inflation convergence. Accordingly, we ask the following question: What is the relationship between having certain international policies in the current year and inflation convergence within the next ten years? While asking this question, we also control for factors that are country-and-time specific. The following subsections provide the technical details of the methodology summarized so far.

2.1 Unit Root Tests

For each ten-year rolling window (with 120 months of sample size), inflation convergence is investigated for each country pair ij using the model given by:

$$\Delta q_t^{ij} = \mu^{ij} + \phi^{ij} q_{t-1}^{ij} + \sum_{m=1}^{p} \theta_m^{ij} \Delta q_{t-m}^{ij} + \varepsilon_t^{ij} \tag{1}$$

where $q_t^{ij} = \pi_t^i - \pi_t^j$, with π_t^i and π_t^j representing headline inflation rates in country i and country j, respectively, at month t, and Δ represents time difference. For each ten-year window, individual estimations of this model are achieved for each country pair.

The standard unit root test of ADF-GLS developed by Elliott, Rothenberg, and Stock (1996) is used, since it is accepted as superior to other existing unit root tests in terms of its power. Formally, the null hypothesis of $H_0 : \phi^{ij} = 0$ (implying non-convergence) is tested against the alternative hypothesis of $H_0 : \phi^{ij} < 0$ (implying convergence). The optimal number of lags p is determined according to Schwarz information criterion (SIC), where the maximum number of lags of 12 is determined according to Schwert (2002).[1]

Conditional on the null hypothesis of $H_0 : \phi_{is} = 0$ is rejected (implying convergence), the speed of convergence for each ten-year window is approximated by using the autoregressive parameter ϕ^{ij} as in studies such as by Lopez and Papell (2012) according to:

$$\lambda^{ij} = -\frac{\ln(2)}{\ln(1+\phi^{ij})} \text{ when } \phi^{ij} < 0 \tag{2}$$

which corresponds to the half-life of inflation convergence (in months) between countries i and j.

2.2 Investigating the Role of Standard Gravity Variables

This subsection starts with providing a simple theoretical motivation for the empirical investigation of inflation convergence. Afterwards, the corresponding implications are used to connect the unit root test results to the standard gravity variables.

[1]The exact formula used to obtain the maximum number of lags is $floor\left\{12\left(\left(T+1\right)/100\right)^{0.25}\right\}$, where $T = 120$ is the sample size (in months) for each ten-year rolling window.

2.2.1 Drivers of Inflation Differentials

Similar to studies such as by Dutton (1993), Wu and Chen (1998), Chung and Crowder (2004) and Ferreira and León-Ledesma (2007), a simple theoretical motivation for the empirical investigation of inflation convergence in the following two subsections can be achieved by considering the two well-known arbitrage conditions, namely UIP and RPPP:

$$E_t\left[\Delta s_{t+1}^{ij}\right] = r_t^i - r_t^j \qquad \text{UIP} \tag{3}$$

and

$$\pi_t^i = \Delta s_t^{ij} + \pi_t^j + \sigma_{t-1}^{ij} \qquad \text{RPPP} \tag{4}$$

where E_t is the expectation operator (based on the available information at time t), Δs_t^{ij} is the percentage change in the exchange rate between countries i and j at time t, r_t^i (r_t^j) is the nominal interest rate in country i (j) at time t, $\pi_t^i - \pi_t^j$ is the inflation differential between countries i and j at time t, and σ_{t-1}^{ij} represents the deviations from RPPP due to lagged bilateral trade costs between countries i and j at time $t-1$ (as trade takes time as in Hummels and Schaur (2013)) that can be captured by the standard gravity variables, similar to studies such as by Crucini and Yilmazkuday (2014). Combining these two equations results in:

$$E_t\left[\pi_{t+1}^i - \pi_{t+1}^j\right] = r_t^i - r_t^j + \sigma_t^{ij} \tag{5}$$

which suggests that future expected inflation differentials between any two countries depend on current country-specific nominal interest rates as well as current bilateral trade costs. As interest rates reflect monetary policy of countries, inflation convergence (in this paper) is also related to the monetary policy convergence as discussed in studies such as by Westbrook (1998), Haug, MacKinnon, and Michelis (2000), Mumtaz and Surico (2012) or Liu and Lee (2021). Therefore, according to Equation 5, we will consider country-fixed effects (to capture country-specific factors leading to alternative nominal interest rates) and standard gravity variables (to capture bilateral trade costs) to investigate the drivers of inflation convergence and its speed.

Regarding the economic intuition behind inflation convergence, consider RPPP expressed by Equation 4. It represents an arbitrage condition across countries through the real exchange rate. When the exchange rate is fixed (or countries have a common currency) as one example, if prices in country i (and thus π_t^i) get higher compared to country j, country i would purchase products from country j (due to the arbitrage opportunity, subject to trade costs) until prices in country j (and thus π_t^j) get higher due to higher demand; similarly, if prices in country i (and thus π_t^i) get lower compared to country j, country j would purchase products from country i until prices in country i (and thus π_i^j) get higher due to higher demand. In both cases, inflation rates would converge to each other, subject to the trade costs (represented by σ_t^{ij}'s) between these countries. Therefore, trade costs play an important role on inflation convergence through the real exchange rate represented by Equation 4.

When the exchange rate is flexible as another example, it is determined by the corresponding interest rates according to UIP as shown in Equation 3. Specifically, if r_t^i gets higher than r_t^j, there would be a capital flow to country i that would lead into the appreciation of its currency. In this case, the arbitrage opportunity between countries would be determined according to Equation 5 through the real interest rate, where inflation convergence is not only determined by trade costs (as in the fixed exchange rate case) but also by interest rate differentials (representing exchange rate changes according to Equation 3). Therefore, if countries are in a monetary union or have a monetary policy coordination as in studies such as by Betts and Devereux (2000) and Benigno (2002), inflation rates would again converge to each other due to the arbitrage opportunity across countries, subject to the trade costs. When countries have different interest rates, they can still have inflation convergence as long as there are arbitrage opportunities (subject to trade costs), but this convergence would mostly depend on the magnitude of interest rate differentials and arbitrage opportunities (i.e., through the real interest rate). This is exactly why it is important to control for country-specific factors (by country-fixed effects) in the corresponding empirical investigation below. Once again, trade costs play an important role on inflation convergence, this time through the real interest rate represented by Equation 5.

The economic intuition that has been discussed so far can be expanded by considering global factors that are common across countries (as in studies such as by Kose, Otrok, and Whiteman (2003) and Ha, Kose, Ohnsorge, and Yilmazkuday (2019)), input-output linkages across countries (as in studies such as by Auer, Levchenko, and Sauré (2019)), and distribution sectors within each country (as in studies such as by Crucini and Yilmazkuday (2014)). Specifically, having a common global factor across inflation rates of countries (e.g., energy prices) or input-output linkages (e.g., in the production of automobiles) would facilitate inflation convergence due to similar production costs, whereas differences in distribution costs (e.g., retail wages or rental space) that are country-specific would obstruct inflation convergence due to the lack of an arbitrage opportunity across countries regarding these costs. Regarding the implications for our empirical investigation below, both having a common global factor and input-output linkages in the production process highly depend on international trade costs, whereas differences in distribution costs are country specific; hence, we already control for these additional possibilities by having trade costs and country-fixed effects in our empirical investigation below.

Overall, inflation convergence across countries can depend on not only bilateral trade costs between them but also the corresponding country-specific factors that can be explained through their real interest rates or real exchange rates. We use this theoretical motivation to have the following empirical investigation.

2.2.2 Drivers of Inflation Convergence

If the null hypothesis of $H_0 : \phi^{ij} = 0$ based on Equation 1 is rejected by the ADF-GLS test, there is evidence for inflation convergence across countries i and j. In such a case, we denote the existence of inflation convergence by $C_w^{ij} = 1$, where w represents the ten-year window (corresponding to 120 months) considered in the unit root test. Alternatively, if the null hypothesis of $H_0 : \phi^{ij} = 0$ based on Equation 1 is *not* rejected by the ADF-GLS test, we denote the nonexistence of inflation convergence by $C_w^{ij} = 0$. Formally, for each country pair ij and each ten-year window w, we have:

$$C_w^{ij} = \begin{cases} 1 \text{ when } \phi^{ij} < 0 \text{ for ten-year window } w \\ 0 \text{ when } \phi^{ij} = 0 \text{ for ten-year window } w \end{cases} \tag{6}$$

where the ADF-GLS test is achieved at the 5% significance level.

Once the existence of inflation convergence is determined for each country pair and each ten-year window, the results are pooled together as a panel data (consisting of country pairs and ten-year windows) to be further used to investigate the drivers of inflation convergence according to the following linear probability model (to be able to include country-and-time fixed effects):

$$
\begin{aligned}
C_w^{ij} = \; & \beta_{cur}\varphi_{w-1}^{ij,cur} + \beta_{fta}\varphi_{w-1}^{ij,fta} + \beta_{dis}\varphi_{w-1}^{ij,dis} + \beta_{bor}\varphi_{w-1}^{ij,bor} \\
& + \beta_{col}\varphi_{w-1}^{ij,col} + \beta_{lan}\varphi_{w-1}^{ij,lan} + \delta_w^i + \delta_w^j + \varepsilon_w^{ij}
\end{aligned} \tag{7}
$$

where the subscript $w-1$ in the right-hand-side variables (introduced below) represents the year preceding the ten-year window w. As an example, if the unit root test is achieved by using the monthly data covering the ten-year (or 120-months) window between 1971 and 1980, $w-1$ represents the year of 1970. Accordingly, our investigation focuses on the effects of right-hand-side variables of the current year on the inflation convergence within the next ten years.

In Equation 7, $\varphi_{w-1}^{ij,cur}$ is a dummy variable taking a value of 1 if countries i and j have a common currency at year $w-1$, $\varphi_{w-1}^{ij,fta}$ is a dummy variable taking a value of 1 if countries i and j have a free trade agreement at year $w-1$, $\varphi_{w-1}^{ij,dis}$ represents the log distance between countries i and j, $\varphi_{w-1}^{ij,bor}$ is a dummy variable taking a value of 1 if countries i and j have a common border, $\varphi_{w-1}^{ij,col}$ is a dummy variable taking a value of 1 if countries i and j have a colonial relationship ever, $\varphi_{w-1}^{ij,lan}$ is a dummy variable taking a value of 1 if countries i and j have a common official language, and ε_w^{ij} represents residuals.

The country-and-time fixed effect δ_w^i controls for factors that are country-i and ten-year window w specific, whereas the country-and-time fixed effect δ_w^j controls for factors that are country-j and ten-year window w specific. These country-and-time fixed effects over each ten-year window control for several country-specific characteristics that are effective in explaining inflation convergence in the literature. Specifically, among others, Westbrook (1998), Haug, MacKinnon, and Michelis (2000), Mumtaz and Surico (2012) or Liu and Lee (2021) have discussed the importance of country-specific monetary policies, Dobrinsky (2006) shows the importance of catch-up inflation (through developments in country-specific productivity or per capita income changes), or Liu and Lee (2021) discuss the role of country-specific income levels or inflation volatility in explaining the heterogeneity of inflation convergence across countries.

Besides, these country-and-time fixed effects over each ten-year window can also control for any period of high inflation, any period of high economic growth, alternative monetary or exchange rate policy regimes, being a member of the World Trade Organization or the European Union, trade or finance openness, as well as other country-specific geographic factors such as being an island, landlocked, and so forth. As these country-and-time fixed effects are controlled for, Equation 7 mainly focuses on the effects of standard gravity variables on inflation convergence.

2.2.3 Drivers of the Speed of Inflation Convergence

Conditional on inflation convergence for ten-year window w (i.e., $\phi^{ij} < 0$ or $C_w^{ij} = 1$), the corresponding speed of convergence represented by the half-life of inflation convergence (in months) is estimated according to Equation 2. Once half-lives are determined for each country pair and each ten-year window, the results are pooled to be further used to investigate the drivers of the speed of convergence according to the following ordinary-least-squares regression:

$$\lambda_w^{ij} = \gamma_{cur}\varphi_{w-1}^{ij,cur} + \gamma_{fta}\varphi_{w-1}^{ij,fta} + \gamma_{dis}\varphi_{w-1}^{ij,dis} + \gamma_{bor}\varphi_{w-1}^{ij,bor} \tag{8}$$
$$+ \gamma_{col}\varphi_{w-1}^{ij,col} + \gamma_{lan}\varphi_{w-1}^{ij,lan} + \kappa_w^i + \kappa_w^j + \upsilon_w^{ij}$$

where λ_w^{ij} represents the half-life of inflation convergence (in months) between countries i and j for the ten-year window w. Notation and the economic intuition for the right-hand-side variables are the same as in Equation 7, except for country-and-time fixed effects being represented by κ_w^i and κ_w^j, and residuals represented by υ_w^{ij} in this expression. As country-and-time fixed effects are controlled for, Equation 8 mainly focuses on the effects of standard gravity variables on the speed of inflation convergence.

3 Data Set

The data set consists of (i) monthly data on country-level headline inflation rates for the period between January 1971 and December 2020 and (ii) annual data on the country-pair-level standard gravity variables for the period between 1970 and 2010. The combined data set cover 184 countries.[2]

[2] The list of these countries is as follows: Aruba, Afghanistan, Angola, Albania, United Arab Emirates, Argentina, Armenia, Antigua and Barbuda, Austria, Azerbaijan, Burundi, Belgium, Benin, Burkina Faso, Bangladesh, Bulgaria, Bahrain, Bahamas, Bosnia and Herzegovina, Belarus, Belize, Bolivia, Brazil, Barbados, Brunei Darussalam, Botswana, Central African Republic, Canada, Switzerland, Chile, China, Cote d'Ivoire, Cameroon, Congo, Dem. Rep., Congo, Rep., Colombia, Comoros, Cabo Verde, Costa Rica, Curacao, Cyprus, Czech Republic, Germany, Djibouti, Dominica, Denmark, Dominican Republic, Algeria, Ecuador, Egypt, Arab Rep., Spain, Estonia, Ethiopia, Finland, Fiji, France, Gabon, United Kingdom, Georgia, Ghana, Guinea, Gambia, The, Guinea-Bissau, Equatorial Guinea, Greece, Grenada, Guatemala, Guyana, Hong Kong SAR, China, Honduras, Croatia, Haiti, Hungary, Indonesia, India, Ireland, Iran, Islamic Rep., Iraq, Iceland, Israel, Italy, Jamaica, Jordan, Japan, Kazakhstan, Kenya, Kyrgyz Republic, Cambodia, Kiribati, St. Kitts and Nevis, Korea, Rep., Kuwait, Lao, PDR, Lebanon, Liberia, Libya, St. Lucia, Sri Lanka, Lesotho, Lithuania, Luxembourg, Latvia, Macao SAR, China, Morocco, Moldova, Rep., Madagascar, Maldives, Mexico, North Macedonia, Mali, Malta, Myanmar, Montenegro, Mongolia, Mozambique, Mauritania, Mauri-

3.1 Monthly Data on Inflation

The country-level monthly data on headline consumer price indices are obtained from the World Bank.[3] As detailed in Ha, Kose, and Ohnsorge (2021), the main advantage of this data set (over others in the literature) is that it is a comprehensive monthly data covering a virtually global sample of countries over half a century. Specifically, based on alternative starting dates (that we consider for robustness), the data set provides a continuous balanced sample for several countries, which is essential for both the cross-sectional and time dimensions of the investigation. Since this data set is constructed by collecting data from cross-country and/or country-specific sources, it can be subject to structural changes over time (e.g., due to the definition of headline consumer price indices). Nevertheless, this is less of a concern in our empirical investigation, as we not only consider ten-year rolling windows for the inflation convergence analysis to control for structural changes over time but also include country-and-time fixed effects while investigating the drivers of inflation convergence and it speed.

The obtained monthly series are converted into inflation rates (e.g., π_t^i in Equation 1 representing inflation of country i at month t) by considering year-on-year log changes, which makes the inflation series independent of seasonality by construction. The corresponding summary of inflation rates across countries is given in Figure 1, where alternative balanced

tius, Malawi, Malaysia, Namibia, New Caledonia, Niger, Nigeria, Nicaragua, Netherlands, Norway, Nepal, New Zealand, Oman, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Paraguay, West Bank and Gaza, Qatar, Romania, Russian Federation, Rwanda, Saudi Arabia, Sudan, Senegal, Singapore, Solomon Islands, Sierra Leone, El Salvador, San Marino, Serbia, South Sudan, Sao Tome and Principe, Suriname, Slovakia, Slovenia, Sweden, Eswatini, Seychelles, Syrian Arab Republic, Chad, Togo, Thailand, Tajikistan, Timor-Leste, Tonga, Trinidad and Tobago, Tunisia, Turkey, Taiwan, China, Tanzania, United Rep., Uganda, Ukraine, Uruguay, United States, Uzbekistan, St. Vincent and the Grenadines, Venezuela, RB, Vietnam, Samoa, Kosovo, Yemen, Rep., South Africa, Zambia, Zimbabwe.

[3] Inflation data can be downloaded at the web page of https://www.worldbank.org/en/research/brief/inflation-database.

panels of countries are represented as the number of countries covered in the inflation data may change over time. As is evident, independent of the balanced panel considered, the median and average inflation rates (across countries) are reduced over time. This is also reflected in the standard deviation across countries as it also decreases over time, suggesting that inflation rates of countries are getting closer to each other. Needless to say, a formal investigation (as described above) is necessary to decide on the potential drivers of inflation convergence across these countries.

3.2 Annual Data on Standard Gravity Variables

The country-pair-level annual data on standard gravity variables ($\varphi^{ij,cur}$, $\varphi^{ij,fta}$, $\varphi^{ij,dis}$, $\varphi^{ij,bor}$, $\varphi^{ij,col}$, $\varphi^{ij,lan}$) are obtained from Centre d'Études Prospectives et d'Informations Internationales (CEPII).[4] In this data set, the variables of *comcur*, *fta_wto*, *contig*, *col45* and *comlang_off* have been used for $\varphi^{ij,cur}$, $\varphi^{ij,fta}$, $\varphi^{ij,bor}$, $\varphi^{ij,col}$ and $\varphi^{ij,lan}$, respectively, in this paper, whereas the log of *distw* has been used for $\varphi^{ij,dis}$.

Although the series of $\varphi^{ij,dis}$, $\varphi^{ij,bor}$, $\varphi^{ij,col}$ and $\varphi^{ij,lan}$ are virtually constant over time, $\varphi^{ij,cur}$ and $\varphi^{ij,fta}$ change over time as they depend on time-varying international arrangements. Accordingly, the corresponding summary of $\varphi^{ij,cur}$ and $\varphi^{ij,fta}$ over time are given in Figure 2, where, again, alternative balanced panels of countries (that are consistent with those in Figure 1) are represented.

As is evident, independent of the balanced panel considered, the percentage of countries having a common currency has increased from about 0.5% in 1980 to about 2.7% in 2010.

[4] The gravity data of CEPII has been downloaded in 2017 from http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp.

Similarly, the percentage of countries having a free trade agreement has increased from about 2% in 1970 to about 28% in 2010. Therefore, the reduction in the median inflation rate (and in the standard deviation of inflation across countries) over time in Figure 1 coincides with the increasing percentage of countries having a common currency or a free trade agreement. For sure, this relationship will be tested formally below.

4 Empirical Results

Unit root tests are achieved for each country pair and ten-year window considering alternative balanced panels (as data availability across countries is changing over time). As it is not possible to show and discuss all of these results, they are summarized in the following subsection. Afterwards, the unit root test results are connected to the standard gravity variables in the second and third subsections. Robustness checks are discussed in the last subsection. These results will be further discussed and connected to the existing literature in the following section.

4.1 Unit Root Test Results

The existence of inflation convergence C_w^{ij} is summarized across country pairs over time in Figures 3-6, where alternative balanced panels are considered. For each ten-year window (represented by the corresponding mid-year in the horizontal axes), the series represent the percentage of country pairs experiencing inflation convergence at the 5% level. Formally, for each balanced panel, we define $F_w(C_w^{ij})$ according to the following expression:

$$F_w\left(C_w^{ij}\right) = \frac{\sum_{ij} C_w^{ij}}{N_{ij}} \tag{9}$$

where N_{ij} is the number of country pairs. The series represented in Figures 3-6 represent ten-year moving averages of $F_w(C_w^{ij})$'s over time to focus on their long-term trends. As is evident, the percentages of country pairs experiencing inflation convergence range between 5% and 14% across different time periods and balanced panels.

The existence of inflation convergence is further summarized in Table 1, where the long-run averages (across ten-year rolling windows) for country pairs are considered. Formally, the first column of Table 1 summarizes the distribution of $T^{ij}(C_w^{ij})$ given by the following expression:

$$T^{ij}\left(C_w^{ij}\right) = \frac{\sum_{w} C_w^{ij}}{W} \tag{10}$$

where W is the number of ten-year windows. According to Table 1, the average (median) country pair has experienced inflation convergence by about 12% (7%) of the time, with a range between 0% and 100%. It is implied that certain country pairs have experienced inflation convergence for each and every ten-year window, whereas certain others have not experienced any inflation convergence in any of the ten-year windows.

When country pairs are split into alternative categories, the results are again given in Figures 3-6. Independent of the balanced panel considered, country pairs with a common currency, a free trade agreement or a common border have experienced inflation convergence relatively more than others. In comparison, country pairs with a colonial relationship or a common language have experienced relatively more inflation convergence only for the balanced panel of 2001-2020. Therefore, there is visual evidence for the standard gravity variables facilitating inflation convergence, although this observation will be investigated formally below.

Conditional on the existence of inflation convergence (i.e., for ij and w that satisfy $C_w^{ij} = 1$), the speed of inflation convergence measured by the corresponding half life in months, λ_w^{ij}, is summarized across country pairs over time in Figure 7 (as ten-year moving averages), where, again, alternative balanced panels are considered. Formally, for each balanced panel, the series in Figure 7 that can be denoted by $F_w\left(\lambda_w^{ij}\right)$ are obtained according to the following expression:

$$F_w\left(\lambda_w^{ij}\right) = \begin{cases} \text{Median}_{ij}\left(\lambda_w^{ij}\right) \\ \text{Minimum}_{ij}\left(\lambda_w^{ij}\right) \\ \text{Maximum}_{ij}\left(\lambda_w^{ij}\right) \end{cases} \tag{11}$$

where we consider their ten-year moving averages to focus on their long-term trends. As is evident, the median half-life (across country pairs) is mostly around 5 months, although there is evidence for its volatility over time. There is also a significant difference across country pairs, when the minimum and maximum half-life measures (across country pairs) are considered over time.

The speed of inflation convergence (conditional on the existence of inflation convergence) is further summarized in Table 1, where the long-run averages (across ten-year rolling windows) for country pairs are considered. Formally, the second column of Table 1 summarizes the distribution of $T^{ij}\left(\lambda_w^{ij}\right)$ given by the following expression:

$$T^{ij}\left(\lambda_w^{ij}\right) = \frac{\sum_w \lambda_w^{ij}}{W} \tag{12}$$

where W is the number of ten-year windows. As is evident in Table 1, the average (median) country pair has experienced inflation convergence with a half-life of about 6.7 (5.1) months, with a range between 0.3 and 45.7 months. Hence, certain country pairs have experienced inflation convergence in a much faster way compared to certain others.

Overall, the results in Figures 3-7 and Table 1 suggest that there is evidence for inflation convergence and its speed changing both over time and across country pairs in a significant way. We are interested in investigating this heterogeneity by considering the role of standard gravity variables, as we achieve in the next subsections.

4.2 Drivers of Inflation Convergence

Estimation results based on Equation 7 are given in Table 2, where all regressions include country-and-time fixed effects. The results are again provided for alternative balanced panels. The first column of each balanced panel shows the estimation results based on univariate regressions as gravity variables can be correlated with each other (e.g., the first row shows the results when only common currency is included in the regression), whereas the second column of each balanced panel shows the estimation results when all gravity variables are included in the regression for robustness purposes.

Depending on alternative balanced panel considered, having a common currency, a free trade agreement, a common border or a colonial relationship in the current period increases the probability of inflation convergence within the next ten years when univariate regressions are used. In contract, the probability of inflation convergence within the next ten years decreases with distance across countries, and the effects of having a common language are statistically insignificant when univariate regressions are used. As all regressions include country-and-time fixed effects, these results are robust to the consideration of any country-specific factors that may change across ten-year windows.

Regarding the corresponding magnitudes in univariate regressions, the probability of inflation convergence increases with having a common currency by up to 13%, with having a free trade agreement up to 3%, with having a common border up to 5%, and with having a colonial relationship up to 4% in a statistically significant way. In contrast, doubling distance between countries decreases their probability of inflation convergence up to about 1%.

Overall, depending on alternative balanced panels and robust to the consideration of country-and-time specific factors, all standard gravity variables (but having a common language) are effective in explaining the existence of inflation convergence.

4.3 Drivers of the Speed of Inflation Convergence

Estimation results based on Equation 8 are given in Table 3, where all regressions again include country-and-time fixed effects. The results are again provided for alternative balanced panels. As in Table 2, the first column of each balanced panel shows the estimation results based on univariate regressions as gravity variables can be correlated with each other, whereas the second column of each balanced panel shows the estimation results when all gravity variables are included in the regression for robustness purposes.

When univariate regressions are considered, having a common currency reduces the half-life of inflation convergence up to 1.8 months, having a free trade agreement reduces it up to 0.5 months, doubling the distance between countries increases it up to 0.2 months, having a common border reduces it up to 1.2 months, and having a colonial relationship reduces it up to 0.4 months. Having a common language is again statistically insignificant in all balanced panels.

Overall, depending on alternative balanced panels and robust to the consideration of country-and-time specific factors, all standard gravity variables (but having a common language) are effective in explaining the speed of inflation convergence as well.

4.4 Robustness Checks

In this subsection, we conduct robustness checks based on (1) potential measurement errors and (2) an alternative window length for investigating inflation convergence and its drivers. As in the benchmark case, all regressions include country-and-time fixed effects to control for any country-specific factors that may change across ten-year windows.

As collection of inflation data in low-income countries may be problematic and subject to measurement errors, as the first robustness check, we replicate our empirical investigation by ignoring countries with per capita income lower than $1,000. In this case, the drivers of inflation convergence (replacing Table 2) are depicted in Table 4. When univariate regressions are considered, the probability of inflation convergence increases with having a common currency by up to 14%, with having a free trade agreement up to 2%, with having a common border up to 5%, and with having a colonial relationship up to 6% in a statistically significant way. In contrast, doubling distance between countries decreases their probability of inflation convergence up to about 1%.

For the first robustness check, the drivers of the speed of inflation convergence (replacing Table 3) are given in Table 5. When univariate regressions are considered, having a common currency reduces the half-life of inflation convergence up to 0.9 months, having a free trade agreement reduces it up to 0.3 months, doubling the distance between countries increases it up to 0.2 months, and having a common border reduces it up to 1.1 months in a statistically significant way. In contrast, having a colonial relationship or a common language is statistically insignificant in all balanced panels.

Although certain magnitudes are slightly different, these results are highly consistent with those in our benchmark case represented by Table 2 and Table 3, supporting the robustness of our investigation based on measurement errors in low-income countries.

The second robustness check replicates the empirical investigation by using twenty-year windows while investigating inflation convergence across countries as it may take time as suggested in studies such as by Phylaktis and Ravazzolo (2005). In this case, the drivers of inflation convergence (replacing Table 2) are depicted in Table 6, where the results are presented for only three balanced panels due to having twenty-year windows. When univariate regressions are considered, the probability of inflation convergence increases with having a common currency by up to 26%, with having a free trade agreement up to 9%, with having a common border up to 20%, with having a colonial relationship up to 7%, and with having a common language up to 3% in a statistically significant way. In contrast, doubling distance between countries decreases their probability of inflation convergence up to about 3%. As the magnitude of these results is much bigger than those in Table 2, it is implied that the standard gravity variables of the current year are more effective on inflation convergence within the next twenty years in comparison to within the next ten years.

The drivers of the speed of inflation convergence (replacing Table 3) are given in Table 7 for the second robustness check. When univariate regressions are considered, having a common currency reduces the half-life of inflation convergence up to 7.1 months, having a free trade agreement reduces it up to 1.7 months, doubling the distance between countries increases it up to 1.1 months, having a common border reduces it up to 4.5 months, having a colonial relationship reduces it up to 2.3 months, and having a common language reduces it up to 1.8 months in a statistically significant way. Compared to the benchmark results in Table 3, these effects are much bigger, suggesting that the standard gravity variables of the current year are more effective on reducing the half-life of inflation convergence within the next twenty years in comparison to within the next ten years.

Overall, both robustness checks support the benchmark results quantitatively, although certain magnitudes are different, especially when twenty-year windows are considered for the inflation convergence investigation. This result is in line with the idea of inflation convergence taking time.

5 Discussion of Results and Policy Implications

The empirical results suggesting half-lives of about 6.7 months (on average across country pairs and ten-year windows), with a range between 0.3 and 45.7 months, is in line with earlier studies such as by Ceglowski (2003), Fan and Wei (2006), Das and Bhattacharya (2008) or Crucini and Shintani (2008) who have estimated half-lives between 0.75 and 23 months for alternative country or city pairs. As this paper covers the most number of countries for the longest monthly sample period possible, the results in this paper also shed light on the heterogeneity of half-life measures across these studies, as we discuss next by making connections to the standard gravity variables.

Specifically, when the heterogeneity across country pairs regarding their inflation convergence and the corresponding half-lives is investigated in secondary analyses by estimating the effects of standard gravity variables in the current year on the inflation convergence and its speed within the next ten years, the corresponding results suggest that robust to the consideration of country-and-time fixed effects, having a common currency, a free trade agreement, proximity, a common border, or a colonial relationship between countries individually increases the probability of inflation convergence. This is consistent with studies such as by Holmes (1998), Auer and Mehrotra (2014), Auer, Levchenko, and Sauré (2019) or Liu and Lee (2021) who have shown or discussed the importance of international trade (that can be captured by the standard gravity variables in this paper) in explaining international inflation spillovers and thus inflation convergence. In terms of the corresponding magnitudes, the effects of having a common currency on inflation convergence is shown to dominate those of other gravity variables, consistent with earlier international trade studies such as by Glick and Rose (2002) who have shown that the effects of having a common currency on international trade dominate those of other gravity variables.

Regarding policy suggestions, it is implied that inflation convergence can be achieved by having a common currency or a free trade agreement, although the former is more effective in terms of the corresponding magnitude. As inflation convergence across countries is an indicator of welfare improvement, the results in this paper confirm that it can be achieved through these international policies.

6 Conclusion

This paper has investigated the inflation convergence of country pairs considering ten-year windows for the monthly period between January 1971 and December 2020 covering 184 countries. The average (median) country pair has experienced inflation convergence by about 12% (7%) across ten-year windows. Certain country pairs have experienced inflation convergence for each and every ten-year window, whereas certain others have not experienced any inflation convergence in any of the ten-year windows. Conditional on having convergence, the corresponding speed of convergence results suggest that the average (median) country pair has experienced inflation convergence with a half-life of about 6.7 (5.1) months, with a range between 0.3 and 45.7 months across country pairs.

It is implied that there is significant evidence for heterogeneity across country pairs regarding their inflation convergence and the corresponding half-lives. This heterogeneity has been further investigated in secondary analyses by estimating the effects of standard gravity variables in the current year on the inflation convergence and its speed within the next ten years. The results suggest that having a common currency, a free trade agreement, proximity, a common border, or a colonial relationship between countries individually increases the probability of inflation convergence. Among these, having a common currency has the biggest impact (in terms of magnitude) on both the existence of inflation convergence and the corresponding speed.

Regarding policy implications, as inflation convergence across countries is an indicator of welfare improvement, international policies toward having a common currency or a free trade agreement would be beneficial for countries in a significant way. As having a common currency dominates the effects of other gravity variables, policy makers may want to prioritize having common currencies with other countries if they would like to benefit more from welfare-improving inflation convergence with other countries. These implications are robust to the consideration of not only country-and-time specific factors but also certain measurement errors and alternative window lengths used for the investigation of inflation convergence.

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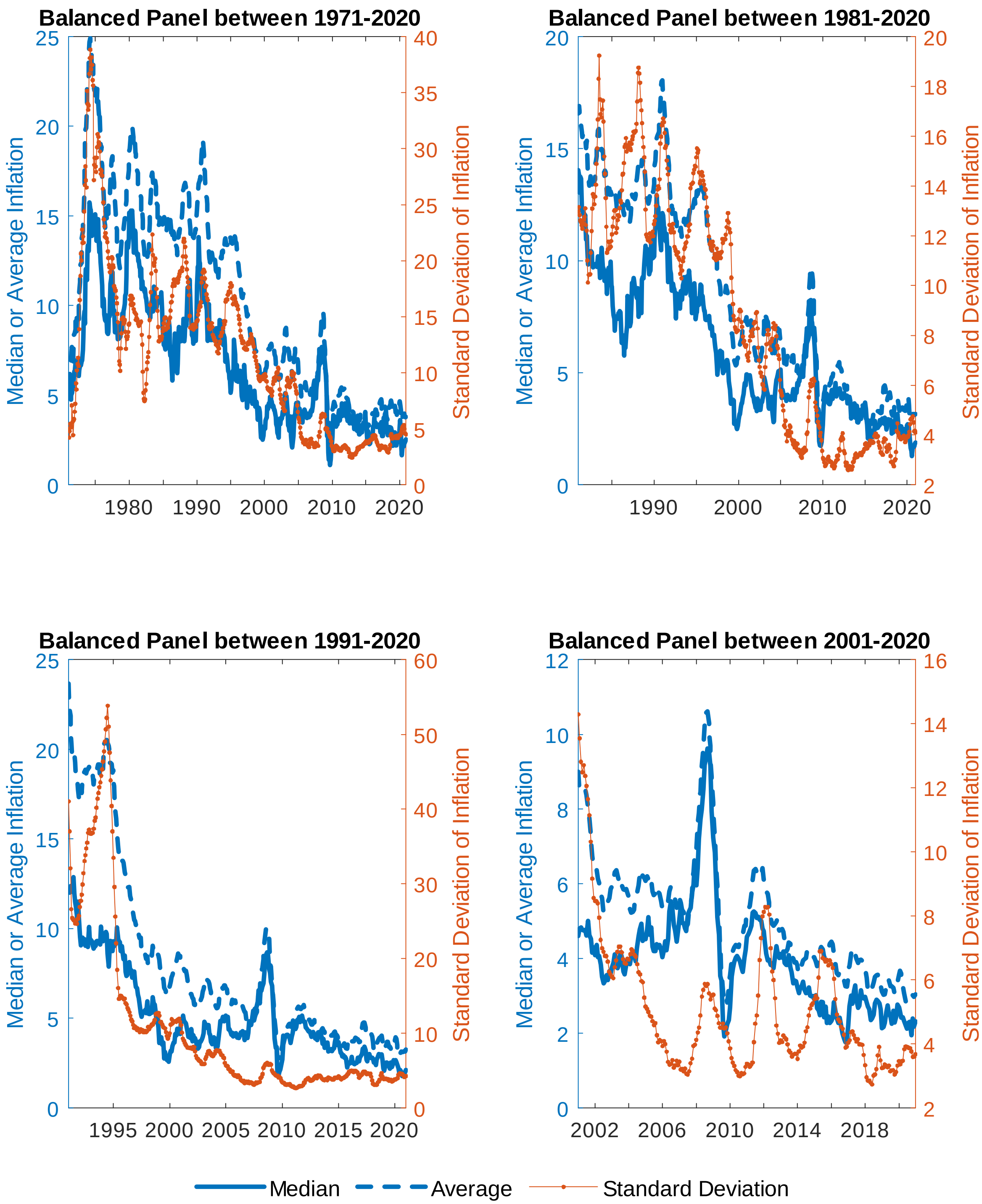
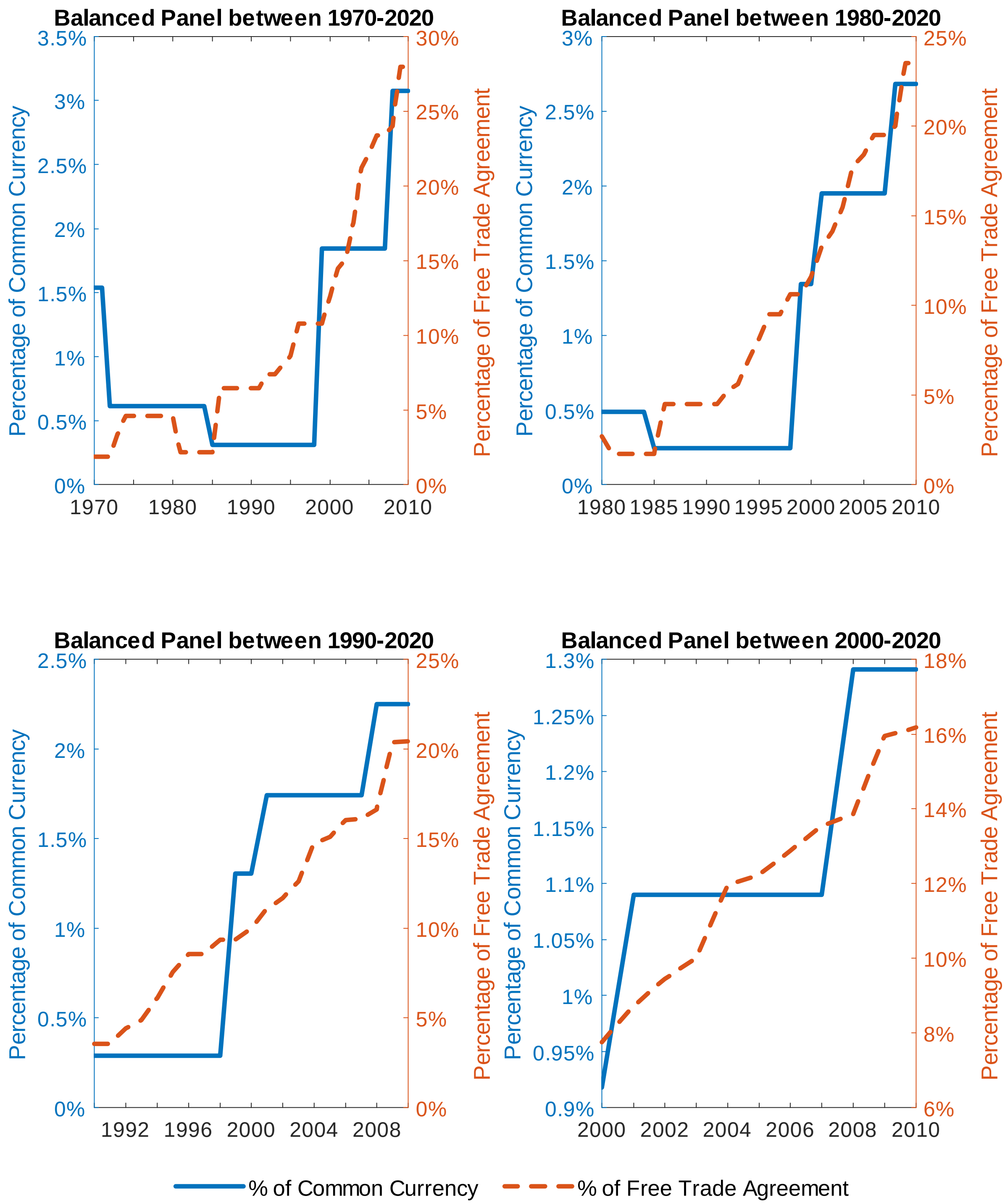
Figure 1 - Inflation Rates across Countries



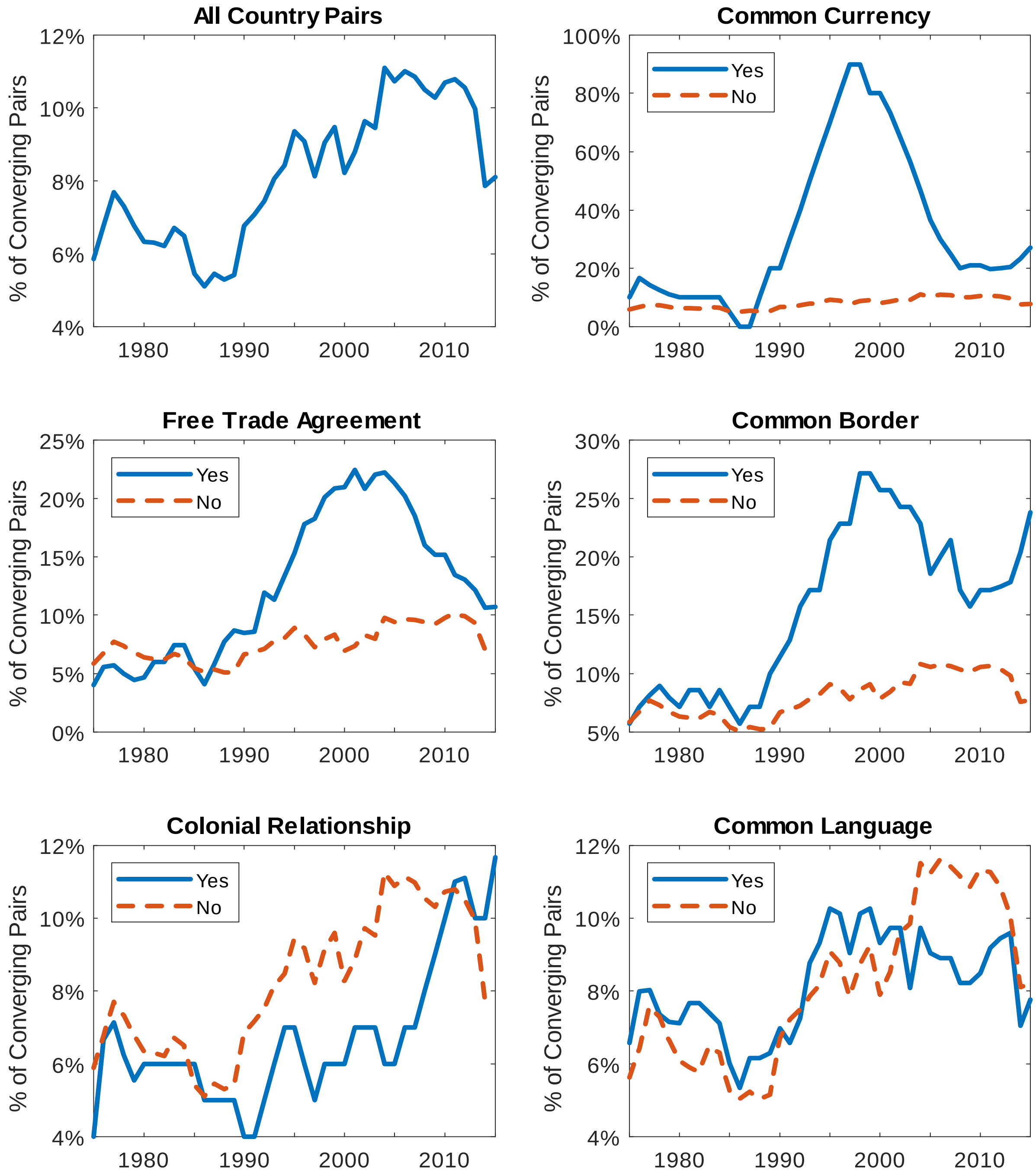
Notes: Series represent the median, average and standard deviation of year-on-year monthly inflation across countries for each year.

Figure 2 - Time-Varying Gravity Variables



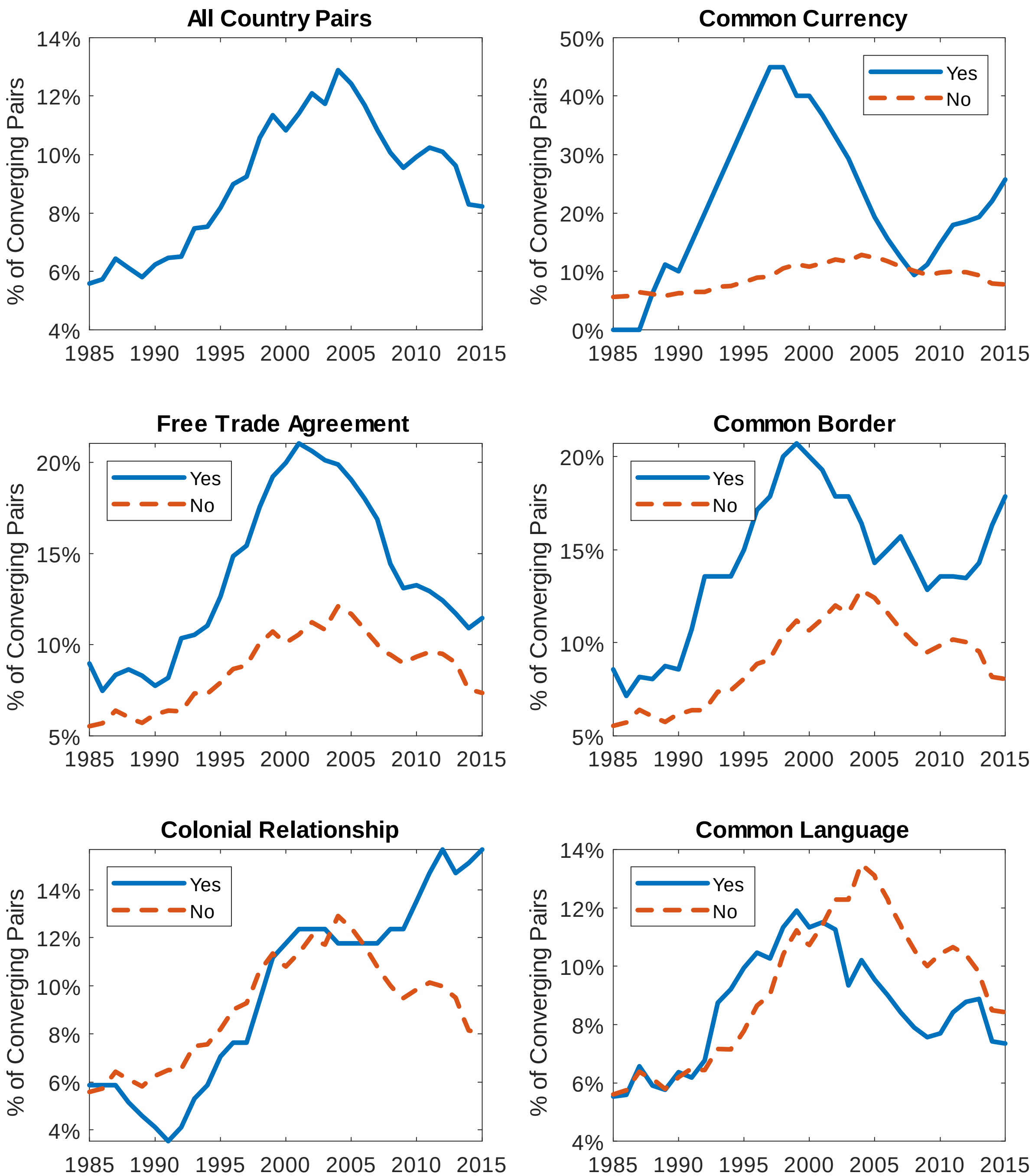
Notes: Series represent the percentage of country pairs having a common currency or a free trade agreement within each year. Other gravity variables (which are not shown here) are virtually constant over time.

Figure 3 - Existence of Inflation Convergence for Balanced Panel of 1971-2020



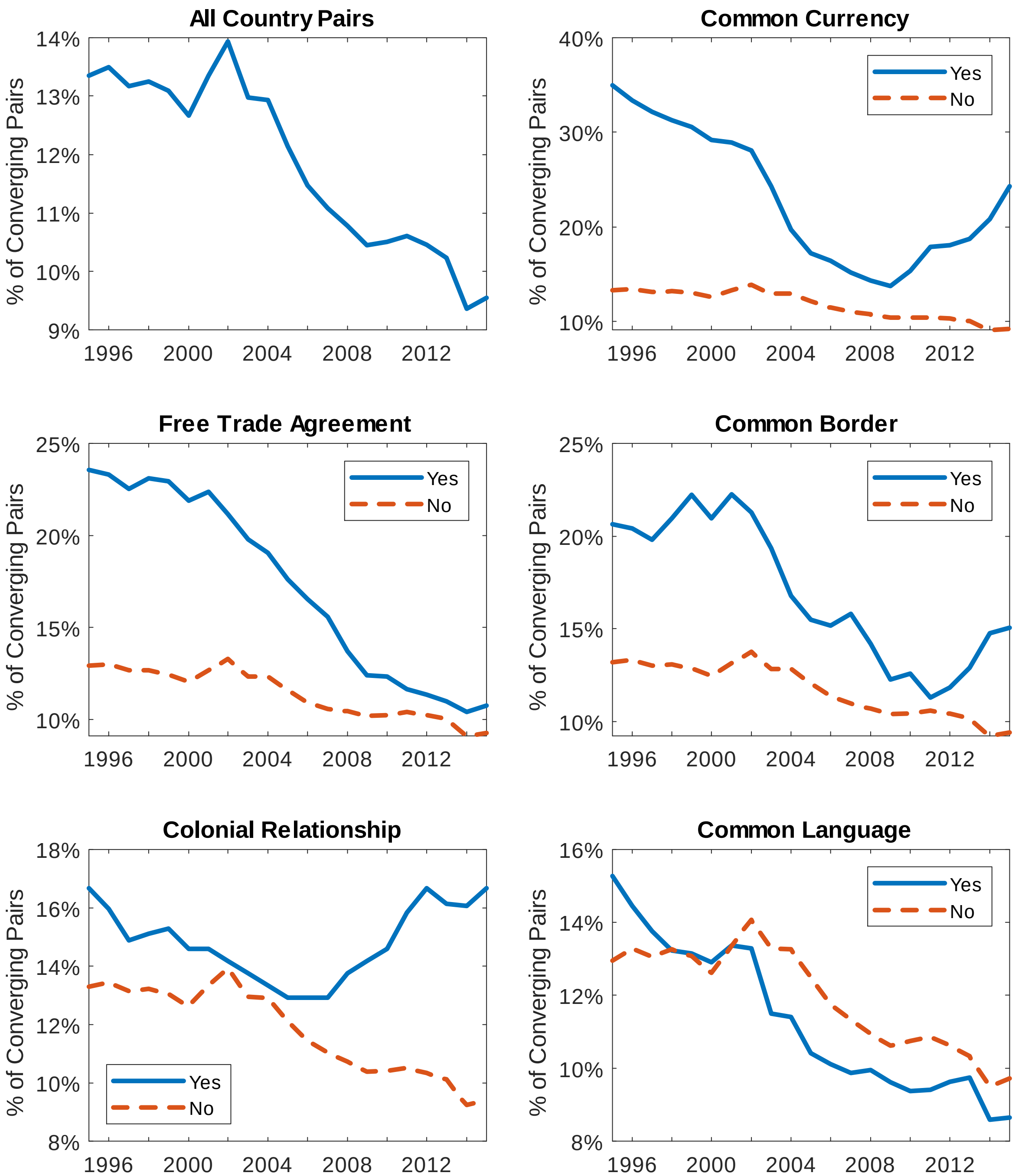
Notes: Series represent percentage of country pairs experiencing inflation convergence at the 5% level.

Figure 4 - Existence of Inflation Convergence for Balanced Panel of 1981-2020



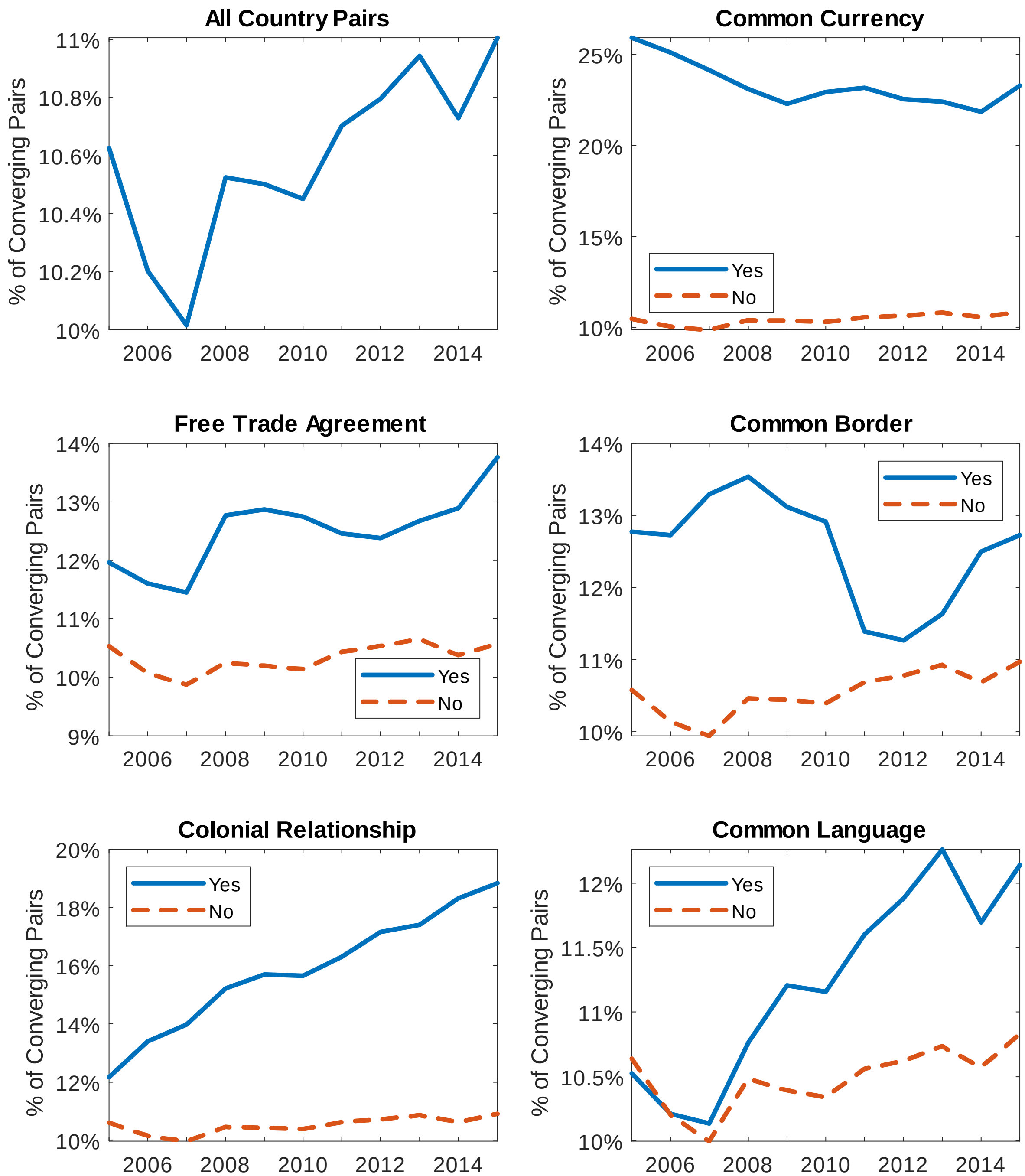
Notes: Series represent percentage of country pairs experiencing inflation convergence at the 5% level.

Figure 5 - Existence of Inflation Convergence for Balanced Panel of 1991-2020



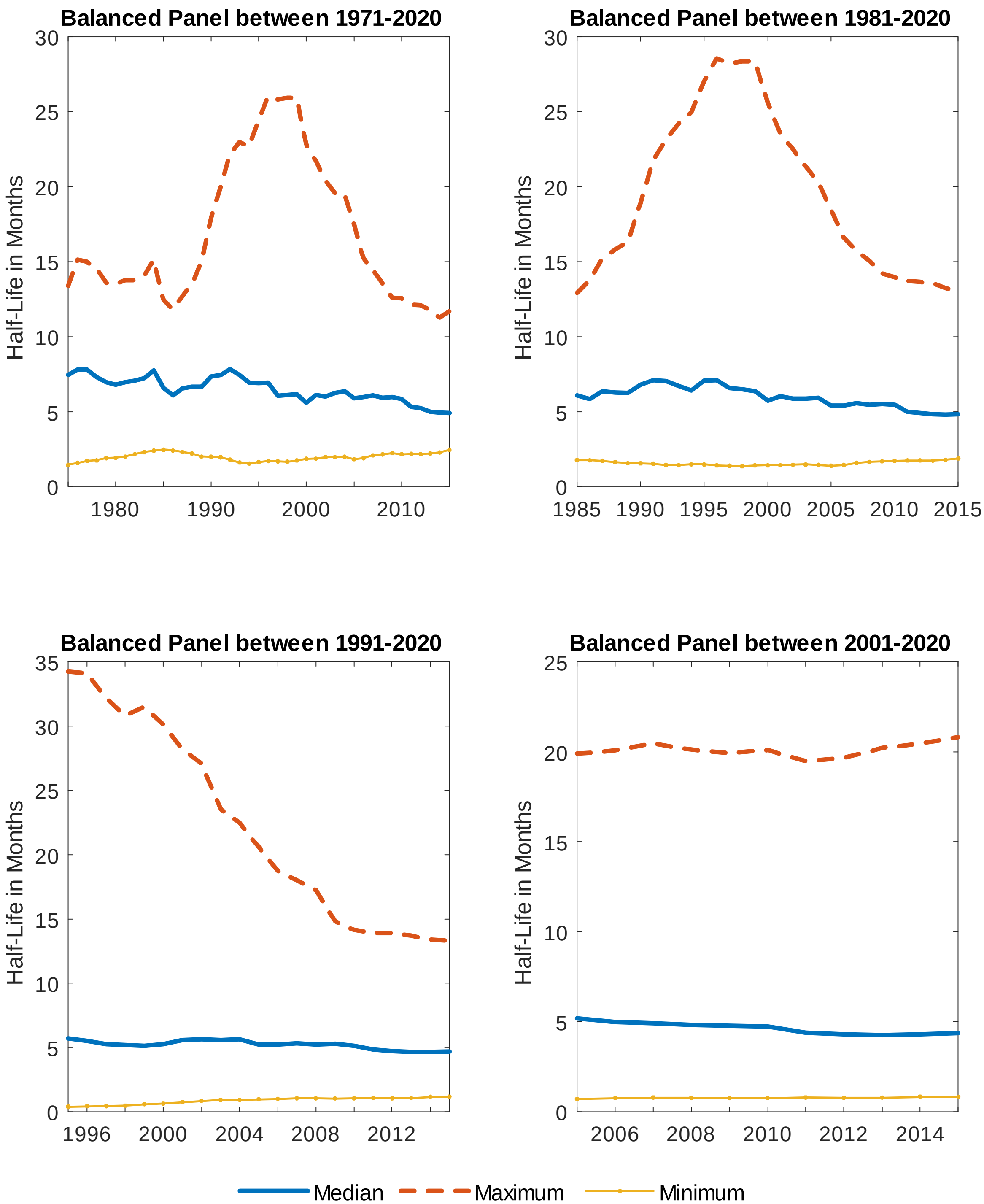
Notes: Series represent percentage of country pairs experiencing inflation convergence at the 5% level.

Figure 6 - Existence of Inflation Convergence for Balanced Panel of 2001-2020



Notes: Series represent percentage of country pairs experiencing inflation convergence at the 5% level.

Figure 7 - Half-Life of Inflation Convergence



Notes: Series represent half-life of inflation convergence in months conditional on convergence. Median, minimum and maximum are calculated across country pairs for each year.

Table 1 - Summary of Unit-Root Test Results

	Convergence at 5%	Half-Life in Months
Average across Country Pairs	12%	6.7
Standard Deviation across Country Pairs	16%	4.9
Minimum across Country Pairs	0%	0.3
25th Percentile across Country Pairs	0%	3.2
Median across Country Pairs	7%	5.1
75th Percentile across Country Pairs	17%	8.9
Maximum across Country Pairs	100%	45.7

Notes: The numbers represent statistics based on the long-run average (across ten-year rolling windows) for country pairs.

Table 2 - Drivers of Inflation Convergence for Balanced Panels

	Dependent Variable: Existence of Inflation Convergence							
	Balanced Panel of 1971-2020		Balanced Panel of 1981-2020		Balanced Panel of 1991-2020		Balanced Panel of 2001-2020	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
Common Currency	0.132***	0.121***	0.0587*	0.0420	0.0555*	0.0404	0.0623*	0.0614*
	(0.0346)	(0.0337)	(0.0271)	(0.0268)	(0.0258)	(0.0259)	(0.0243)	(0.0245)
Free Trade Agreement	0.0223	0.0155	0.0200*	0.00879	0.0262**	0.0189*	0.00815	-0.000494
	(0.0142)	(0.0151)	(0.0100)	(0.0106)	(0.00882)	(0.00940)	(0.00650)	(0.00707)
Log Distance	-0.00462	0.00136	-0.00888**	-0.00702*	-0.00876**	-0.00488+	-0.00600*	-0.00583*
	(0.00395)	(0.00387)	(0.00283)	(0.00299)	(0.00284)	(0.00294)	(0.00239)	(0.00283)
Common Border	0.0480*	0.0190	0.0403**	0.0204	0.0231+	-0.000763	0.0138	-0.00434
	(0.0212)	(0.0205)	(0.0155)	(0.0161)	(0.0136)	(0.0147)	(0.0108)	(0.0122)
Colonial Relationship	-0.00811	0.000917	0.00253	0.0138	0.00346	0.0137	0.0422**	0.0487**
	(0.0103)	(0.0117)	(0.0135)	(0.0138)	(0.0155)	(0.0154)	(0.0159)	(0.0160)
Common Language	-0.00858	-0.0125*	-0.00577	-0.0138**	-0.00100	-0.00858+	0.00141	-0.00782
	(0.00548)	(0.00586)	(0.00460)	(0.00457)	(0.00491)	(0.00496)	(0.00547)	(0.00565)
Country-and-Time Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sample Size	13243	13243	25358	25358	28896	28896	38324	38324
R-Squared	0.437	0.437	0.379	0.379	0.359	0.360	0.275	0.275
Adjusted R-Squared	0.338	0.338	0.313	0.314	0.308	0.308	0.239	0.239

Notes: +, *, ** and *** represent significance at the 10%, 5%, 1% and 0.1% levels. Two-way cluster robust standard errors (at the country-and-time level) are given in parentheses. Inflation convergence is based on the 5% significance level using 10-year windows. Country-and-time fixed effects are included for each individual country within any country pair. Univariate represents regressions results based on univariate regressions (e.g., common currency as being the only independent variable, together with country-and-time fixed effects), whereas Multivariate represents regressions based on all gravity variables as dependent variables (together with country-and-time fixed effects). In the case of univariate regressions, Sample Size, R-Squared and Adjusted R-Squared represent the averages across univariate regressions.

Table 3 - Drivers of the Speed of Inflation Convergence for Balanced Panels

	Dependent Variable: Half-Life of Inflation Convergence in Months							
	Balanced Panel of 1971-2020		Balanced Panel of 1981-2020		Balanced Panel of 1991-2020		Balanced Panel of 2001-2020	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
Common Currency	-1.800*	-1.914+	-0.930**	-0.534	-0.996***	-0.579*	0.182	0.210
	(0.729)	(1.112)	(0.328)	(0.410)	(0.273)	(0.272)	(0.199)	(0.201)
Free Trade Agreement	-0.492	-0.622	0.239	0.642+	-0.457+	-0.175	-0.0838	-0.117
	(0.865)	(0.902)	(0.346)	(0.380)	(0.244)	(0.296)	(0.132)	(0.161)
Log Distance	0.0878	-0.0627	0.137	0.210+	0.181*	0.0115	-0.00651	-0.0353
	(0.302)	(0.265)	(0.103)	(0.111)	(0.0744)	(0.0933)	(0.0525)	(0.0705)
Common Border	-1.012	-0.417	-0.956*	-0.710	-1.169***	-0.920**	-0.194	-0.273
	(0.841)	(0.994)	(0.472)	(0.513)	(0.288)	(0.305)	(0.209)	(0.224)
Colonial Relationship	-0.792	-1.582+	-0.559	-0.516	-0.413+	-0.492+	-0.210	-0.245
	(0.652)	(0.906)	(0.396)	(0.451)	(0.241)	(0.263)	(0.186)	(0.194)
Common Language	0.508	0.957**	-0.148	0.0509	-0.208	-0.0152	0.0680	0.0975
	(0.334)	(0.328)	(0.203)	(0.216)	(0.136)	(0.147)	(0.101)	(0.106)
Country-and-Time Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sample Size	600	600	1713	1713	2926	2926	3843	3843
R-Squared	0.949	0.950	0.881	0.881	0.932	0.932	0.853	0.853
Adjusted R-Squared	0.861	0.862	0.769	0.770	0.890	0.890	0.790	0.790

Notes: +, *, ** and *** represent significance at the 10%, 5%, 1% and 0.1% levels. Two-way cluster robust standard errors (at the country-and-time level) are given in parentheses. Inflation convergence is based on the 5% significance level using 10-year windows. Country-and-time fixed effects are included for each individual country within any country pair. Univariate represents regressions results based on univariate regressions (e.g., common currency as being the only independent variable, together with country-and-time fixed effects), whereas Multivariate represents regressions based on all gravity variables as dependent variables (together with country-and-time fixed effects). In the case of univariate regressions, Sample Size, R-Squared and Adjusted R-Squared represent the averages across univariate regressions.

Table 4 - Robustness #1: Drivers of Inflation Convergence for Balanced Panels

	Dependent Variable: Existence of Inflation Convergence							
	Balanced Panel of 1971-2020		Balanced Panel of 1981-2020		Balanced Panel of 1991-2020		Balanced Panel of 2001-2020	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
Common Currency	0.142***	0.136***	0.0488+	0.0402	0.0578*	0.0444	0.0395	0.0357
	(0.0392)	(0.0405)	(0.0271)	(0.0271)	(0.0278)	(0.0282)	(0.0308)	(0.0308)
Free Trade Agreement	-0.00773	-0.0256	-0.00565	-0.0157	0.0179+	0.00734	0.00191	-0.00771
	(0.0165)	(0.0189)	(0.0121)	(0.0136)	(0.0109)	(0.0124)	(0.00856)	(0.00938)
Log Distance	-0.00523	-0.00744	-0.00407	-0.00657	-0.00887*	-0.00573	-0.00562+	-0.00535
	(0.00574)	(0.00681)	(0.00413)	(0.00490)	(0.00383)	(0.00451)	(0.00333)	(0.00396)
Common Border	0.0521*	0.0221	0.0452*	0.0407+	0.0394*	0.0220	0.0228	0.00764
	(0.0248)	(0.0261)	(0.0200)	(0.0211)	(0.0181)	(0.0197)	(0.0148)	(0.0159)
Colonial Relationship	0.00171	0.00602	0.0252	0.0381+	0.0491*	0.0617**	0.0577*	0.0556*
	(0.0181)	(0.0199)	(0.0201)	(0.0211)	(0.0234)	(0.0237)	(0.0241)	(0.0242)
Common Language	-0.00665	-0.0187	-0.00612	-0.0195+	0.000853	-0.0167+	0.0108	0.00125
	(0.0114)	(0.0132)	(0.00918)	(0.0100)	(0.00878)	(0.00924)	(0.00891)	(0.00951)
Country-and-Time Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sample Size	6235	6235	12335	12335	15317	15317	21008	21008
R-Squared	0.457	0.458	0.383	0.384	0.357	0.358	0.291	0.292
Adjusted R-Squared	0.315	0.315	0.287	0.288	0.286	0.286	0.244	0.244

Notes: +, *, ** and *** represent significance at the 10%, 5%, 1% and 0.1% levels. The regressions exclude countries with per capita income below $1,000 to check for robustness. Two-way cluster robust standard errors (at the country-and-time level) are given in parentheses. Inflation convergence is based on the 5% significance level using 10-year windows. Country-and-time fixed effects are included for each individual country within any country pair. Univariate represents regressions results based on univariate regressions (e.g., common currency as being the only independent variable, together with country-and-time fixed effects), whereas Multivariate represents regressions based on all gravity variables as dependent variables (together with country-and-time fixed effects). In the case of univariate regressions, Sample Size, R-Squared and Adjusted R-Squared represent the averages across univariate regressions.

Table 5 - Robustness #1: Drivers of the Speed of Inflation Convergence for Balanced Panels

	Dependent Variable: Half-Life of Inflation Convergence in Months							
	Balanced Panel of 1971-2020		Balanced Panel of 1981-2020		Balanced Panel of 1991-2020		Balanced Panel of 2001-2020	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
Common Currency	-0.560	-0.941	-0.708*	-0.332	-0.920**	-0.474	-0.575*	-0.496*
	(0.620)	(1.175)	(0.290)	(0.383)	(0.306)	(0.314)	(0.267)	(0.250)
Free Trade Agreement	-0.789	-1.200	0.187	0.466	-0.324	0.0581	-0.307+	-0.326
	(1.250)	(1.516)	(0.442)	(0.473)	(0.278)	(0.325)	(0.165)	(0.201)
Log Distance	0.212	-0.0856	0.0902	0.100	0.191*	0.0560	0.0374	-0.116
	(0.436)	(0.426)	(0.130)	(0.138)	(0.0911)	(0.103)	(0.0584)	(0.0918)
Common Border	-0.416	0.391	-0.723+	-0.546	-1.107***	-0.899**	-0.525*	-0.446
	(0.885)	(1.083)	(0.435)	(0.467)	(0.323)	(0.339)	(0.255)	(0.284)
Colonial Relationship	-1.450	-2.648*	-0.411	-0.180	-0.378	-0.354	-0.285	-0.272
	(1.040)	(1.331)	(0.397)	(0.444)	(0.292)	(0.314)	(0.225)	(0.230)
Common Language	0.0274	0.651	-0.318	-0.181	-0.315	-0.0798	-0.119	-0.0389
	(0.612)	(0.665)	(0.262)	(0.309)	(0.194)	(0.213)	(0.121)	(0.133)
Country-and-Time Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sample Size	294	294	1032	1032	1707	1707	2431	2431
R-Squared	0.968	0.969	0.924	0.925	0.951	0.952	0.865	0.866
Adjusted R-Squared	0.892	0.889	0.834	0.833	0.912	0.913	0.794	0.794

Notes: +, *, ** and *** represent significance at the 10%, 5%, 1% and 0.1% levels. The regressions exclude countries with per capita income below $1,000 to check for robustness. Two-way cluster robust standard errors (at the country-and-time level) are given in parentheses. Inflation convergence is based on the 5% significance level using 10-year windows. Country-and-time fixed effects are included for each individual country within any country pair. Univariate represents regressions results based on univariate regressions (e.g., common currency as being the only independent variable, together with country-and-time fixed effects), whereas Multivariate represents regressions based on all gravity variables as dependent variables (together with country-and-time fixed effects). In the case of univariate regressions, Sample Size, R-Squared and Adjusted R-Squared represent the averages across univariate regressions.

Table 6 - Robustness #2: Drivers of Inflation Convergence for Balanced Panels

	Dependent Variable: Existence of Inflation Convergence					
	Balanced Panel of 1971-2020		Balanced Panel of 1981-2020		Balanced Panel of 1991-2020	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
Common Currency	0.252***	0.143**	0.260***	0.190**	0.194**	0.171**
	(0.0629)	(0.0534)	(0.0634)	(0.0596)	(0.0592)	(0.0580)
Free Trade Agreement	0.0915***	0.0280	0.0586**	0.0174	0.0280	0.0219
	(0.0274)	(0.0288)	(0.0219)	(0.0231)	(0.0203)	(0.0222)
Log Distance	-0.0338***	-0.0165**	-0.0262***	-0.0153**	-0.00618	0.00642
	(0.00612)	(0.00610)	(0.00530)	(0.00548)	(0.00584)	(0.00665)
Common Border	0.200***	0.124***	0.155***	0.0998***	0.0558*	0.0363
	(0.0347)	(0.0334)	(0.0293)	(0.0279)	(0.0247)	(0.0250)
Colonial Relationship	0.0707***	0.0714***	0.0613**	0.0668**	0.0517+	0.0456
	(0.0172)	(0.0198)	(0.0211)	(0.0218)	(0.0287)	(0.0287)
Common Language	0.0191*	-0.00636	0.0174+	-0.00631	0.0262*	0.0188+
	(0.00942)	(0.00949)	(0.00938)	(0.00890)	(0.0110)	(0.0109)
Country-and-Time Fixed Effects	YES	YES	YES	YES	YES	YES
Sample Size	10013	10013	17178	17178	15136	15136
R-Squared	0.486	0.491	0.428	0.430	0.443	0.443
Adjusted R-Squared	0.397	0.402	0.368	0.370	0.398	0.398

Notes: +, *, ** and *** represent significance at the 10%, 5%, 1% and 0.1% levels. Two-way cluster robust standard errors (at the country-and-time level) are given in parentheses. Inflation convergence is based on the 5% significance level using 20-year windows. Country-and-time fixed effects are included for each individual country within any country pair. Univariate represents regressions results based on univariate regressions (e.g., common currency as being the only independent variable, together with country-and-time fixed effects), whereas Multivariate represents regressions based on all gravity variables as dependent variables (together with country-and-time fixed effects). In the case of univariate regressions, Sample Size, R-Squared and Adjusted R-Squared represent the averages across univariate regressions.

Table 7 - Robustness #2: Drivers of the Speed of Inflation Convergence for Balanced Panels

	Dependent Variable: Half-Life of Inflation Convergence in Months					
	Balanced Panel of 1971-2020		Balanced Panel of 1981-2020		Balanced Panel of 1991-2020	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
Common Currency	-7.059***	-4.371***	-4.835***	-4.207***	-2.822***	-2.322***
	(0.898)	(0.996)	(0.909)	(0.882)	(0.728)	(0.644)
Free Trade Agreement	-1.670+	0.337	0.422	1.007	-0.228	0.448
	(0.895)	(0.929)	(0.570)	(0.616)	(0.532)	(0.589)
Log Distance	1.085***	0.662*	0.145	0.0212	0.157	-0.0854
	(0.300)	(0.317)	(0.153)	(0.135)	(0.148)	(0.139)
Common Border	-4.528***	-1.331	-1.813+	-1.345	-2.264***	-2.569***
	(1.211)	(1.383)	(0.951)	(1.079)	(0.648)	(0.750)
Colonial Relationship	-1.630**	-0.737	-2.316***	-1.827***	-1.124*	-1.347**
	(0.615)	(0.755)	(0.504)	(0.535)	(0.453)	(0.519)
Common Language	-1.801***	-1.059*	-0.648*	-0.302	-0.0600	0.165
	(0.454)	(0.425)	(0.295)	(0.275)	(0.229)	(0.236)
Country-and-Time Fixed Effects	YES	YES	YES	YES	YES	YES
Sample Size	1460	1460	3757	3757	4310	4310
R-Squared	0.905	0.908	0.829	0.830	0.909	0.910
Adjusted R-Squared	0.823	0.827	0.754	0.756	0.884	0.885

Notes: +, *, ** and *** represent significance at the 10%, 5%, 1% and 0.1% levels. Two-way cluster robust standard errors (at the country-and-time level) are given in parentheses. Inflation convergence is based on the 5% significance level using 20-year windows. Country-and-time fixed effects are included for each individual country within any country pair. Univariate represents regressions results based on univariate regressions (e.g., common currency as being the only independent variable, together with country-and-time fixed effects), whereas Multivariate represents regressions based on all gravity variables as dependent variables (together with country-and-time fixed effects). In the case of univariate regressions, Sample Size, R-Squared and Adjusted R-Squared represent the averages across univariate regressions.