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# ▶ Participation and employment in seven developing economies: an Age-Period-Cohort Analysis

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## ► Abstract

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This paper aims at comparing various characteristics of labour force participation and employment, either formal or informal, for both men and women in several emerging or developing economies of different regions using pseudo panels and the Age-Period-Cohort (APC) method. This study allows us to disentangle the effects of three factors (age-effect, time/period-effect and cohort effect), which shape participation and employment patterns, and understand better how the life-courses of individuals are influenced by these three factors. The authors provide detailed results for each of these effects and put a specific focus on the case of women. Differences in the age profile of women are observed according to the respective country analysed. The analysis of time-effect allows us to observe a clear and consistent pattern of increased female participation in cases of medium and large recessions in the countries concerned. This confirms the hypothesis of an added worker effect, i.e. an increase in the labour supply of women when their husbands' income decreases due to unemployment or reduction in working hours. Finally, regarding cohort effects, the authors observe different behaviours of the newer generation, which depend on gender and other characteristics, such as the level of education. The long-term evolution of male and female participation could indicate that those will not increase naturally in the coming years simply through generations renewal.

Keywords: Age-period-cohort analysis, labour market transitions, labour market, female labour supply, emerging economies, pseudo panels

**The views expressed in this background paper are those of the authors and do not necessarily represent the views of the organizations where the researchers are based.**

## 1. Introduction<sup>1</sup>

Our life courses are defined by the transitions we make including the move from education to work, changes in jobs, and the transitions between paid and unpaid work, or to retirement. In the 2019 ILO Centenary Declaration for the Future of Work, acknowledging the effects on our life courses of future of work drivers, including globalization, climate change and the greening of economies and technological and demographic changes, the ILO tripartite constituents called upon all Member States to strengthen “the capacities of all people to benefit from the opportunities of a changing world of work”, especially through “effective measures to support people through the transitions they will face throughout their working lives”. In this Declaration, ILO constituents have thus placed the issue of the management of labour market transitions throughout the working life at the core of the human-centred approach to the future of work.

However, we know very little about the evolution of workers’ life courses over the long term. This is notably the case in developing economies where analytical instruments, which allow tracking individuals over time, and study flows between different states over several years are often missing. In this context, our paper constitutes an effort to describe and compare the evolutions of participation and employment patterns in a set of comparable emerging or developing economies over the last two decades by constructing pseudo-panels. A pseudo-panel is a method that can be used to analyse labour market dynamics in the absence of panel data and based on regular cross-sectional surveys. Following Deaton (1985), it allows to group individuals into cohorts, defined as groups with fixed membership, that are treated as observations (see also Perez Ribas 2022). The most common characteristic to constitute a cohort is the year of birth that we also use in this article. To analyse these pseudo-panels, we rely on the age-period-cohort (APC) methodology, which allows us to estimate three types of effects on participation and employment patterns. Two of them are particularly relevant from a life course perspective: 1) the age profile, which showcases the evolution of labour supply according to age, and 2) the cohort profile, which showcases this evolution according to birth cohorts, allowing in consequence to identify long-term trends, which are influenced by structural changes (such as technological changes or evolutions in social norms). These two effects are completed with a short-term effect, denoted the time effect, which measures the influence of the economic conditions in the short run, such as periods of recessions or recoveries.

In this article, we cover seven emerging or developing countries of three different regions: three from Latin America (Argentina, Brazil and Mexico), two from Africa (Egypt and South Africa) and two from Asia (Indonesia and the Philippines). These seven countries provide an interesting diversity in terms of development level, growth, social norms and demographic characteristics, which are briefly discussed in the following sections. This paper usefully complements the relatively small existing literature analysing labour participation and employment patterns based on the APC method by bringing a comparative perspective on emerging and developing economies. Previous studies had either focused on one country, including countries covered in our study such as Indonesia (Cameron et al 2019), Mexico (Duval and Orraca 2008 and 2011) or South Africa (Burger and Van Fintel 2009 and 2014), or a group of countries from a single region such as MENA (Lassassi and Tansel 2019), or compared the same type of evolutions but in a group of advanced economies (Grigoli et al 2018).

This study aims at answering a series of research questions. First, we aim at measuring to what extent the three types of effects on labour force participation differ for men and women in different countries. Then we put a special focus on the case of women as this population has experienced bigger changes in the last two decades in most of these countries. We try to get a better understanding of these changes by measuring the lifecycle, year and cohort effects on female employment by different socioeconomic characteristics (education, formality/informality, skills, age and marital status).

Key messages from our empirical investigation are the following: First, women’s participation in reproductive age varies quite substantially by country, level of education and job type (formal or informal, salaried or not). Second, we observe a clear and consistent pattern of increased female participation in cases of medium and large recessions in the countries concerned. This confirms the hypothesis of an added worker effect, i.e. an increase in the labour supply of women when their husbands’ income decreases due to unemployment or reduction in working hours. Third, the long-term evolution of male and female participation could indicate that those will not increase naturally in the coming years simply through generation renewal. Over the long term, participation is at best stagnating and in some cases declining.

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The next section provides some contextual elements on these seven developing economies and summarizes previous related research. This is followed by a methodological section where we present the data and discuss the model. Afterwards, we present the detailed results first the age effects, then the year effects and finally the cohort effects. The final section concludes and discusses policy implications.

## 2. Contextual elements

### 2.1. Description of the seven labour markets

These seven countries are interesting cases for the comparative analysis of the evolutions of age, period and cohort effects on main labour market outcomes over the long term. While all of them can be considered developing or emerging economies, Table 1 shows significant differences in the conditions and the functioning of their labour markets, as well as in terms of growth and development levels. Figure A1 in the appendix also sheds some light on the evolution of the main indicators over the last two decades.

When undertaking comparative analysis through an APC model, it is important to consider the demographic context of each country. The median age of the population in Tab 1 shows that these countries are at different stages of demographic transition and are ageing at different paces. Brazil has the oldest and the most rapidly ageing population with a median age of 33.5 years and an increase of 8.4 years since 2000. Mexico has the second most rapidly ageing population (+6,6 years). In the five other countries, the pace has been slower and median ages range between 25.2 (Philippines) and 31.9 years old (Argentina). Fertility is another important demographic characteristic to consider in such a comparative study as childbearing has a strong impact on female labour market participation. When analysing this variable, Brazil and Egypt are at the two extremes of the spectrum with respectively 1.7 and 3.5 children per woman, while in other countries, fertility rates range between 2.1 and 2.7 (Mexico and the Philippines).

Another driver to consider in the analysis of labour supply is access to education. In five of these countries, we see a clear pattern of improvement in terms of education (no data is available for the Philippines). In Argentina, Brazil, Mexico, Indonesia and, to a lesser extent, Egypt, we observe a reduction in the share of the working-age population with a basic level of education (or less) and an increase in the share of intermediary and high levels for both men and women. In South Africa, the evolution is less encouraging with an increase in both ends (low and high levels) and a decrease in the intermediary level. It should also be noted that in four countries (Argentina, Brazil, Indonesia and South Africa), the share of working-age women with high-level education is bigger than the share of men.

In terms of labour market functioning, in 2019, labour force participation was particularly low in Egypt (42.2%) and highest in Indonesia (68.2%). Over the decades and until the COVID-19 crisis, the seven countries experienced different trajectories. While participation increased slightly in Mexico, Brazil and Indonesia in the 2000s, the next decade was more stable in most countries except Egypt where it started decreasing after 2015. In all countries, the labour force participation rate of men is higher than that of women. Argentina, Brazil and Indonesia are the only labour markets where women's participation is above 50%. In these countries, as well as in Mexico, the gap between men and women tends to narrow, also because of shrinking male participation. In Egypt, where female participation remains particularly low (15.9%), and in the Philippines, no reduction in this gap can be observed in the last decades. In South Africa, both participation of women and, to a lesser extent, men have been on the rise in the last decades.

The determinants of female participation are well documented by the research.<sup>2</sup> In a study covering 117 countries, Besamusca et al (2015) showed that female participation follows an inversed U-shaped curve according to age almost universally with some variations in terms of amplitude and timing depending on the country. However, another assumption that is often made to explain female participation is far more questionable, i.e. the U-shaped hypothesis, which links participation and development (Verick 2014). Accordingly, female participation is the highest in poor countries because women are engaged in subsistence activities; it falls in middle-income countries because many men are moving to better-paid industrial jobs and then increases again due to improvements in education and fertility rates and growing demand in the services sector. Economic conditions, such as GDP per capita and sector size, are determinants of women

<sup>2</sup> In many countries, life events such as marriage, family membership and obligations are important correlates of female labour supply. The kind of work offered to women and the level of educational attainment are also important factors. For a complete discussion on the theoretical aspects of female labour supply, readers can refer to Killingsworth (1987).

participation at young and old ages but are weak factors of participation for those between 25 and 55 years of age (Besamusca et al 2015). In fact, female participation is in general the outcome of a complex interaction of multiple macroeconomic, individual and institutional factors. The importance of access to education, for example, is known to be critical for the improvement of women employment outcomes even though education tends to raise their reservation wage and expectations and needs therefore to be accompanied by adequate job creation (Verick 2014). In the case of Indonesia, for example, economic development has favoured the participation of younger women in urban areas due to increased demand for wage employment but reduced the participation of younger women in rural areas where they preferred opting out from informal or unpaid employment (Schaner and Das 2016). Moreover, gender and family-related norms and legislations are key factors affecting female participation in many countries, especially for women at prime age (Besamusca et al).

Available literature also shows interesting differences between countries. Regarding economic factors, women's participation is often considered a coping mechanism. There is for example evidence from Latin America, especially Argentina, Brazil and Mexico, but also from Indonesia showing that female participation is countercyclical. In these countries, several studies showed the existence of an added-worker effect, i.e. an increased participation of women in responses to instability or unemployment among male primary earners (Cerruti 2000, Parker and Skoufias 2004; Paz 2009, Fernandes and Felicio 2005, Verick 2014). Moreover, in the context of Latin American economies, Serrano et al. (2019) relate the evolution of FLFP for 18 countries with the cyclical and trend components of GDP, finding evidence of a negative association between participation and the business cycle, especially for married, with children and vulnerable women. Martinoty (2015) goes beyond the correlation analysis, providing causal evidence for Argentina that women whose partner becomes unemployed have higher chances of entering the labour force and finding a job, in the context of a big output depression like the crisis of Argentina in 2002. Her results depart from different studies for developed economies, where female labour supply response is moderate at most<sup>3</sup>.

Egypt is an interesting case concerning the role of gender and family-related norms on women participation. Available studies on this country show the importance of family circumstances, such as marriage and childbearing, as major determinants of female participation, as well as the importance of the availability of jobs in the public sector. The shrinking of the public sector in the last decades is often considered as one of the main factors explaining the sluggishness of female participation in the country despite improvement in education (Hendy 2015, Assaad et al 2022). In Indonesia, Schaner and Das (2016) also demonstrated that women with young children are significantly less likely to work compared to other women, especially due to a reduction in wage employment. Interestingly, the same study shows that when these women return to the labour force as their children are getting older, it is rarely into wage employment but in family work and in self-employment. In the case of the Philippines, Bayudan-Dacuycuy (2017) also considers unbalanced gender responsibilities in housework as one of the main reasons explaining the stagnation of female participation in the last decades.

Employment and unemployment rates have had more cyclical and correlated evolutions during the same period. Indonesia, the Philippines and Mexico have at the same time the highest employment rates (respectively 65.7%, 58.1% and 58.0%) and the lowest levels of unemployment (largely below 5%). In the opposite situation, South Africa combines a low level of employment rate (39.5%) and a high level of unemployment as more than one-fourth of its active population remains unemployed. The case of Egypt is very specific as its low level of employment (38.9%) combines with a relatively moderate but significant level of unemployment (7.8%). This is mainly explained by the largely gender-unbalanced participation in the Egyptian labour market where 5 out of 6 women remain out of the active population and where active women have a much higher probability of being unemployed than men (21.2% against 4.7%). In terms of evolution, the three countries where GDP growth has been relatively slow in the last decade (Brazil, Argentina and South Africa) have experienced an increase in unemployment rates while the four others have been on a decreasing trend. In these three countries, women have also historically faced higher levels of unemployment than men.

The structures of employment are also very different between countries indicating differences in their stages of development and structural transformation. For example, Indonesia and Egypt have relatively higher levels of informality in comparison with Brazil, Argentina and South Africa where it concerns less than half of the working population. The three Latin American countries experienced a rise in the share of formal jobs in recent decades. However, in Argentina, this evolution seems to have reversed in the last years with a slight decline in formal jobs and an increase of informal self-employed jobs. In Brazil, the formalization dynamic has not been beneficial for every profile. White and younger men and

<sup>3</sup> In another context (rural India), one should also mention the article of Bárcia de Mattos et al (forthcoming) which shows the complex coping strategies at the household level during the COVID-19 pandemic.

women with higher education and living in better-off regions are more likely to have transitioned to formal employment while for black, older, lower educated from poorer regions, no significant changes can be found (Tonet Maciel and Oliveira 2018). Overall, in Latin America, despite high level of turnover, very few workers in lower-tier informal wage employment managed to move up the job ladder while most of formal workers maintain their work status. Education plays an important role in improving or maintaining decent employment conditions (Maurizio and Montalvo 2021, Escobedo Gonzalez and Moreno Trevino 2020, Conover et al 2022 on Mexico). Egypt has experienced a totally opposite evolution with a globally declining share of formal jobs and a steep rise in informal salaried jobs. The Egyptian labour market is also known to be rather static in general and education, especially tertiary education, is the most significant factor explaining upward transitions. However, many highly educated individuals are queuing in non-employment until they are able to find a formal wage employment (Tansel and Ozdemir 2015 and 2019, Mahmoud Al Barrawi 2022). According to countries and periods, male and female prospects with regards to informal employment are different. The only country where the labour market remains structurally more unfavourable to women in this regard throughout the period is South Africa.<sup>4</sup>

Despite dramatic changes in the last two decades, the proportion of employees in the working population remains below 50% in Indonesia. In this country, own-account workers and contributing family workers remain, especially for women, very common statuses in the labour market. In other countries, employees represent between 63.9% (the Philippines) and 83.7% (South Africa) of the working population. Egypt is also characterized by a relatively high proportion of female contributing family workers (21.7%).

All these countries have now an employed population that is working in majority in the sector of services, but the situation varies significantly between 53.3% in Indonesia and 80.0% in Argentina. This is in great part due to a growing participation of women in the service sector (with the exception of Egypt) but also, in the case of Argentina and Brazil, due to a worrying process of deindustrialisation (Rodrik 2016, Castillo and Martins Neto 2016, ILO 2022). However, Indonesia<sup>5</sup>, Egypt and the Philippines keep a sizeable portion of their working populations in the agriculture (respectively 13.5%, 12.9% and 11.9%). In Egypt, the share of jobs in the agriculture has even rebounded in the last years. While the proportion of jobs in industry had slowly reduced between the early 2000 and the mid-2010's (with the exception of Egypt), it seems that the COVID-19 crisis has accelerated this process in most countries.

Finally, when analysing jobs by skill levels, it seems that there are some signs of polarisation in countries such as Brazil, Indonesia and Mexico where the proportions of the highest and the lowest levels of qualification have been growing in the two last decades. In the Philippines, the increase in the highest levels of qualification has been particularly sizeable (before the crisis). In most countries, the share of the highly qualified occupations is larger for women than for men, but the phenomenon is particularly marked in Egypt. In this country, the relatively low number of active women is particularly concentrated in the most qualified occupations.

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<sup>4</sup> In a complementary analysis published as part of this project, Brehm et al (2022) found that Indonesia and South Africa both exhibited important job-to-job mobility patterns across and within age. In both countries, younger cohorts are increasingly absorbing employee and better-quality jobs. During their working lives, individuals tend to experience more transitions in South Africa than in Indonesia despite drastic increases in the last years. In South Africa, mobility between formal and informal work are more prevalent than mobility between employment statuses while in Indonesia, there is more stickiness in informal jobs.

<sup>5</sup> In Indonesia, there is evidence that the move of many households from agricultural sector to non-agricultural sector has not been a driver of increased welfare in the most recent period and in absence of real improvement in skills contrary to Arthur Lewis' dual sector model theory (Moeis et al 2020).

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**Table 1 - Key labour market indicators in 2019**

	Argentina			Brazil			Egypt			Indonesia			Mexico			Philippines			South Africa		
	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women
<b>Labour force participation rate</b>	60,3	71,2	50,2	62,6	72,3	53,4	42,2	68,5	15,9	68,2	82,5	53,9	60,1	76,9	44,5	59,4	72,5	46,5	55,3	62,4	48,5
<b>Employment rate</b>	54,4	64,7	44,8	55,1	64,9	45,9	38,9	65,2	12,5	65,7	79,3	52,1	58,0	74,2	43,0	58,1	71,0	45,3	39,5	45,7	33,7
<b>Unemployment rate</b>	9,8	9,2	10,7	11,9	10,2	14,1	7,8	4,7	21,2	3,6	3,8	3,3	3,5	3,5	3,5	2,2	2,1	2,5	28,5	26,8	30,5
<b>Share of informal employment</b>	49,7	49,7	49,6	40,1	42,0	37,5	67,0	69,7	51,9	80,1	79,0	81,6	57,6	57,5	57,8	nd	nd	nd	40,5	38,4	43,1
<b>Status in employment (%)</b>																					
<b>Employees</b>	73,5	71,2	76,6	66,9	62,7	72,5	71,1	71,8	67,3	48,3	53,0	41,1	68,1	68,6	67,2	63,9	66,0	60,5	83,7	81,3	86,7
<b>Employers</b>	3,8	4,8	2,4	4,7	5,8	3,4	9,4	10,7	2,8	3,5	4,5	1,9	4,8	6,2	2,5	2,9	3,4	2,2	5,7	8,0	2,7
<b>Own-account workers</b>	22,2	23,6	20,2	26,1	30,0	20,8	13,1	14,0	8,2	35,1	36,6	32,9	22,6	22,0	23,5	27,1	26,3	28,2	10,1	10,4	9,7
<b>Contributing family workers</b>	0,6	0,4	0,8	2,2	1,4	3,3	6,4	3,5	21,7	13,1	5,9	24,2	4,6	3,2	6,7	6,1	4,2	9,1	0,6	0,3	0,9
<b>Sector employment (%)</b>																					
<b>Agriculture</b>	0,1	0,1	0,0	5,6	9,2	1,3	12,9	14,2	4,9	13,5	14,6	11,5	8,1	11,8	2,3	11,9	15,5	5,8	5,6	6,9	4,0
<b>Industry</b>	19,7	30,1	7,1	19,2	27,7	9,4	33,4	37,0	11,8	33,2	38,9	22,0	28,5	35,0	18,2	27,2	35,8	12,3	22,3	31,0	11,9
<b>Services</b>	80,0	69,5	92,7	75,2	63,1	89,3	53,4	48,4	82,9	53,3	46,5	66,5	62,3	52,3	78,3	60,9	48,7	81,9	72,1	62,1	84,1
<b>Not classified</b>	0,2	0,3	0,2	0,0	0,0	0,0	0,3	0,3	0,4				1,0	0,9	1,2				0,0	0,0	0,0
<b>Occupations (%)</b>																					
<b>Skill level 1 (low)</b>	19,2	14,4	25,0	21,1	17,9	24,9	9,3	9,8	6,1	30,4	32,6	26,0	24,1	23,6	24,8	33,6	38,5	25,3	29,5	25,0	34,9
<b>Skill level 2 (medium)</b>	50,1	57,5	41,2	51,6	57,4	44,9	61,3	67,4	25,1	49,5	50,8	47,0	52,1	55,2	47,1	47,4	48,0	46,3	48,7	54,4	41,9
<b>Skill level 3 and 4 (high)</b>	23,8	20,3	28,0	25,8	22,3	29,9	29,2	22,6	68,6	19,2	15,3	26,9	22,6	19,3	27,7	18,6	13,0	28,4	21,6	20,3	23,2
<b>Not classified</b>	6,9	7,8	5,8	1,5	2,5	0,3	0,2	0,2	0,2	0,9	1,3	0,1	1,3	1,9	0,3	0,3	0,5	0,0	0,2	0,3	0,0
<b>Access to education (% of working age pop.)*</b>																					
<b>Basic education and below</b>	43,0	45,6	40,7	44,6	46,6	42,6	51,6	48,1	55,2	61,2	58,7	63,6	63,4	63,2	63,6	nd	nd	nd	60,5	60,4	60,6
<b>Intermediate education</b>	39,1	39,1	39,1	38,0	37,6	38,3	35,4	37,9	32,9	28,7	31,6	25,7	22,7	22,3	23,0	nd	nd	nd	26,9	27,4	26,5
<b>Advanced education</b>	17,3	14,5	19,7	16,8	14,9	18,5	12,8	13,8	11,9	10,2	9,6	10,7	13,8	14,4	13,3	nd	nd	nd	10,9	10,2	11,6
<b>GDP growth (%)</b>																					
	2000-2009 (avg.)	2010-2019 (avg.)		2000-2009 (y avg.)	2010-2019 (y avg.)		2000-2009 (y avg.)	2010-2019 (y avg.)		2000-2009 (y avg.)	2010-2019 (y avg.)		2000-2009 (y avg.)	2010-2019 (y avg.)		2000-2009 (y avg.)	2010-2019 (y avg.)		2000-2009 (y avg.)	2010-2019 (y avg.)	
<b>GDP growth (%)</b>	2,6	1,4		3,4	1,4		5,0	3,9		5,3	5,4		1,5	2,7		4,5	6,4		3,6	1,7	
<b>Median age of the population (2020)</b>																					
	2020	Evol. since 2000		2020	Evol. since 2000		2020	Evol. since 2000		2020	Evol. since 2000		2020	Evol. since 2000		2020	Evol. since 2000		2020	Evol. since 2000	
<b>Median age of the population (2020)</b>	31,9	4,0		33,5	8,4		25,3	4,1		29,3	4,9		29,3	6,6		25,2	4,7		27,3	4,5	



## 2.2. What have we learned from previous research based on APC models?

A relatively small number of studies have provided comparative insights on the evolution of main employment outcomes with an aim of disentangling age, period and cohorts effects through a pseudo-panel approach. For example, in Grigoli et al (2018), the labour force participation for 17 advanced economies is estimated over the period 1985 to 2016. The study documents significant changes in the participation over the life course across generations, especially in the case of women. The changes in the labour force participation of men since 2008 are broadly consistent with the shifts in the age profile of the population and the drag from the global financial crisis. The new generations of women are significantly more likely to be active in these countries, with the exception of the USA where participation of both sexes is falling more than what ageing and the cycle would imply between 2008 and 2016. However, the process of increasing participation of women started to plateau in recent years, with signs of reversal in some countries.

Several studies put a specific focus on the evolution of women's participation in developing and emerging economies. Lassassi and Tansel (2019) analysed female labour force participation behaviour over the past decade in five MENA countries, including Egypt (for the period 2000 to 2014), through age-period-cohort methodology to understand the traditionally low level of participation in these countries. The paper provides a very detailed sets of findings on age, time and cohort effects which is difficult to summarize in a few lines. In accordance with previous research findings and with some variations according to countries, marital status, the level of education and the place of living (rural/urban), the age profiles have generally a standard inverted-U shape, with low participation rates for the young and the old. In Egypt, the time of presence of women in the labour market looks slightly longer than in comparable countries, such as Jordan or Tunisia. Age profiles also display a very slight M-shape for women in Egypt, especially for those in urban regions, married and with at least secondary education, suggesting that those leave the labour force temporarily for childbearing. Regarding time effects, the results are remarkably different from one country to another<sup>6</sup>. In Egypt, contrary to Jordan and Tunisia, the participation rates tend to increase, which could indicate that the country is on the increasing portion of the U curve mentioned in the previous section. However, there are also some signs of reduced participation for women with tertiary education in recent years, which could be related to the decline of job opportunities in the public sector. Regarding cohort-effects, female participation rates have remained relatively stable over generations in Egypt (same for Jordan and Tunisia) and do not show many variations according to the different socioeconomic characteristics, except for never-married women and women with secondary education for whom participation is slightly decreasing with newer generations.

Cameron et al (2019) also analysed the evolution of female participation in Indonesia based on the National Socioeconomic Survey (SUSENAS) on the period 1996 to 2013 and provided some results by age and cohort. Despite a very stable participation in the last two decades, the analysis shows very interesting and promising structural changes, in particular that participation of younger generations is higher than that of older generations. The authors identify a slight decline in the very last cohorts (after the 1973 cohort) which may reflect that younger cohorts were still completing their education at the time of the survey. In comparison, the analysis does not find any evolution in male participation throughout the cohorts. The increase in female participation is particularly strong for urban women and those who live in villages with significant industries and services. This evolution also concerns both married and unmarried women and all education levels, except upper-secondary educated women. Concerning age profiles, the authors also identify a slight M-shaped curve, which can be explained by childbearing responsibilities.

While not based on pseudo panels and an APC model, the study from Queiroz and Alves Ferreira (2021) also brings interesting analysis on the evolution of age profiles in labour force participation change in Brazil between 1979 and 2015. Unsurprisingly, the length of male working life tended to decline with a declining participation in younger ages due to increase in educational attainment but also at older ages with the improvements in social protection. Above 65 years, less than 30% continue to be in the labour force while there were 60% in 1950. Concerning women, the age profiles show relatively little change at younger and older ages but interestingly an important evolution at the reproductive ages. At these ages, participation has increased drastically and the M-shape has largely dissipated in the latest years.

On the case of Mexico, Duval and Orraca (2008) provided decomposition of labour force participation, unemployment rate, and employment shares of self-employment, and of the formal and informal salaried sectors according to age, cohort, and time effects for the period 1987 to 2009. The age profiles of labour force participation and formal employment both

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<sup>6</sup> Interestingly, in a relatively similar research focusing on Turkey, Tunali et al (2019) observed a M-shaped age profile attributable to child-bearing, but for women in rural areas and urban women with low-education women.

follow a standard inverted U-shape. Younger workers are more likely to participate in the informal salaried sector, while self-employment increases monotonically with age. However, significant informal salaried employment is also observed among older unskilled workers and women. Interestingly, concerning time-effects, countercyclical variations are observed for the informal salaried sector (strong), self-employment (with a lag) and an “added worker” effect is observed for unskilled women, albeit in case of severe recessions only. Regarding the cohort effect, the authors observe a steadily rising participation in the informal sector with a corresponding decline in formality among newer generations of salaried workers and an increasing participation of newer generations of women (contrary to men with low education). In a more recent study, Levy and Szekely (2016) bring some complementary insights on the trend in the rate of informal employment in Mexico in comparison with other Latin American Countries over the long term (1980-2013). While the reduction in informality in Latin America is mainly associated with a cohort effect, as younger generations become more educated, there is not a similar trend in Mexico. In this country, despite faster progress in access to education, younger generations have not found their way more easily to formal employment due to adverse labour market situations (negative time effects).

Complementary, Calero et al (2018) shows different age profiles of employment status according to gender and level of education in Latin America. In the region, individuals with higher educational attainment are more likely to work in the formal sector and after age 27, their proportion remains relatively constant in formal employment (between 45 and 55% for men and between 40 and 50% for women). In contrast, for individuals with less than secondary school, this proportion is under 21 percent for men and under 7 percent for women. On the other hand, less educated individuals, and especially men, are more likely to work in informal employment or to be self-employed throughout their life cycle.

Another example is Burger and Von Fintel (2009 and 2014) which analyse the determinants of rising unemployment rate in South Africa. While the authors find evidence of cyclical variations of the labour market (suggesting that jobless growth is not a relevant feature), two distinct trends are observed in the participation profiles by generation. For the people born between 1930 and 1975, participation gradually increased for younger generations of all race and gender groups, especially for women. Then, black men and women born between 1975 and 1982 experienced a sudden additional surge in participation, which stabilized for those born after 1982. According to the authors, this surge in participation is less related to higher aspirations following the political transition in 1994 than to the age-normalization policies implemented by the Ministry of Education between 1997 and 2003 that aimed at reducing the large number of over-aged learners in classes. This large number of premature exits from the education system fuelled, in turn, unemployment.

## 3. Methodology

### 3.1. Data

We exploit the harmonized information from the ILOSTAT microdata repository from seven countries to construct series of labour force participation over the long term. This harmonized information comes from household or labour force surveys, the frequency of the information is quarterly or annual, and the window of analysis depends on the country's available information (see Table 2). In the case of Argentina, we use household survey's quarterly data from 2004 up to 2021 (EPH). For Mexico, we use quarterly data for the period 2002-2021, using the information from the labour force survey (ENE 2002-2004 and ENOE 2005-2021). For Brazil, we use the national household survey's annual data from 1995 up to 2021 (PNAD 1995-2015 and PNADC 2016-2021). As in the case of Brazil, for Indonesia we rely on the labour force survey's annual data from 1996 up to 2021. For the Philippines, South Africa and Egypt, we use the quarterly information from labour force surveys, and the time windows with information are 2002-2021, 2008-2021 and 2008-2019, respectively.

**Table 2. Data Description**

Country	Name of Survey	Surveys used	Frequency
Argentina	Encuesta Permanente de Hogares	2004-2021	Quarterly
Brazil	Pesquisa Nacional por Amostra de Domicílios	1995-2015	Annual
	Pesquisa Nacional por Amostra de Domicílios Contín	2016-2021	Annual
Egypt	Labour force sample survey	2008-2019	Quarterly
Indonesia	National Labour Force Survey	1996-2021	Annual
Mexico	Encuesta Nacional de Empleo	2002-2004	Quarterly
	Encuesta Nacional de Ocupación y Empleo	2005-2021	Quarterly
Philippines	Labor Force Survey	2002-2021	Quarterly
South Africa	Quarterly Labour Force Survey	2008-2021	Quarterly

With each cross-sectional survey, we construct pseudo-panels per country. Each pseudo-panel shows the dynamics of a particular variable (e.g. labour force participation over time) for certain groups of the population. For example, the participation of women born in 1980 can be followed using the averages of those women interviewed in different cross-sectional surveys (from different quarters or years). The assumption is that the average behaviour of those women is well approximated using this information, even though most of the women interviewed in one survey are not polled again in the subsequent surveys. The literature has taken different approaches to define a cohort. For example, Duval and Orraca (2008), using Mexican quarterly information between 1987 and 2008, define a cohort by the year of birth. Lassassi and Tansel (2019) also use the year of birth for defining cohorts for five MENA countries between 2000-2014, but using annual instead of quarterly data. Grigoli et al. (2018) and Tunali et al. (2019) define a cohort as those persons born in 5-year windows, also using annual data for 17 advanced economies for the period 1985-2016 and for Turkey during 1988-2013, respectively. In our paper, we define a cohort as those born in a particular year.

The labour participation rate is defined as the sum of those individuals employed and those unemployed that are actively seeking for a job, over the population between 18 and 64 years<sup>7</sup>. For the male participation rate and the female labour force participation (FLFP) rate, we condition the calculation of the ratio to men and women, respectively. In addition, we characterize the employment rate by formal and informal jobs (job status), where the informal jobs could be salaried or self-employed (independent workers without employees). We focus on the main job to carry out the estimations, since people might have more than one job. Instead of calculating the share of formal/informal jobs over total employment, as in, for example, Duval and Orraca (2008), we calculate the ratio over population between 18 and 64 years to facilitate interpretation and comparison of indicators. Indeed, with this calculation, labour force participation is understood as the direct sum of the unemployment rate plus the formal and the informal rates. It means that a one-percentage increase in the informal rate translates automatically into a one-percentage increase in the participation rate (holding the formal and unemployment rates constant).

We also separate employment by education level, following the International Standard Classification of Education (ISCE). We define individuals with basic education as those with only lower secondary education (or those that did not finish the school); those with upper secondary education (that finished school) are considered with intermediate education level; and those individuals with any stage of tertiary education are classified as having an advanced level of education. A last classification of employment is associated with the level of skills for the job, where jobs can be categorized as low skill, medium skill and high skill jobs, following the International Standard Classification of Occupations (ISCO) system<sup>8</sup>.

### 3.2. The Age-Period-Cohort (APC) Model

The APC analysis aims to disentangle the evolution of a particular variable (e.g. labour force participation) into its lifecycle determinants (denoted as “age effects”), long-term trends (denoted as “cohort effects”) and the short-term shocks (denoted as “year effects”) that affect the variable. The lifecycle effects are the natural response of labour supply to age, since people typically start working (or search for a job) once they finished their studies (school or university), and they leave the labour force when they get old and retired. We follow Perez Ribas (2022), which provides a clear interpretation of the differences between cohort and year effects. The long-term trends, or cohort effects, correspond to macro-events that have permanent effects over individuals, such as technological change or changing social norms and their effects over the labour market. In comparison, the year effects represent macro-events that affect all cohorts in a similar way but only in the short run.

The APC analysis has been widely used to study female labour force participation, but it should be noted that the exercise does not try to formally estimate the determinants of participation, nor is it suitable to study labour market transitions of individuals. Following the interpretation of Perez Ribas (2022), we use the decomposition of Deaton and Paxson (1994). Once we construct the pseudo-panel per country, we estimate the following linear model.

$$p_{ct} = \beta + \alpha_a + \kappa_c + \lambda_t + \varepsilon_{ct}$$

Where  $p_{ct}$  denotes the participation rate of cohort  $c$  at period  $t$ ,  $\alpha_a$  denotes the age effects (or lifecycle determinants),  $\kappa_c$  refers to the cohort effects (or long-term trends), and  $\lambda_t$  are the year effects (or short-term shocks). To achieve the

<sup>7</sup> Concerning definitions of main labour market indicators, see ILO (2016).

<sup>8</sup> Low skill jobs include elementary occupations, such as cleaners and helpers; agricultural, forestry and fishery labourers; workers in mining, construction, manufacturing and transport; food preparation assistants; street and related sales and service workers; among others. Medium skill jobs include clerical support workers; service and sales workers; skilled agricultural, forestry and fishery workers; craft and related trades workers; and plant and machine operators, and assemblers. Workers with advance skills includes managers, professionals, and technicians and associate professionals.

proposed decomposition, the identification assumption of Deaton and Paxson (1994) is that the sum of the shock-term shocks is zero ( $\sum_t \lambda_t = 0$ ), in such a way that year effects are orthogonal or completely unrelated to a time trend. This assumption makes complete sense in the context of labour force participation, where labour market conditions and outcomes (like the rate analysed in this paper) are interrelated with the evolution of economic activity. For this reason, economic recessions, or GDP contractions, which are by nature a short-run event, should have a counterpart in the short-term shocks to labour force participation. Another way to interpret the assumption of Deaton and Paxson is that any trend growth in participation rate is explained by either age or cohort effects.

The assumption imposed by Deaton and Paxson (1994) is just one of a set of possible assumptions that could achieve the decomposition. Besides the implementation of the proposal by Deaton and Paxson, Lassassi and Tansel (2019) also decompose the FLFP rate for five MENA countries using the maximum entropy approach (Browning et al. 2012), and Tunali et al. (2019) also employ the maximum entropy estimator and the intrinsic estimator to study FLFP in Turkey.<sup>9</sup> As expected, the results of these alternative decomposition methods attribute trends to the year effects, that are not observed in the Deaton and Paxson decomposition. Hence, in these alternative methods, it is not possible to interpret the year effects as macro-events that affects participation only in the short run.<sup>10</sup> For this reason, we only consider the Deaton and Paxson decomposition.<sup>11</sup>

We propose a complementary analysis of the age effects in order to assess the changes in the shape of its curve over the long term in the case of women. In past years, the literature on FLFP has indeed paid attention to the shape of the age effects, since women's participation might substantially diverge from the inverted U-shape generally observed for men because of childbearing. A key question is whether the M-shape in certain countries has become more or less pronounced over time. For this reason, we complement the APC analysis with the following model, already applied in Calero et. al (2018):

$$p_{ct} = \beta + \alpha_a + \delta_a D_c^{Gen} + \lambda_t + \beta gdp_t + \varepsilon_{ct}$$

The proposed model follows the APC specification with two major modifications. The first difference with the APC model is that we are not estimating the long-term trends. Instead of including the cohort effects, we are interacting the age effects with a dummy variable for a particular group of cohorts ( $D_c^{Gen}$ ). The estimation is carried out for two generations, or groups of cohorts: the Millennials (individuals born in the 1980s and 1990s) and the Generation X (born in the 1960s and 1970s). We define the dummy variable  $D_c^{Gen}$  as one for Millennials and zero otherwise. Hence, the coefficient of interest is  $\delta_a$  and measures the change in the age effects for Millennials in comparison to Generation X. If this coefficient is positive for a particular group age, then, participation increased for Millennials; and if negative, the opposite is true. The second difference with the APC model is that we include the variable GDP in levels (in real terms and in local currency units) to control for any long-run trend associated with economic activity that is not captured by the year effects (short-run shocks associated with the cyclical component of GDP). For consistency, we make the same assumption about the year effects as in the APC model, or to estimate this model, we impose that sum of the shock-term shocks is zero ( $\sum_t \lambda_t = 0$ ).

## 4. Detailed results

### 4.1. Lifecycle Determinants (Age Effects)

This section discusses the lifecycle determinants of labour force participation. Figure 2 shows the age effects for men and women for the seven economies. While we have combined the age effects of women and men in one figure per country, it must be recalled that each estimation of the age effect (men or women) comes from a different regression, and for this reason, the magnitude of the estimates cannot be compared. In the case of men, the profiles correspond to the standard inverted-U shape, that indicates that men increase substantially their chances of participation in the early 20s, then participation reaches a relative plateau, and starts a clear decreasing pattern around the fifties. In the case of women, the

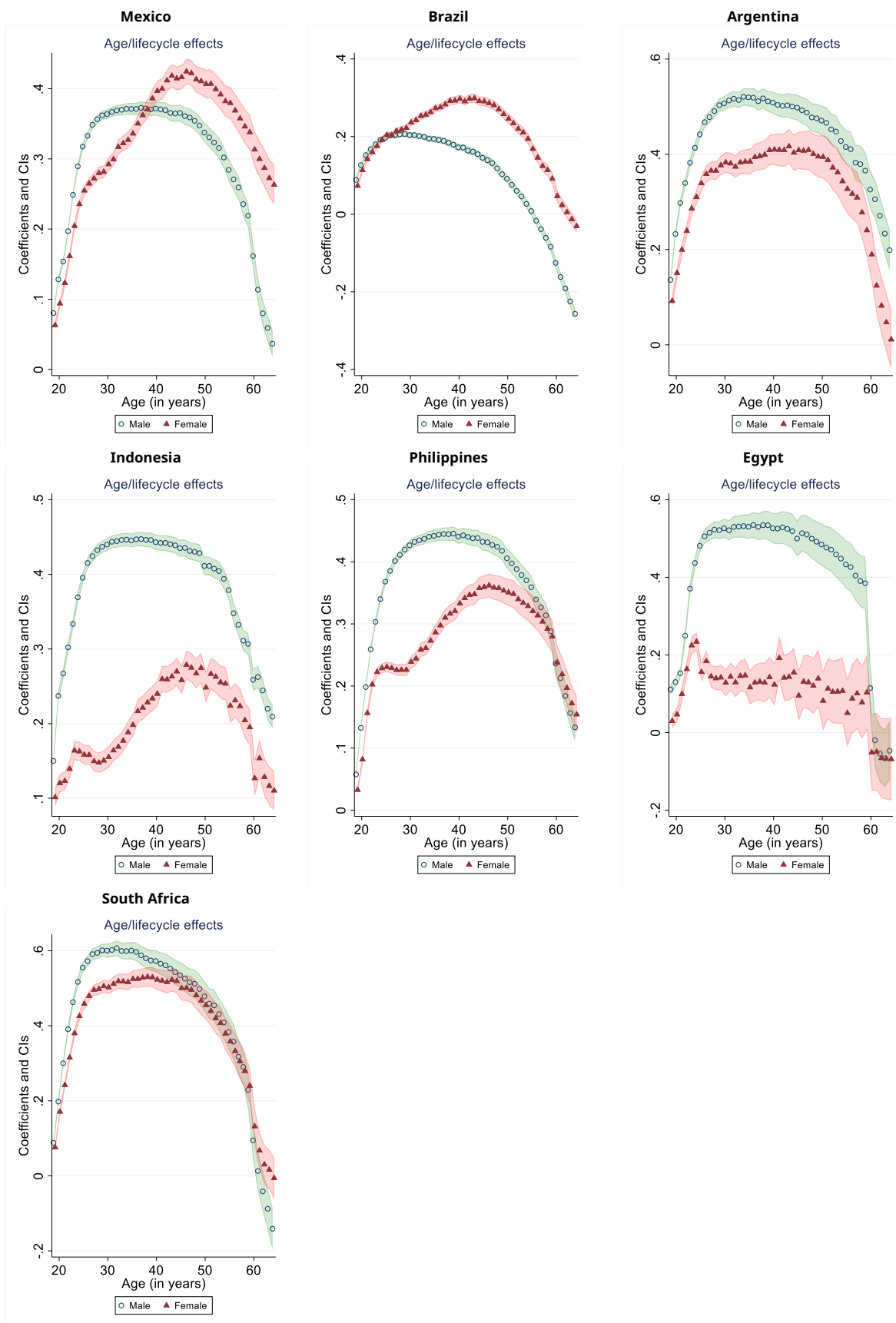
<sup>9</sup> The maximum entropy estimation is an information-based approach, that allows the formalization of the uncertainty about the potential solutions to achieve identification of the APC model (one of them could be the Deaton and Paxson identification assumption), and also allows the estimation of the most likely solution.

<sup>10</sup> These alternative decompositions have been widely used in other disciplines like demography, sociology or epidemiology; where the need or suitability of interpreting the year effects as short-term shocks is not present.

<sup>11</sup> As explained by Tunali et al. (2019), the alternative methods recover the same turning points for the age, year and cohort effects. However, the trends in participation can be attributed to any of these effects.

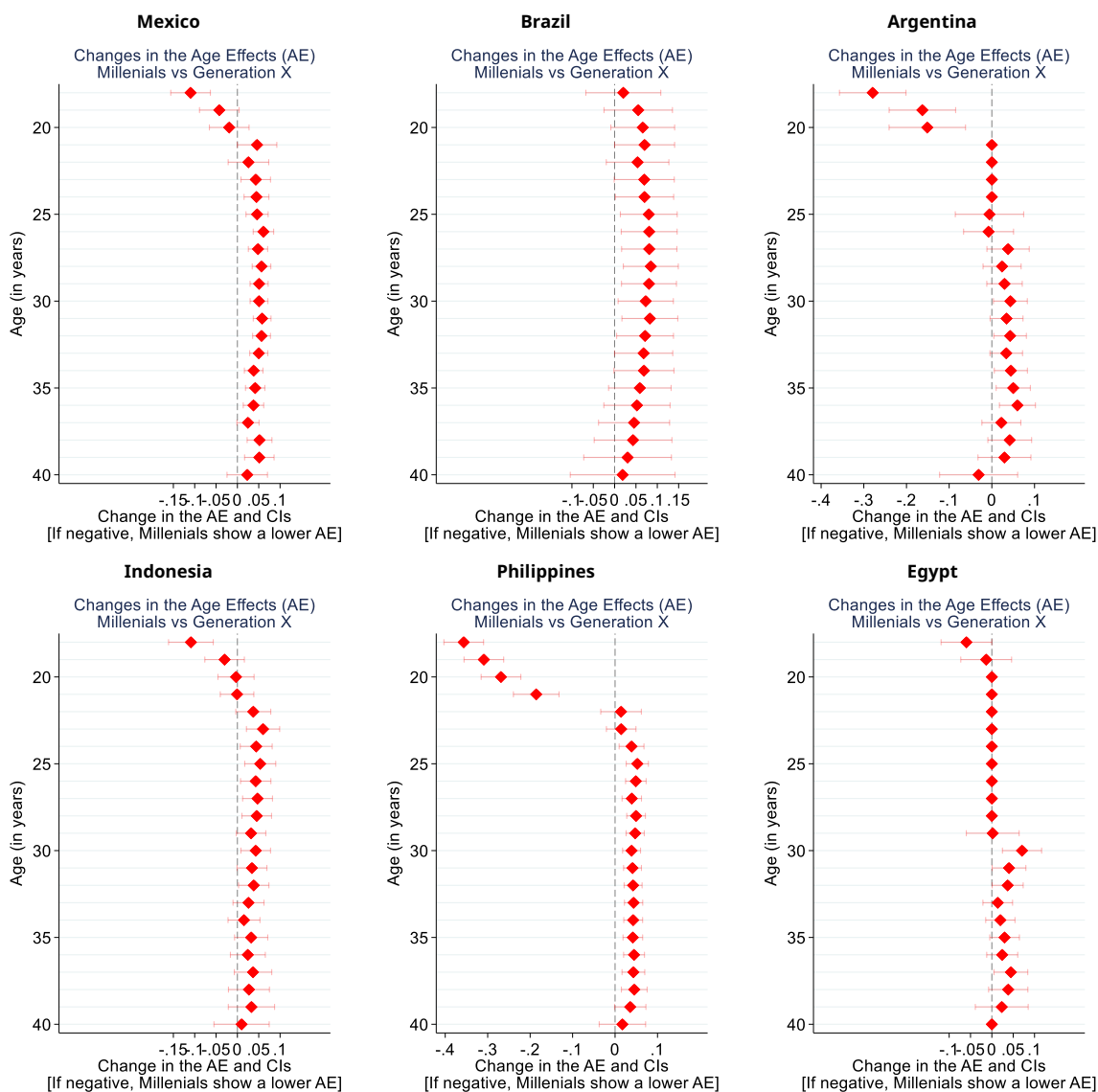
evidence is more mixed reflecting the heterogeneity of our sample of countries. First, there is evidence of different degrees of the M-shape hypothesis in Indonesia, the Philippines, and Egypt indicating that many women temporarily exit the labour force during the mid-twenties for childbearing purposes. This result is in line with previous studies on Egypt (Lassassi and Tansel 2019) and Indonesia (Cameron et al 2019). Differently, the age profiles for the Latin American countries are in line with the results reported in Duval and Orraca (2008) for Mexico, where female participation increases rapidly until the early 20s, and then grows at a lower rate (but do not decline like in the M-shape cases) until the mid-forties. At that age, the participation of women starts declining. In South Africa a standard inverted-U shape characterizes women's participation.

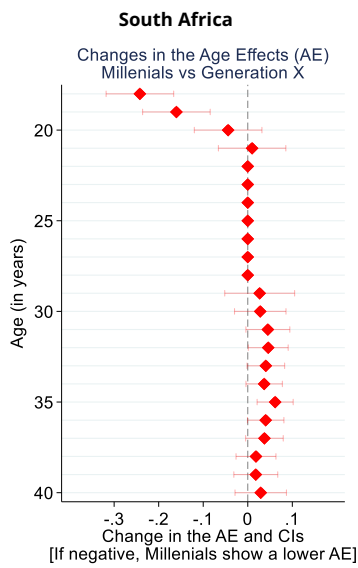
Figure 2. Lifecycle Determinants for Labour Force Participation by Gender



To study changes in the age profiles for women, we use the second model described in section 3.2. and compare the participation of Millennials (born in the 1980s-1990s) at different ages in relation to Generation X (born in the 1960s-1970s). Figure 3 plots the changes in the lifecycle effects on the horizontal axis while the vertical axis corresponds to the age between 18 and 40 years. If these changes take a negative value, it is because the participation of Millennials is lower than the participation of Generation X (and the opposite is true for positive values). When the coefficients could not be estimated due to collinearity, we impose a value of zero without confidence intervals. The first pattern that emerges is that participation tends to be smaller for newer generations between 18 and 20 years old, which could be due to an extension of education for women (with the notable exception of Brazil). At the same time, no clear pattern can be observed for women above 20 years. In the cases of Mexico, Brazil, Indonesia and the Philippines, the participation seems to be slightly positive while in other countries, the results are insignificant.

**Figure 3. Changes in Lifecycle Determinants for Women, Millennials versus Generation X**

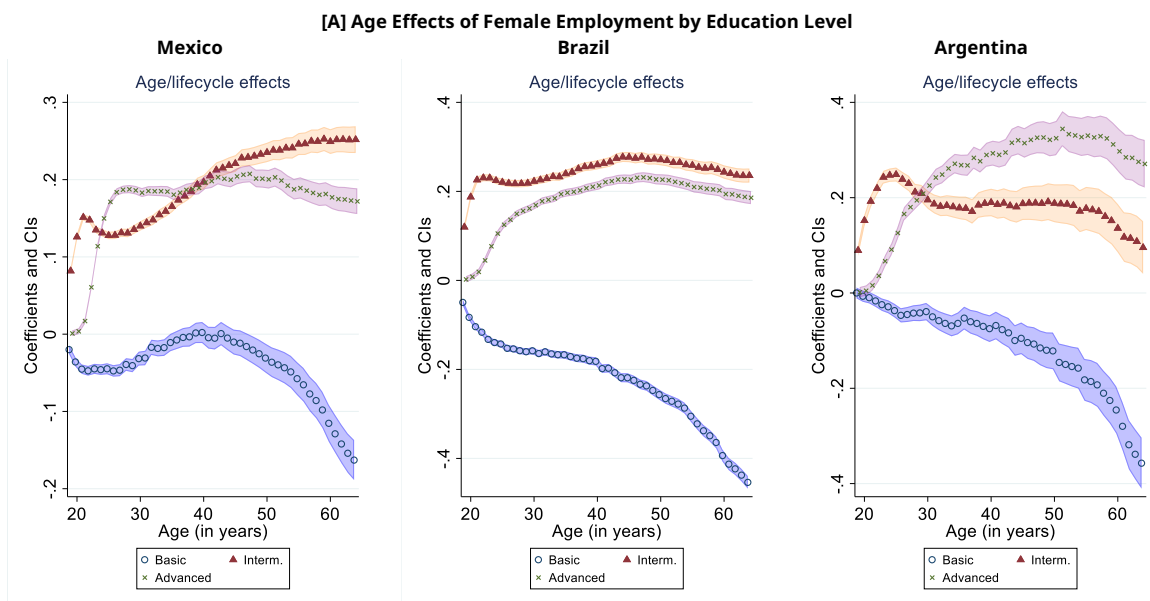




The figure also sheds light on the evolution of the M-shape highlighted earlier for Indonesia and the Philippines<sup>12</sup>. Since the M-shape is a phenomena that occurs between 20 and 40 years old, a contraction or plateau in participation up to the late-20s and a subsequent recovery since the 30s, we would need to see a similar pattern for the changes in age effects to claim that the phenomena was exacerbated for the Millennials, or we should observe the opposite pattern (an increase and then a reduction) to claim that the phenomena was less pronounced for the Millennials. For Indonesia and the Philippines, even though participation increases for almost all ages above 20 years for Millennials, we cannot observe a change in the shape of the curve, meaning that the participation of this generation of women remains influenced by childbearing during their reproductive age.

Having in mind the heterogeneity of the effects for women, we analyse the female age effects by education level, employment by formal/informal status, and employment by skill level (Figure 4). In Appendix, for completeness, we report in figures A2 and A3 the same results for total participation (of men and women).

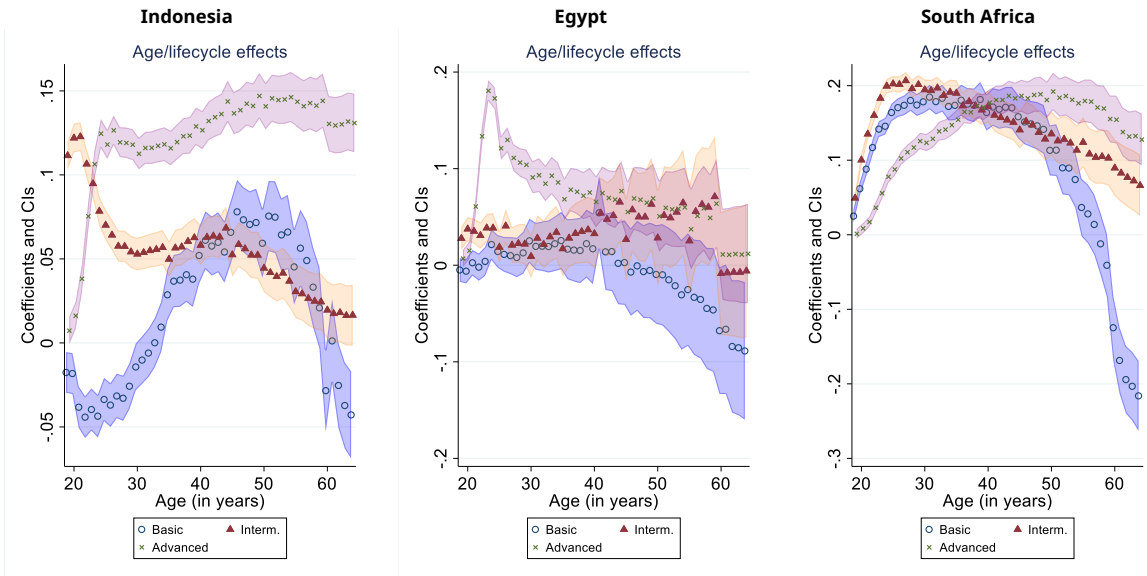
**Figure 4. Lifecycle Determinants of Female Employment by Education, Formality and Skill Level**



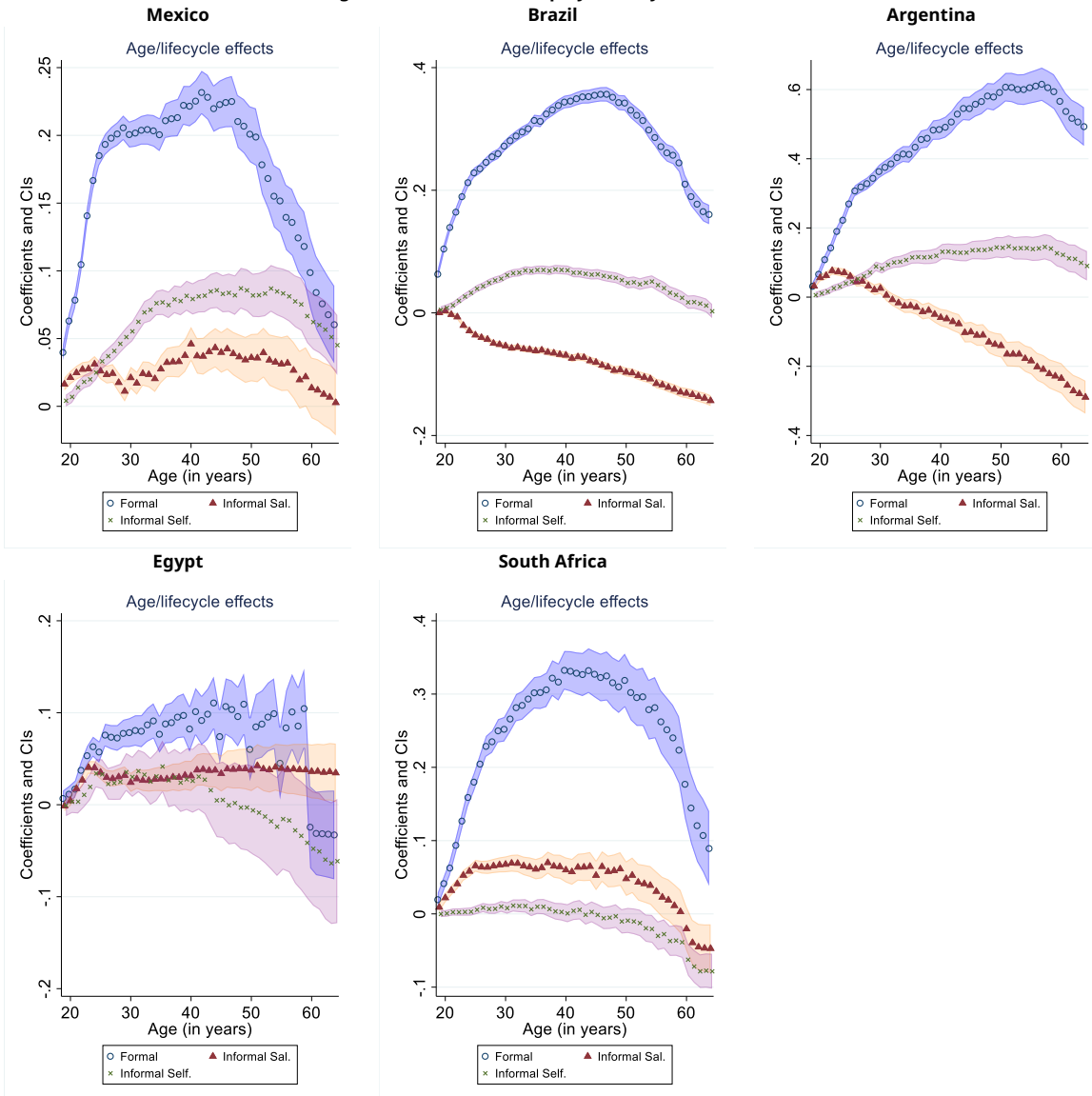
<sup>12</sup> We were not able to estimate the coefficients for Egypt below 30 years.



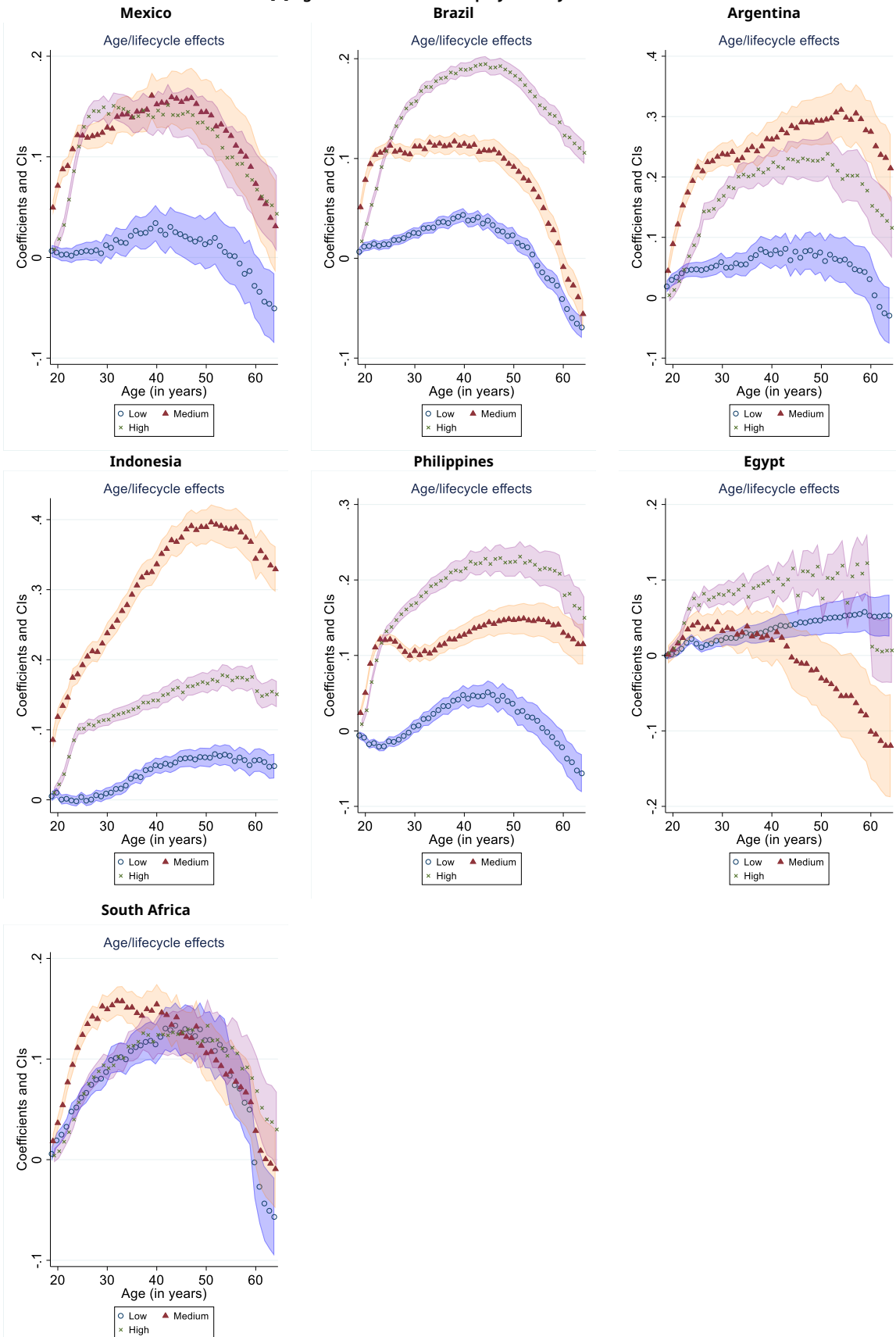
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[B] Age Effects of Female Employment by Formal/Informal



[C] Age Effects of Female Employment by Skill Level



Regarding educational achievement, all the countries show that for the case of advanced education, participation rises during the 20s, and afterwards there is a relative plateau, except for Egypt, where participation shows a continuous decline already after the mid-20s. The M-shape profile for women participation in Indonesia and Egypt, as well as the deceleration in the participation of women in Latin American countries around the mid-20s, seems to be associated with women with intermediate levels of education. In those five countries, participation of women who just completed school exhibit an M-shape profile, which shows a rapid increase in the early 20s, then a reversal in participation, a posterior recovery around the 30s, and the final decline associated with retirement of the labour force. Women with basic levels of education show different age profiles depending on the region (mostly declining in Latin America, M-shape in Indonesia with a peak of participation around 45y, declining in Egypt and inverted-U shape in South Africa). Unsurprisingly, when the analysis considers the whole population (table in appendix), one can see that the inverted U shape is common to all education levels in all the countries, meaning that men are characterized by a marked inverted U shape life cycle.

When we focus on the age effects associated with female employment by formal or informal status of the job, we find that formal jobs follow the standard inverted-U shape in all the countries with varying ages for the peak level. In terms of informal employment, the informal salaried jobs seem to have a stable profile in terms of age, except in the case of Argentina and Brazil, where there is a clear downward trend. This downward trend for informal salaried jobs in Argentina and Brazil is consistent with the same age profile of basic education jobs. It seems that low educated women start their careers in informal jobs, but as they accumulate experience, there is a lower chance that these women remain working in a firm. While we cannot carry out a formal transition analysis, the age profiles for informal self-employed jobs and formal jobs depict an upward trend, suggesting, that a higher chance of getting a job in these two sectors, might be associated with the exit in the informal self-employed sector. Finally, higher chances of getting a self-employment informal job as women accumulate experience characterized the three Latin American countries analysed, but Egypt and South Africa report a more stable pattern according to age.

A final aspect that we analyse is female employment by skill level. When we focus on Indonesia, the Philippines and Egypt, the three countries with the M-shape type of age effects, we observe that low skill jobs explain the M-shape profile, although in the Philippines the intermediate skill level jobs also help to understand this pattern. In Latin America, the deceleration in the participation around the mid-20s is associated with medium skill level jobs. Contrary, the high skill level jobs depict a standard inverted-U shape in all the countries.

## 4.2. Short-Run Shocks (Year Effects)

In this section we analyse the relation of the estimated year effects with the evolution of GDP during windows of output contraction (in the spirit of an event analysis). As we point out before, due to the Deaton and Paxson assumption, the time effects represent short-term shocks that affect labour market participation, and windows of output contraction are also events of short nature. Previous work has focused on this relation, based on the idea of the closed connection between GDP and the labour market. Duval and Orraca (2008) carry out a similar exercise and compare the evolution of year effects with the unemployment rate in Mexico. Differently from them, we solely focus on periods of recessions and recoveries, something that facilitates the visual inspection of the relationship.

To carry out the exercise, we use the evolution of quarterly real GDP in local currency units to focus on those countries with available data on participation with quarterly frequency: Argentina, Mexico, the Philippines, Egypt, and South Africa. In addition to these five countries, we have quarterly data for Brazil starting in 2012 (the annual data of our baseline estimations starts in 1995). We repeat the exercise using the Brazilian data to have six countries of analysis for this section. To define an episode of output contraction, we calculate the GDP fall from peak (the value of quarterly output just before the first decline) to trough (the lowest value of quarterly output just before the start of the recovery). Since the information is expressed in real local currency units, to facilitate the comparison of contractions, we express the value of GDP at the peak equal to 100, in such a way that the GDP at trough reflects accumulated contraction in a standardized way. We identify seventeen episodes of output contractions in our sample with an accumulated GDP contraction. In addition to these events, we also consider, for the sake of completeness, one case of a clear output deceleration in the Philippines during the global financial crisis of 2008, a time window in which all the other countries registered an output contraction. Hence, we finally analyse eighteen episodes (see Table 3). In our sample, we should indicate that Argentina is overrepresented due to the repeated crises that this country has faced during the last two decades, having five output contractions before the COVID-19 era. The declines vary from less than one percent (a drop of 0.3% in 2002-2003 in Mexico) to around twenty per cent, for the COVID-19 crisis output contractions (a drop of 20.26 in Argentina).

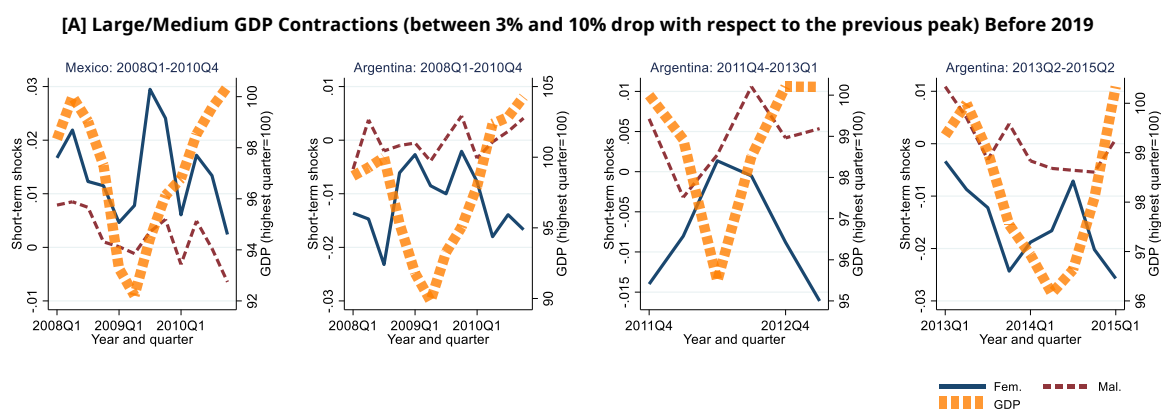
**Table 3. Episodes of output contractions**

Country	Time window	GDP lowest value	Year and quarter
<b>[A] Large/Medium GDP Contractions</b>			
Mexico	2008Q1-2010Q4	92.21	2009-Q2
Argentina	2008Q1-2010Q4	89.83	2009-Q2
Argentina	2011Q4-2013Q1	95.49	2012-Q2
Argentina	2013Q2-2015Q2	96.15	2014-Q3
Argentina	2015Q2-2017Q2	96.32	2016-Q2
Argentina	2017Q1-2018Q4	93.75	2018-Q4
Brazil	2014Q1-2017Q1	92.87	2016-Q4
<b>[B] Small GDP Contractions</b>			
Mexico	2002Q2-2003Q2	99.70	2002-Q4
Mexico	2016Q1-2019Q1	98.80	2017-Q3
Mexico	2012Q2-2013Q3	99.21	2013-Q1
Philippines	2008Q1-2010Q4	n.a.	n.a.
Egypt	2010Q1-2012Q1	99.05	2011-Q1
South Africa	2008Q1-2010Q4	98.46	2009-Q4
<b>[C] GDP Contractions for the COVID-19 Crisis</b>			
Mexico	2019Q1-2021Q4	80.90	2020-Q2
Argentina	2019Q1-2021Q4	79.74	2020-Q2
Brazil	2019Q1-2021Q4	95.81	2020-Q4
Philippines	2019Q1-2021Q4	89.70	2021-Q1
South Africa	2019Q1-2021Q4	82.61	2020-Q2

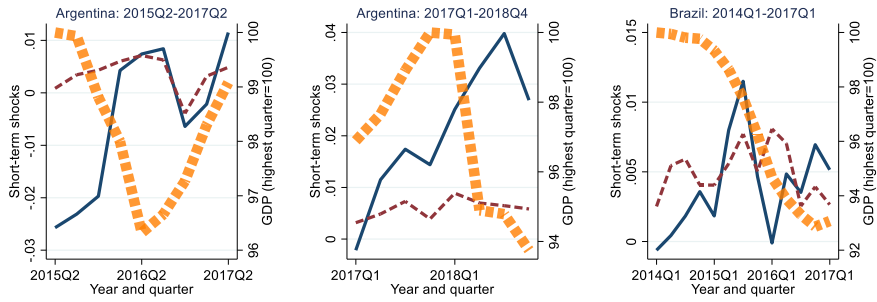
Note: the value of real GDP in local currency units at the peak has been normalized to 100

Available literature has looked at the relation between participation’s heterogeneity (if married, if children, if vulnerable, if the partner has lost her/his job) and business cycles; but has not paid attention to the different magnitudes of contractions. In our case, we classify output contractions as small, or medium/large contractions, for the years before COVID-19. To implement this categorization, we use the accumulated GDP contraction from peak to trough reported in Table 3. We define as small contractions those where the drop in output was less than 2% while those larger than 2% for the pre-COVID-19 crisis are classified as medium or large (with a maximum value of 10 percentage points drop). We distinguish in the analysis the contractions related to the COVID-19 crisis, which ranged between 10% and 20%. As expected, not all contractions are similar, and the length of the time window varies by episode. Some contractions and recoveries last less than a year, and in one episode the recovery did not materialize even after three years (the contraction in Brazil started in 2014). We cap our maximum time window of analysis to three years.

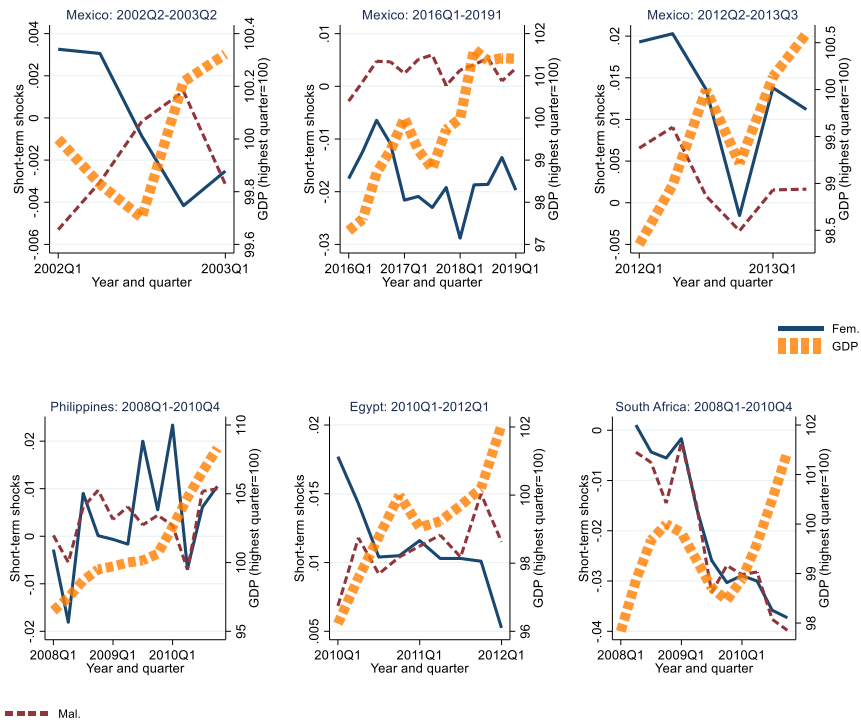
**Figure 5. GDP Contractions and Year Effects for Female/Male Labour Force Participation**



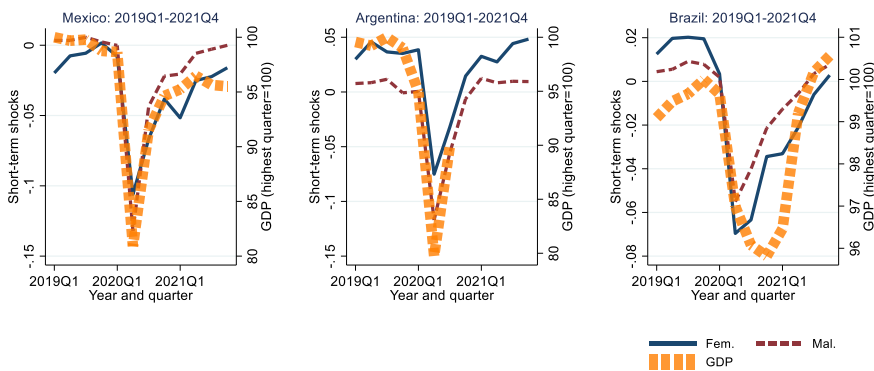
► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis



[B] Small GDP Contractions (less than 2% drop with respect to the previous peak) o Slowdowns Before 2019



[C] GDP Contractions for the COVID-19 Crisis



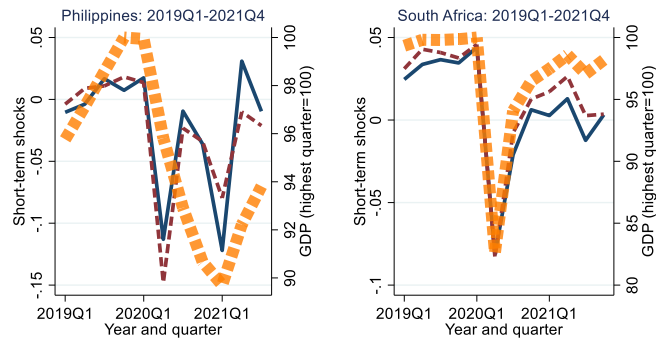
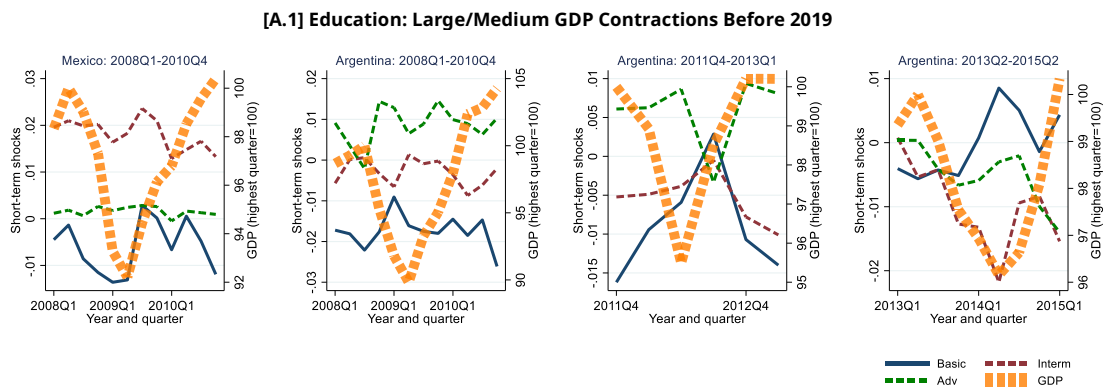


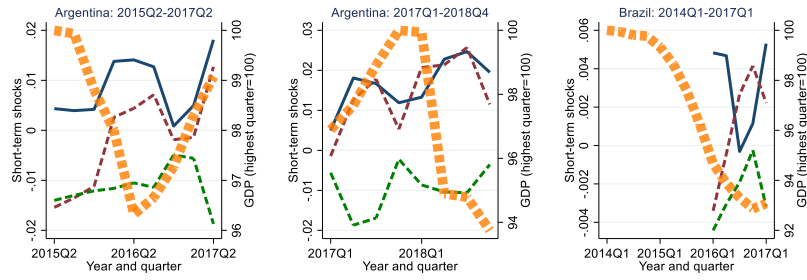
Figure 5 shows the results of the analysis for female and male labour force participation. Panel [A] shows seven episodes with medium and large output contractions before 2019, panel [B] shows six cases with small GDP contractions before 2019, and panel [C] analyses the case of the COVID-19 crisis episodes. For medium and large output contractions, in the cases of Mexico, Argentina and Brazil, we find a clear and consistent pattern of increase in the year effects of FLFP in the seven cases (no clear pattern for the male case). This result is in line with previous research on Latin American countries. However, in complementarity with this literature, we show that when the deterioration in economic conditions is only mild, then female labour supply does not indicate a clear pattern. Indeed, the small output contractions experienced in Mexico, but also in countries from other regions, such as the Philippines, Egypt and South Africa, show a rather procyclical or acyclical pattern for FLFP. This result seems consistent with recent evidence in advanced economies, that points out that the added work effect has diminished over time or is relatively modest.<sup>13</sup> Therefore, we can conclude that the added work effect (or the countercyclical behaviour of FLFP) is present only for relatively deep recessions, and not for any economic downturn. Finally, panel [C] shows the episodes related to the COVID-19 crisis. In this case, we do not find the previous countercyclical pattern for the FLFP. On the contrary, there is a clear procyclical behaviour for participation of both men and women. The result is completely expected in the context of lockdowns or restrictions for labour participation, where there was no room for risk sharing mechanisms at the household level that could boost FLFP (or no added work effect). Interestingly, the recovery of the year effects of participation has been slower for women than for men in the cases of Mexico, Argentina, Brazil and South Africa.

**Figure 6. GDP Contractions and Year Effects for Female Employment by Education, Formality & Skill Level**

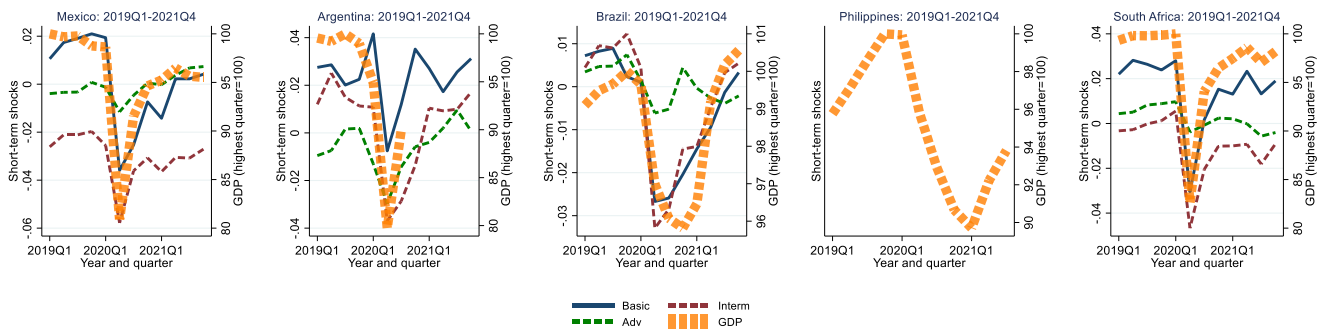


<sup>13</sup> For the case of the US, see Juhn and Potter (2007), and for the case of Austria, see Halla et al. (2020).

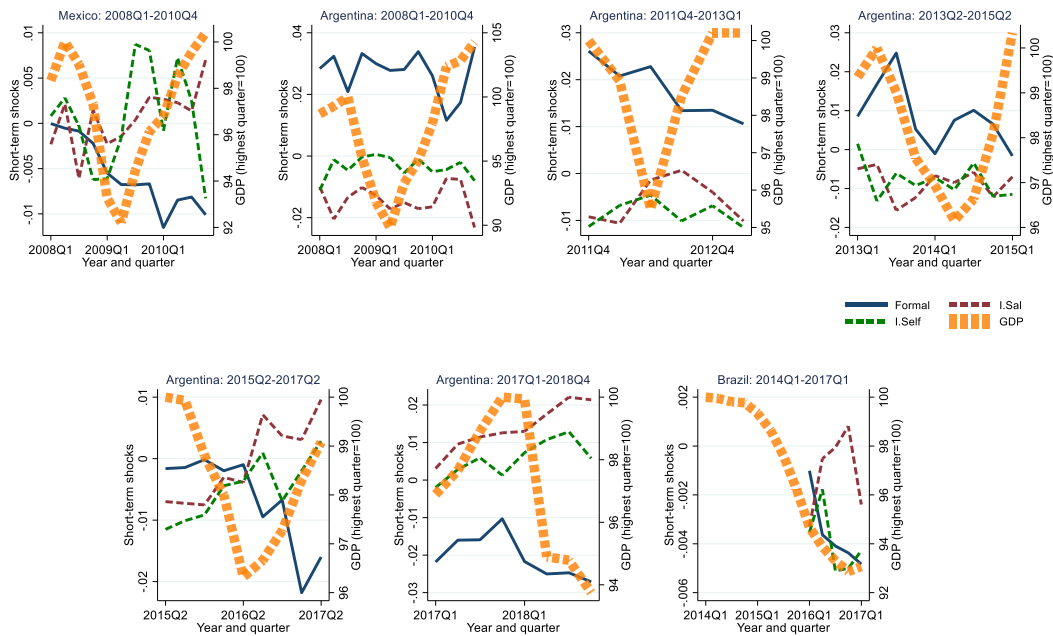
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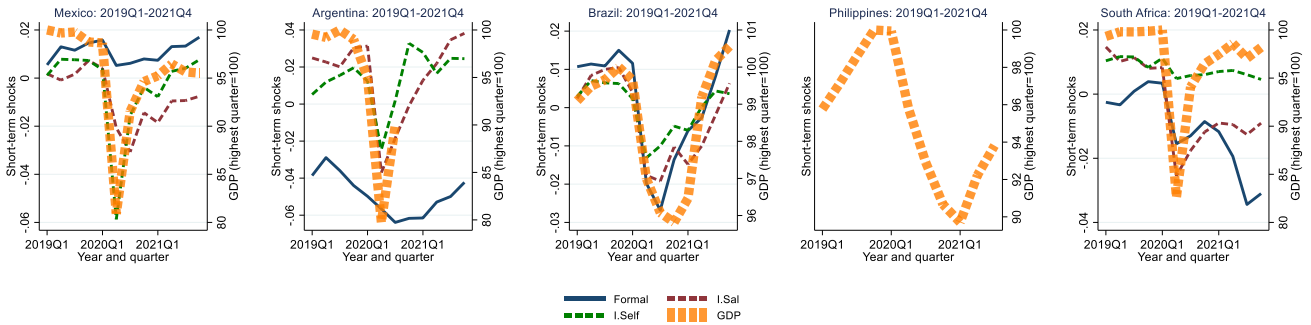
[A.2] Education: COVID-19 Episodes of GDP Contractions



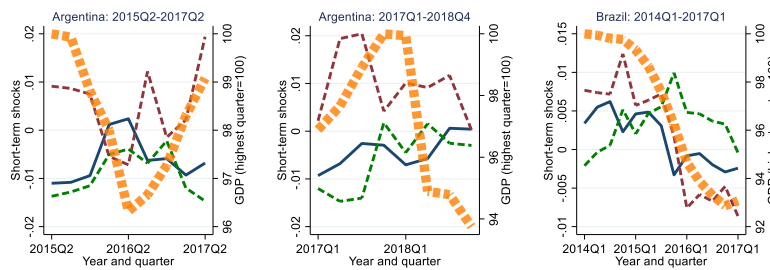
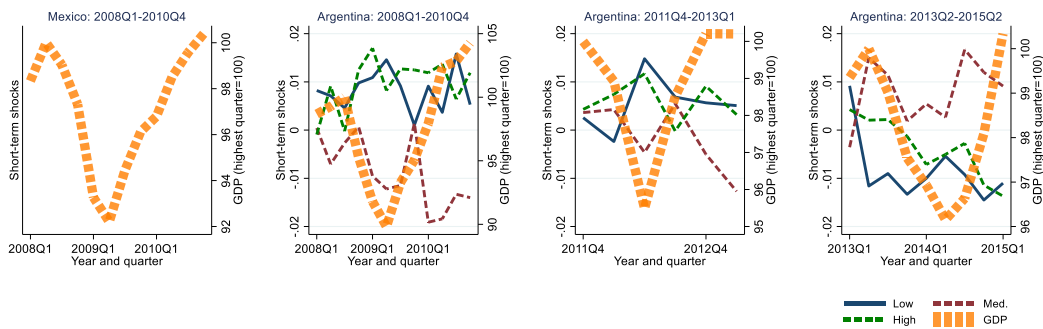
[B.1] Formality: Large/Medium GDP Contractions Before 2019



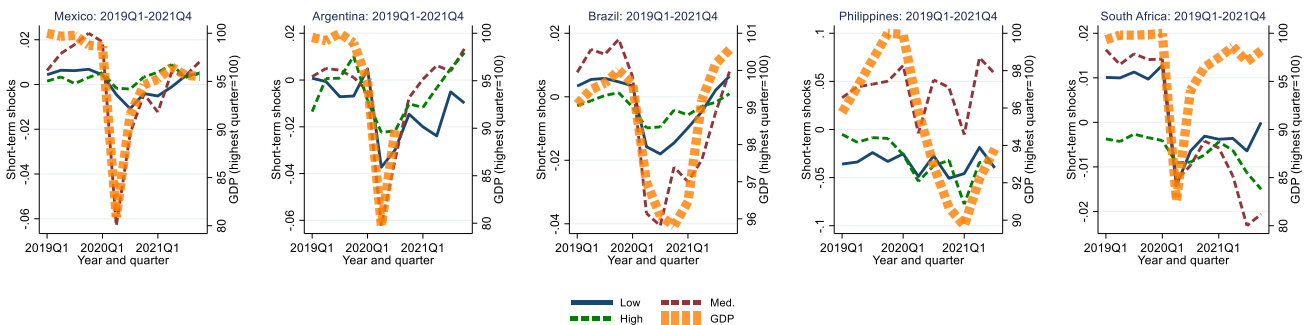
**[B.2] Formality: COVID-19 Episodes of GDP Contractions**



**[C.1] Skill Level: Large/Medium GDP Contractions Before 2019**



**[C.2] Skill Level: COVID-19 Episodes of GDP Contractions**



As in the section for the lifecycle determinants of participation, we focus on female employment year effects and break down these effects by education level, formality and skill level. With this break down, we aim to achieve a better characterization of the countercyclical behaviour of short-run shocks to women participation in the labour market before 2019. Since we did not find a clear pattern for small GDP contractions, we don't present the break down for these episodes. Moreover, as we did before, in the Appendix, and for completeness, we show the same break down of the year effects for total participation (of men and women).



In panels A.1 and A.2 of Figure 6, we look at FLFP short-run shocks by education level. For the contractions before the COVID-19 era, the examples of Mexico and Argentina<sup>14</sup> indicate that the countercyclical behaviour of female participation is mainly explained by women with basic education and to a lesser extent women with intermediary level of education. In panel A.2 we observe the year effects by education level during the COVID-19 crisis, and we clearly see that women with higher levels of education were less impacted, or that the procyclical behaviour of female participation is explained by those women with low or intermediate levels of education. In panels B.1 and B.2, the female year effects are broken down by formal and informal types of jobs. In line with Duval and Orraca (2008), we find that informal jobs for women contribute to the added work effect in Mexico (cf. first figure in panel B.1), but this result also holds very clearly for the recessions in Argentina around 2012, 2016 and 2018 (third, fifth and sixth figures of the same panel). There are all small increases for Argentina around 2009 and 2014. Panel B.2 indicates that during the COVID-19 crisis, jobs in the formal sector for women were relatively less affected, except in the case of Brazil where it recovered more rapidly. In panels C.1 and C.2 the breakdown of women participation short-run shocks is carry out according to the skill level of the job. The countercyclical pattern observed before the COVID-19 crisis is mainly explained by jobs with a low level of skills, however, in some recessions of panel C.1, we can also note an increase in the intermediate skill level jobs for women. For the COVID-19 episodes, the contraction in women participation is clearly more important for those jobs with intermediate skill levels.

### 4.3. Long-Term Trends (Cohort Effects)

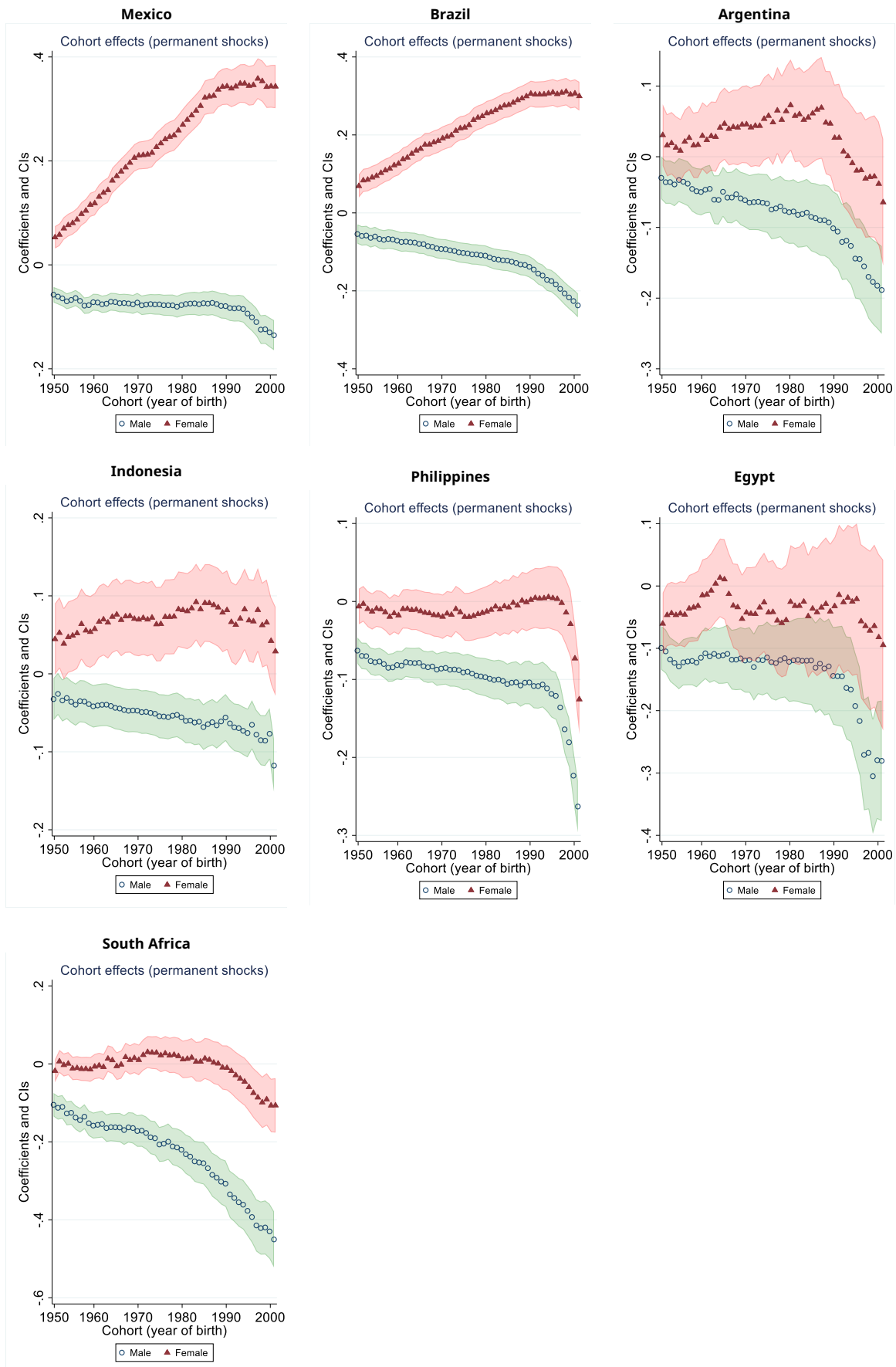
Finally, this section focuses on the long run trends behind labour force participation as the estimated cohort effects correspond to those persons born since the 1950s up to the year 2000. Figure 7 presents the estimated long-term trends by gender. First, there is a downward trend in the male participation for five economies, except for Mexico and Egypt. As mentioned earlier, relatively similar results had been observed previously by Grigoli et al. (2018) in the case of advanced economies, and in particular for the USA, for the men born after the mid-1970s.

The case of women shows more divergent long-term trends in terms of participation, with large gains in FLFP for the three Latin American economies (Mexico, Brazil and Argentina) up to the cohorts of the mid-1980s or early 1990s, a more stable picture of participation in Indonesia, the Philippines and Egypt, and a clear downward trend started with the cohorts born in the 1970s in South Africa. As mentioned earlier, this plateau in the cohort effects is observed since the 1980s, so corresponding to those generations that entered the labour force in the 2000s, it is consistent with the deceleration documented by Gasparini and Marchionni (2017). Besides, there are two countries with reversals in the long-run trend of FLFP, namely Egypt - in consistence with the evolution already documented by Lassassi and Tansel (2019) - and Argentina. To our knowledge, the reversal for Argentina had not been documented previously in the literature.

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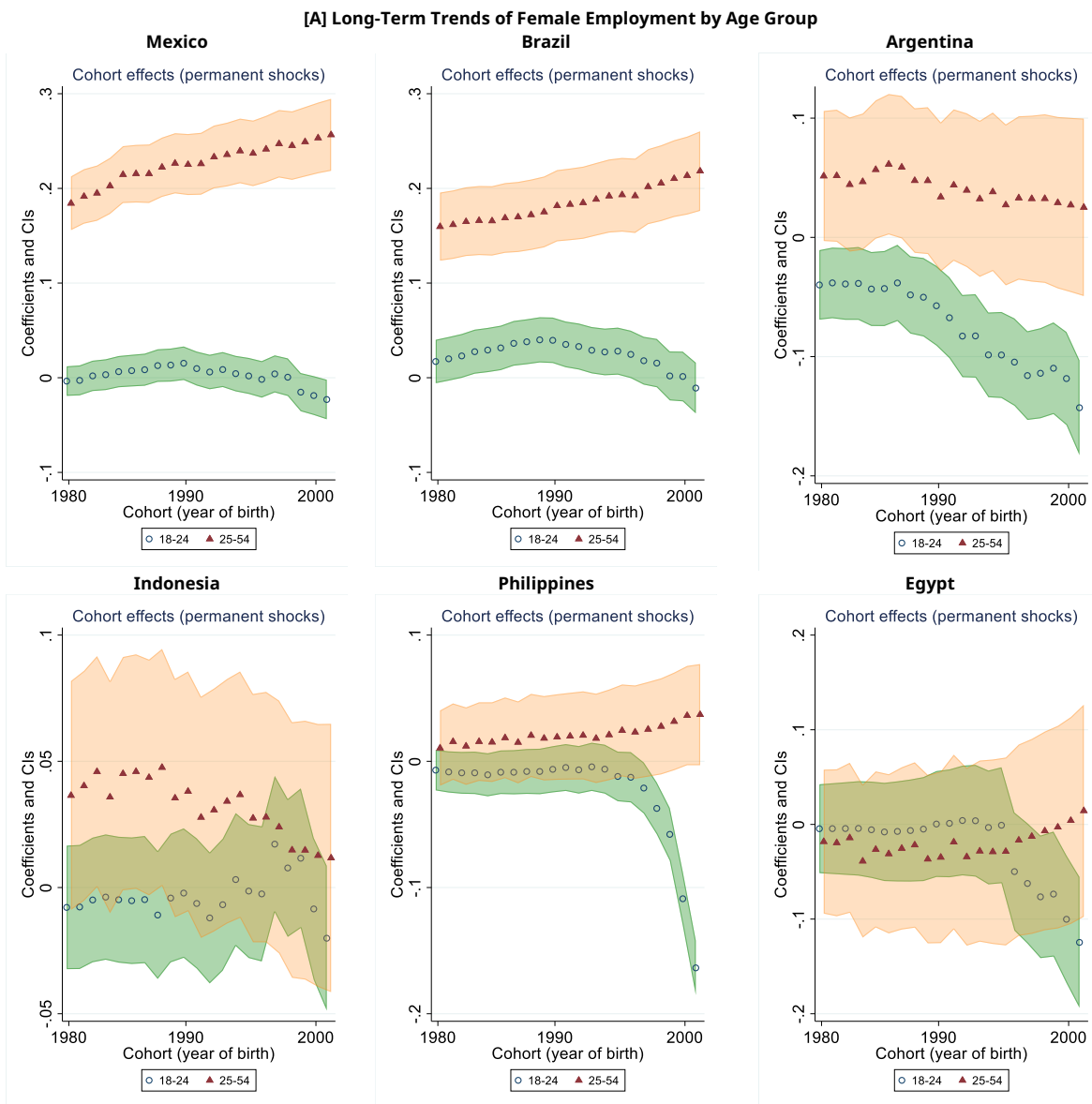
<sup>14</sup> We do not have complete information for Brazil.

**Figure 7. Cohort Effects for Labour Force Participation by Gender**

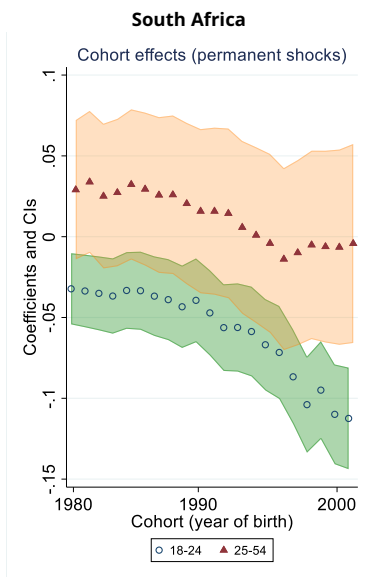


To better characterize the long run trends that affect the participation of women, Figure 8 reports the cohort effects of employment by education level, formal/informal job status, and skill level. In addition to these three break downs of female employment, we look at two different group ages, those female workers that are relatively young (from 18 up to 24 years), and women in their prime working age (between 25 and 54 years). We estimate the participation model for each group age separately. In the Appendix, we report the figures for the cohort effects for total participation (of men and women), as we did in the cases of the age effects and year effects.

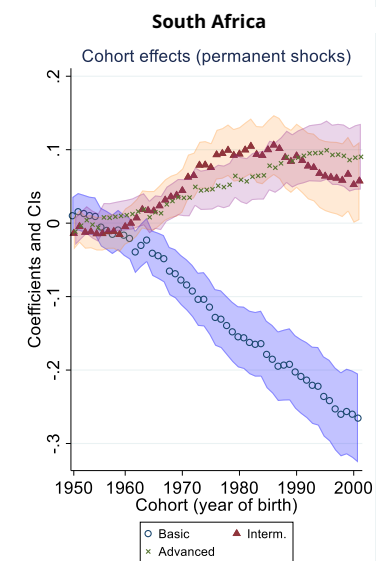
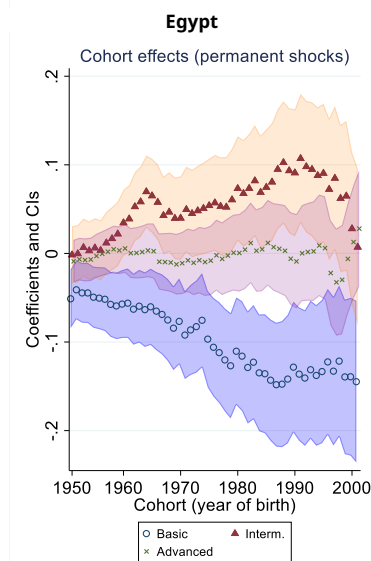
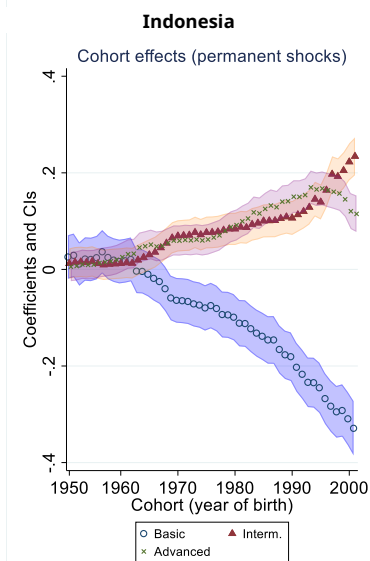
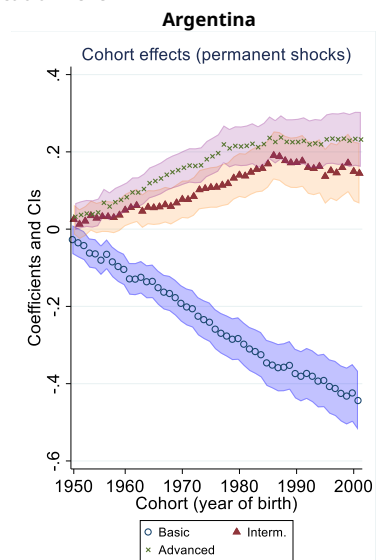
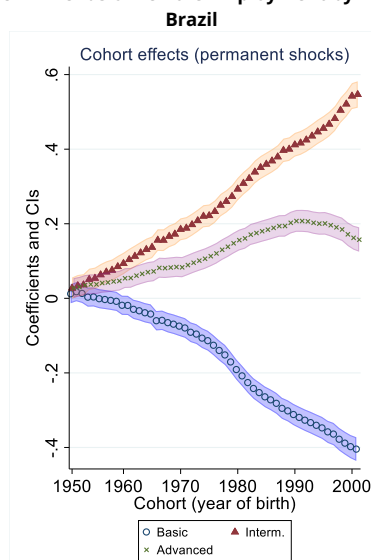
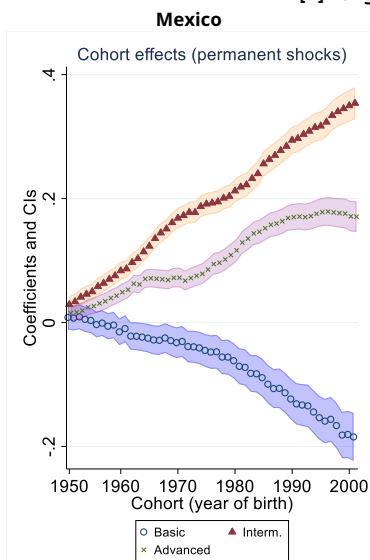
**Figure 8. Cohort Effects of Female Employment by Group Age, Marital Status, Education, Formality and Skill Level**



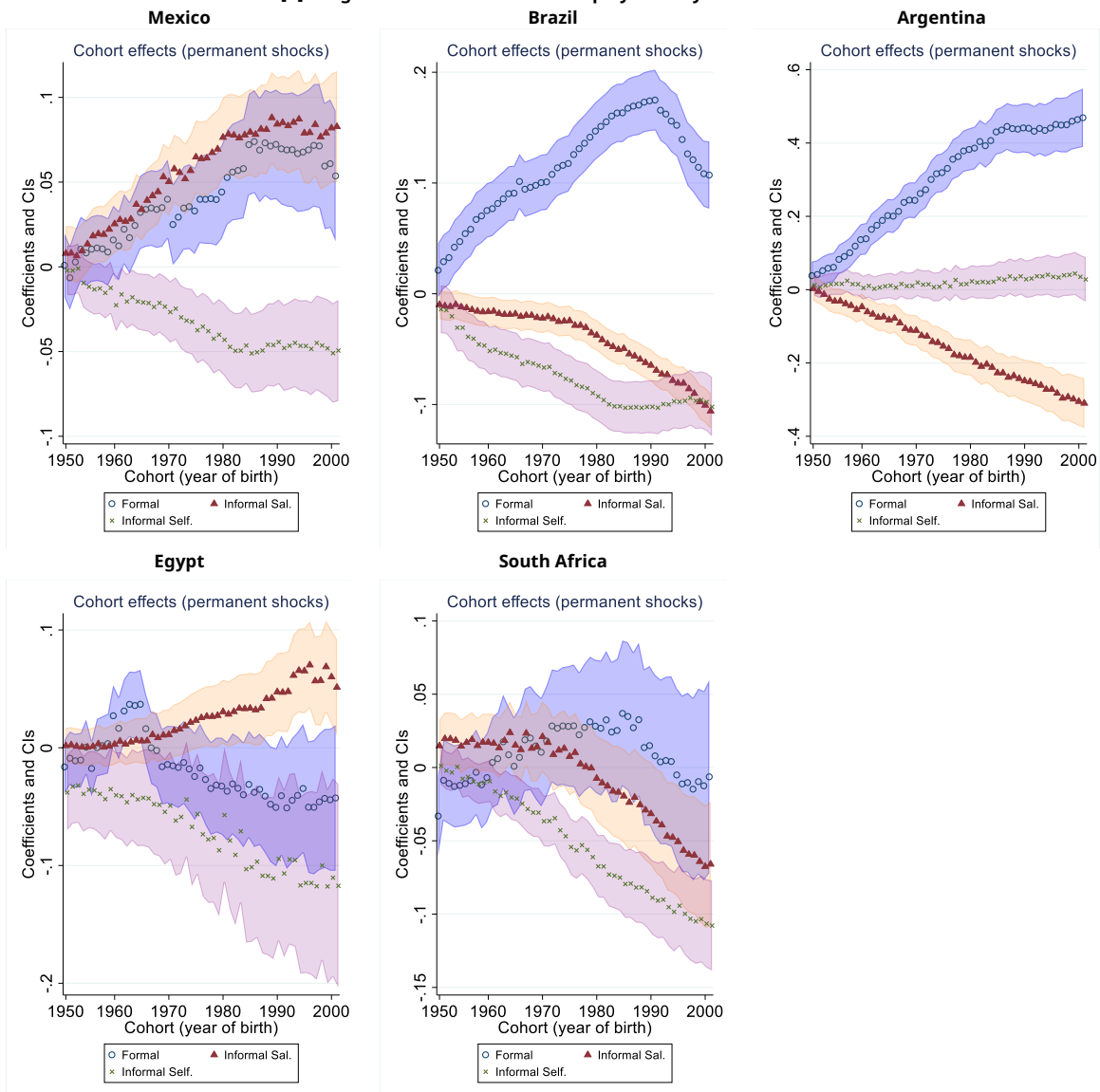
► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis



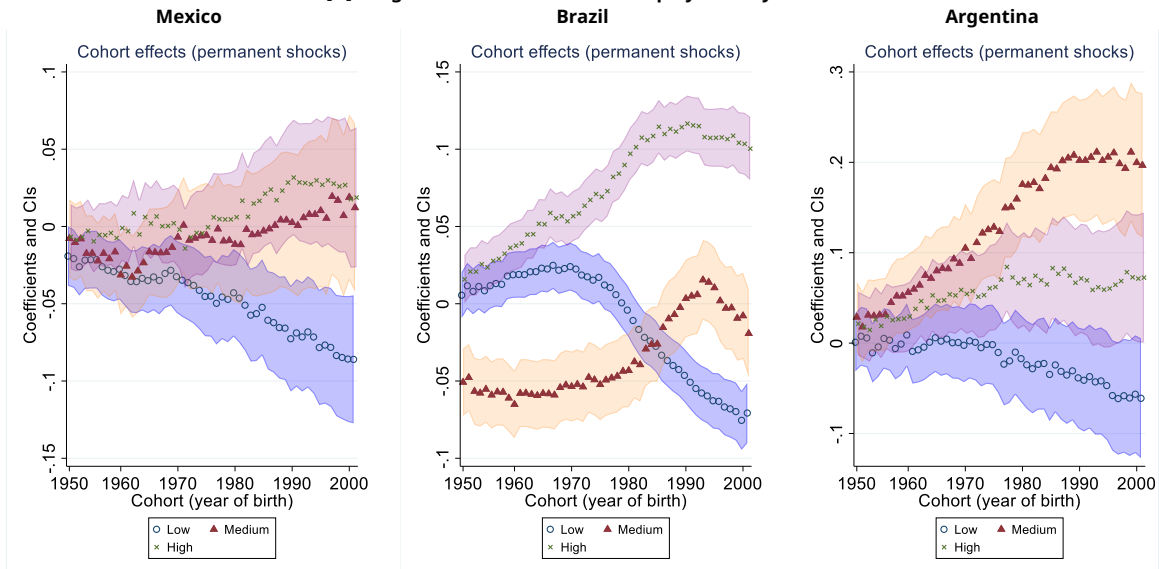
[B] Long-Term Trends of Female Employment by Education Level

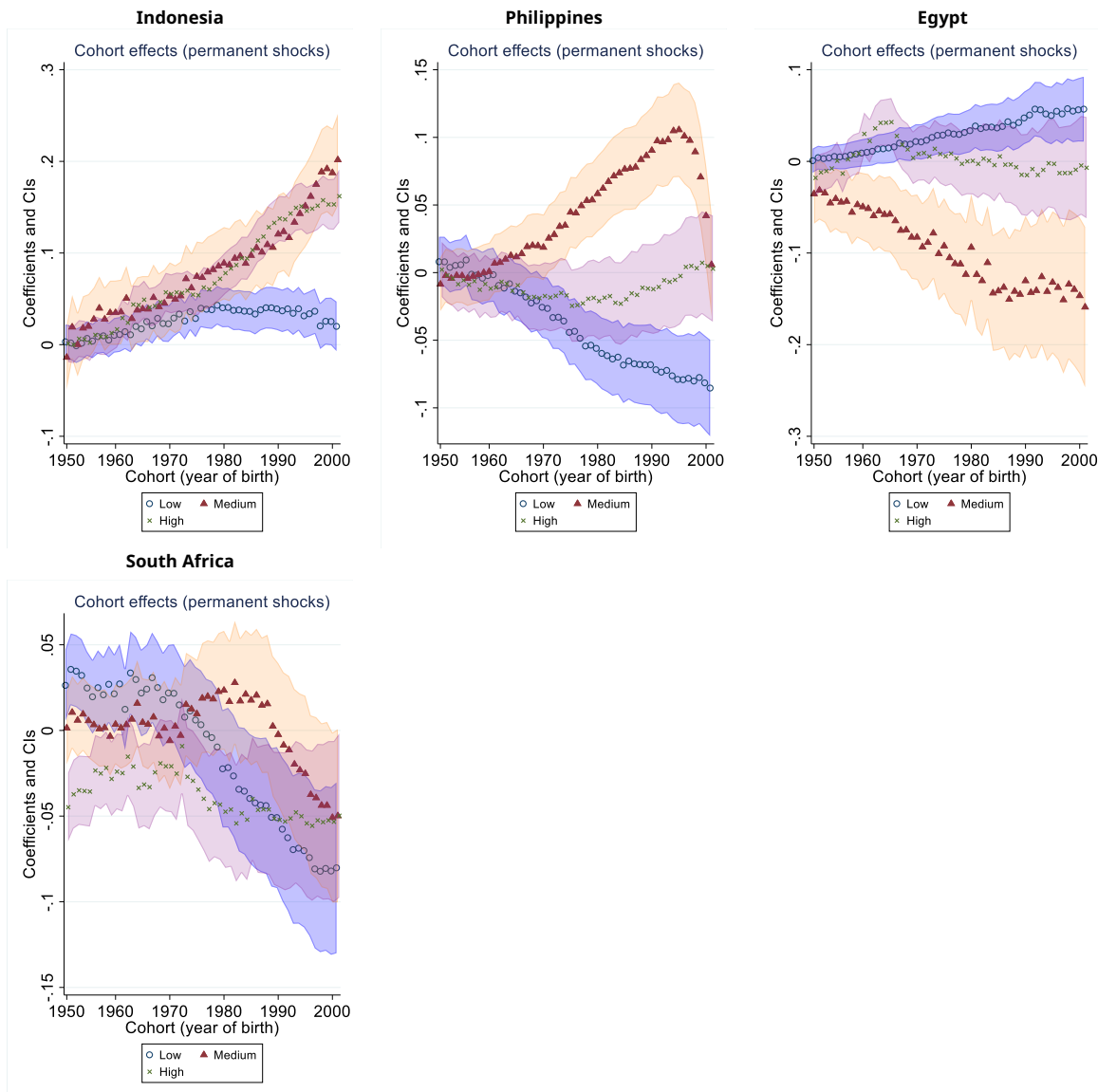


[C] Long-Term Trends of Female Employment by Formal/Informal



[D] Long-Term Trends of Female Employment by Skill Level





Panel A of Figure 8 shows how the cohort effects evolved across women of different group ages, particularly for those women born during the 1980s and 1990s. We observe a change in the trend for relatively young women (between 18 and 24 years) born during the 1990s, which implies lower participation rates in six of the seven economies. The same behaviour is not observed for those women in their prime age (between 24 and 54 years), with stable patterns in Mexico, Brazil, the Philippines and Egypt, and a continuous decline for Argentina, Indonesia and South Africa. As mentioned earlier, this long run declining trend has been previously documented by Grigoli et al (2018) for advanced economies, for those women and men between 15 and 24 years. The change in the trend of the young women might be associated with better access to education experienced by those women born during the 1990s, or maybe to lesser opportunities for younger generations. In advanced economies, Grigoli et al (2018) provides this explanation to understand the downward trend for participation of the young women and men during the last three decades.

Panel C focuses on the formal or informal status of jobs. We have information for five countries. In four cases (three Latin American and South Africa), the participation of women in formal jobs has been increasing for those women born in the 1950s up to 1990, where depending on the country, a plateau, or a reversal in the participation of formal jobs is observed. The exception is Egypt, which registers a peak in the participation of formal jobs for women born during the 1960s, and then a continuous decline for new cohorts, which could be consistent with the reduction in the opportunities in the public sector for women in the recent decades mentioned earlier (this is also true for the increase in self-salaried informal jobs). The other side of the coin is that, in four of the five economies, there is a continuous downward trend in the self-employed informal jobs for women, and in the case of Argentina and Brazil this is true for the informal salaried jobs. Finally, panel D

looks at women employment by skill level. In the three Latin American countries as well as in Indonesia and the Philippines, beginning with the cohorts born in the 1970s, there seems to be a downward trend in the jobs with low skills, and at the same time, greater chances of women of finding a job with intermediate or high skill levels. Again, Egypt presents a particular pattern, where women with high skill jobs gain ground until the cohorts born during the 1960s, and then the chances for women with this type of jobs declined afterwards. Finally, in South Africa all types of jobs in terms of skill levels seem to be decreasing at least since the cohorts born in the 1970s.

## 5. Conclusion

This paper is the first study that aims to compare various characteristics of labour force participation and employment, either formal or informal, for both men and women in several emerging or developing economies of different regions using pseudo panels and the APC method. Previous studies had either focused on one country, or a group of countries from the same region, or compared the same kind of evolutions, albeit in a group of advanced economies. As we cover seven emerging or developing economies from three different regions (Latin America, Africa and Asia), we are able to show a great diversity of participation and employment patterns and disentangle short-term effects, linked to the general economic situation, to long-term effects influenced by age and cohorts.

As mentioned in the introduction, ILO Member States have placed the issue of the management of labour market transitions throughout the working life at the core of the human-centred approach to the future of work (Delautre et al 2021). In response to this call, this study allows to disentangle the effects of three factors shaping participation and employment patterns and understand better how the life-courses of individuals are influenced by these three factors. The first effect, the age-effect, is the effect that influences individuals' participation according to life-cycles events or decisions, such as education, childbearing, retirement and others. The second effect, the time or cycle effect, measures the global macroeconomic situation, which affects all the individuals at the same time but only in the short run. In our analysis, we specifically focus on the periods of recession experienced in the last decades. Finally, the third effect, the cohort effect, measures the long-term effect that is specific to each cohort and could stem from future of work drivers, such as technological changes, but also changes in social norms.

With regards to the age effects, we observe the following results: While in the case of men, the seven countries share relatively similar profiles of participation with the standard inverted-U shape indicating that men increase substantially their chances of participation in the young adulthood, then participation reaches a relative plateau in most of the countries, and starts an accelerated decreasing pattern around the fifties, we see much more diversity in the case of women. Only South Africa shows a standard inverted-U shape for women's participation. In other countries, labour force participation seems to be more affected by childbearing. In three countries, Indonesia, the Philippines, and Egypt, there is a light M-shape indicating that many women temporarily exit the labour force during the mid-twenties. Interestingly, in a complementary analysis comparing the generation of Millennials (born in the 1980s and 1990s) and the generation X (born in the 1960s and 1970s) in the case of Indonesia and the Philippines, we do not see this M shape fading, although participation generally tends to increase after the age of 20. In the three Latin American countries, we see the growth of female participation decelerating after the mid-20s and until the mid-40s. Looking at the disaggregation by education level, we can see that these evolutions in most of these countries are mainly experienced by women with intermediate levels of education, while women with basic levels of education show very different age profiles depending on the region (mostly declining in Latin America, M-shape in Indonesia, stable in Egypt and inverted-U shape in South Africa). These evolutions are also more typical of women in low or intermediate skill levels (depending on countries). In terms of employment, we can see that formal employment is more characterized by an inverted-U shape, while the age profile of informal workers not only depends on the type of jobs, either salaried or self-employed informal jobs, but also varies substantially according to countries. For example, the informal salaried jobs seem to have a stable profile in terms of age, except in the case of Argentina and Brazil. In these two countries specifically, the clear downward trend indicates that participation in informal salaried tends to decrease with age in the case of women.

Regarding the year effects, we focused our analysis on episodes of recessions and recoveries. We distinguished these episodes according to their magnitude, classified as small or medium/large contractions, and put a specific focus on the contractions related to the COVID pandemic in 2020 as we were expecting different patterns of participation and employment in this episode. Similar to previous research, we find a clear and consistent pattern of increased female participation typical of an added worker effect in cases of medium and large output contractions for the three Latin

American countries. This has mainly concerned women with basic and - to a lesser extent - intermediary levels of education and in majority through the channel of informal employment which can be considered as shock absorber (at least in the case of Mexico and Argentina). However, in complementarity to previous research, we do not find the same pattern in case of milder contractions on a larger set of countries. In case of mild recessions, female participation is rather pro- or acyclical. In the case of the Covid crisis, there has been a clear procyclical behaviour for participation of both men and women, which is not surprising due to the context of lockdowns, which prevented any kind of burden sharing mechanisms at the household level and affected all types of employment. During this specific episode, the pro-cyclicality of female participation is mainly explained by those women with low or intermediate levels of education and those in informal employment.

With the analysis of cohort effects, we have been able to perceive the long-term effects of macro changes, such as technological changes and other future of work drivers, as well as changes in social norms on participation and employment. Through this analysis, we see that in most cases, newer generations have very different behaviours than past generations. We observe a long-term downward trend in the male participation in most countries with the exception of Mexico and Egypt. The same kind of trend has been reported in advanced economies by previous research. The case of women shows more divergent long-term trends. In the Latin American economies, we observe large gains up to the cohorts born in the mid-80s or early 90s. With the following cohorts, the female participation is rather reaching a plateau in the case of Mexico and Brazil or decreasing in the case of Argentina. In Indonesia, the Philippines and Egypt, the participation has been more stable throughout generations, while in South Africa, the latest generations have tended to participate less. Education clearly has an impact on female participation. We indeed observe a clear downward trend for newer generations with basic education and an opposite evolution in a majority of countries for women with intermediate and advanced levels of education. The evolution in terms of formal or informal status of jobs is more difficult to summarize. In Latin American countries and South Africa, the participation of women in formal jobs has been increasing up to the generations of the 1990s, where depending on the country, a plateau, or a reversal in the participation of formal jobs is observed. In Egypt, the participation in formal jobs experienced a peak with the women born during the 1960s. Regarding self-employed informal jobs, we observe a continuous downward trend in most countries.

We would like to highlight the importance of these results for public policies. The long-term evolutions in male and female participation could indicate that those will not increase naturally in the coming years simply through generations renewal. Over the long term, participation is at best stagnating and depending on the configurations often reducing. It means that to ensure higher levels of participation and employment, governments will have to take voluntary policy measures. Moreover, the increasing participation of women with intermediary and high education level clearly indicates that education is the most valuable investment to allow women to obtain opportunities in the future. However, these supply side measures should be accompanied by demand side measures facilitating job creation for all groups and by measures, which aim at increasing the formalization of employment. In brief, our results clearly demonstrate the relevance of the ILO Centenary Declaration on the Future of Work, which highlighted the necessity to increase investments in people's capabilities, institutions, and decent and sustainable work.

As we are concluding in this study, we would like to see this kind of analysis repeated in more emerging and developing economies as long-time data series become available. Pseudo panels and APC analysis are insightful and relatively simple instruments to disentangle short- and long-term trends in participation and employment patterns and do not need the long-term longitudinal data sources, which are typically not available. As more and more countries implement cross sectional surveys at the household level, such as labour force surveys, it will become easier to undertake this kind of analysis and cover a larger set of countries. One key area of future research is the long-term impacts of the COVID-19 crisis. In this study, we observed the short-term effects of this crisis on participation and employment through the analysis of the year effects. We believe that in the coming years, it will become possible to observe the long-term impacts of the pandemic on the different cohorts. It would be particularly interesting to look at the participation and employment (formal and informal) profiles of the cohorts of individuals who were in the age of entering the labour market (between 18 and 25 years old) at the time of the pandemic or those, younger, and those who have been affected by the measures of school closures to identify possible long-term scarring effects on life courses.

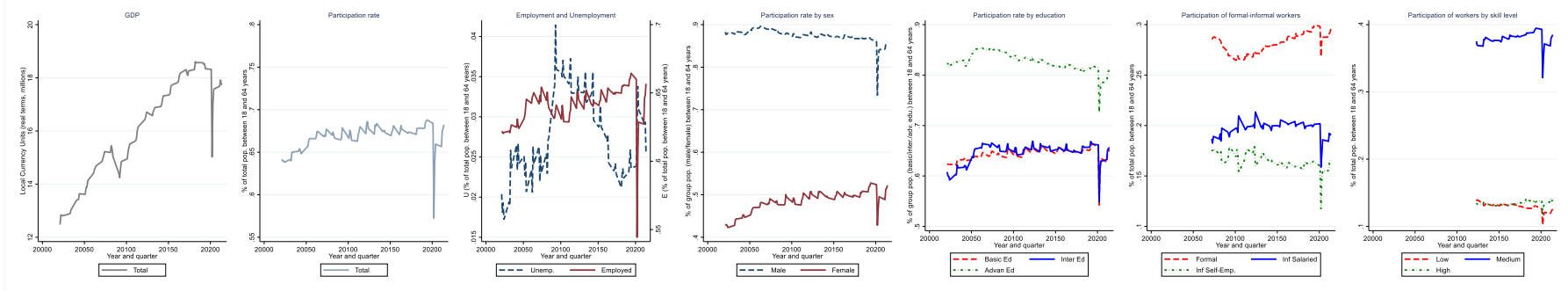


## 6. Appendix (additional figures)

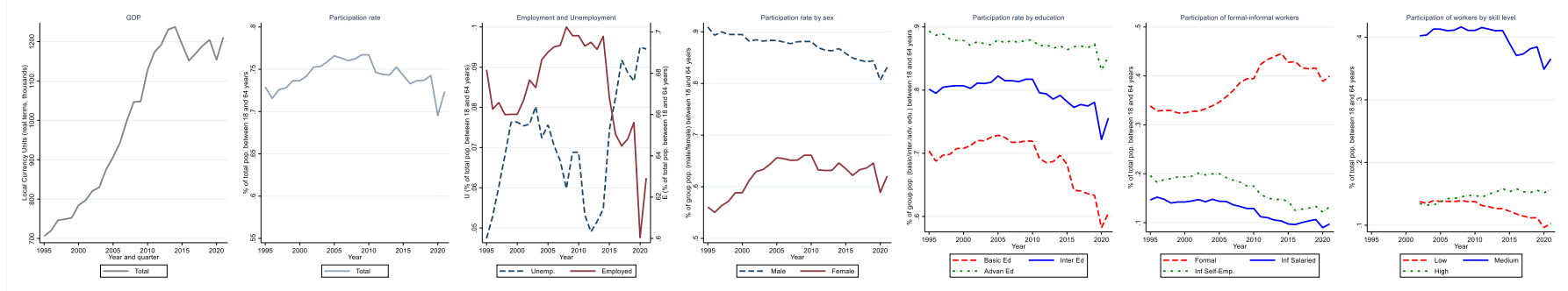
► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis

Figure A1: Descriptive statistics

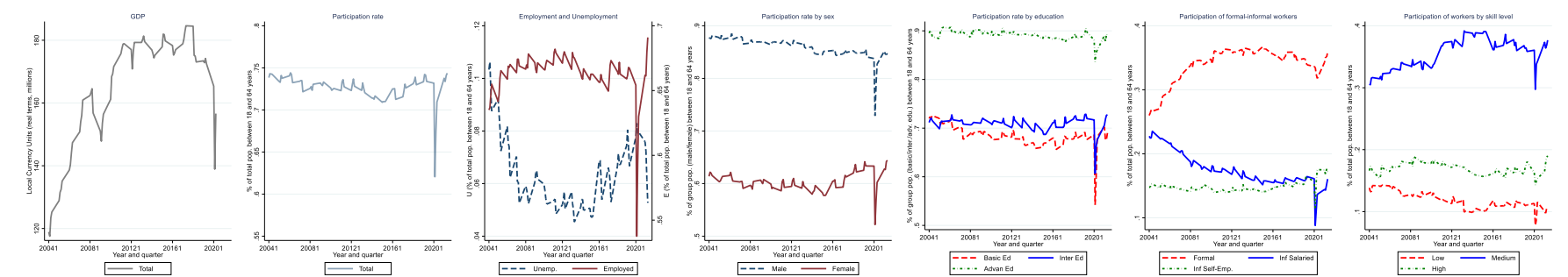
Mexico (2003-2021, quarterly data)



Brazil (1995-2021, annual data)

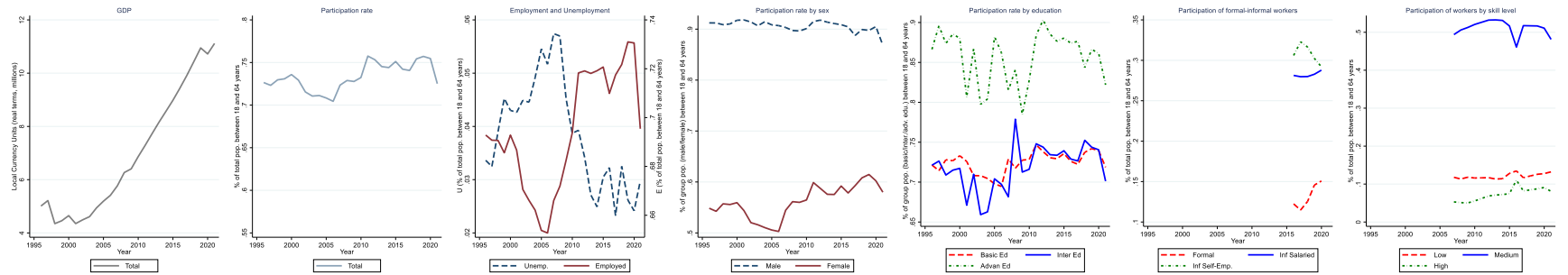


Argentina (2004-2021, quarterly data)

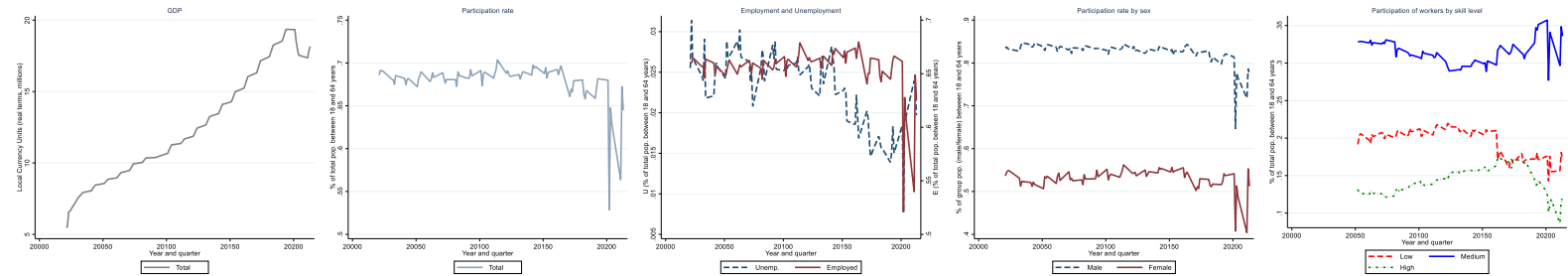


► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis

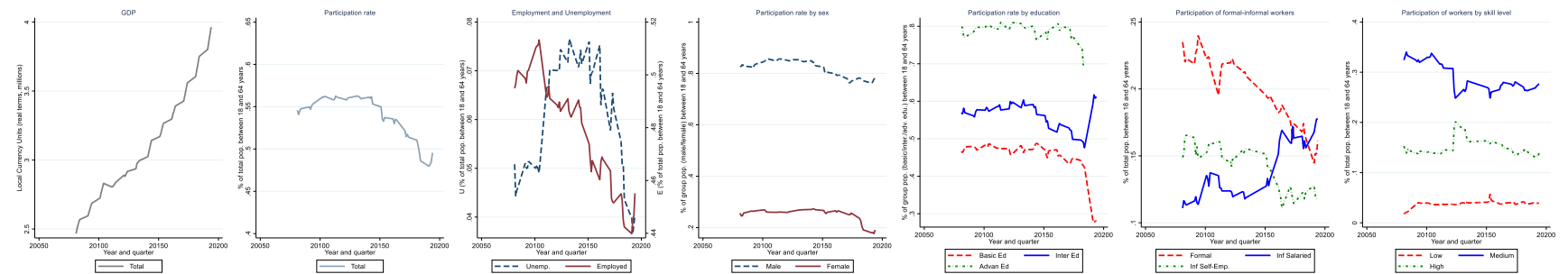
**Indonesia (1996-2021, annual data)**



**Philippines (2002-2021, quarterly data)**

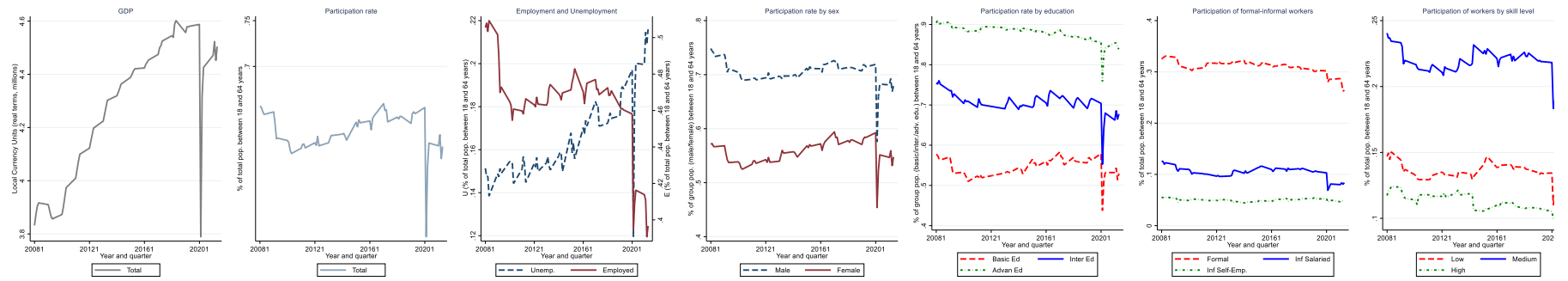


**Egypt (2008-2019, quarterly data)**

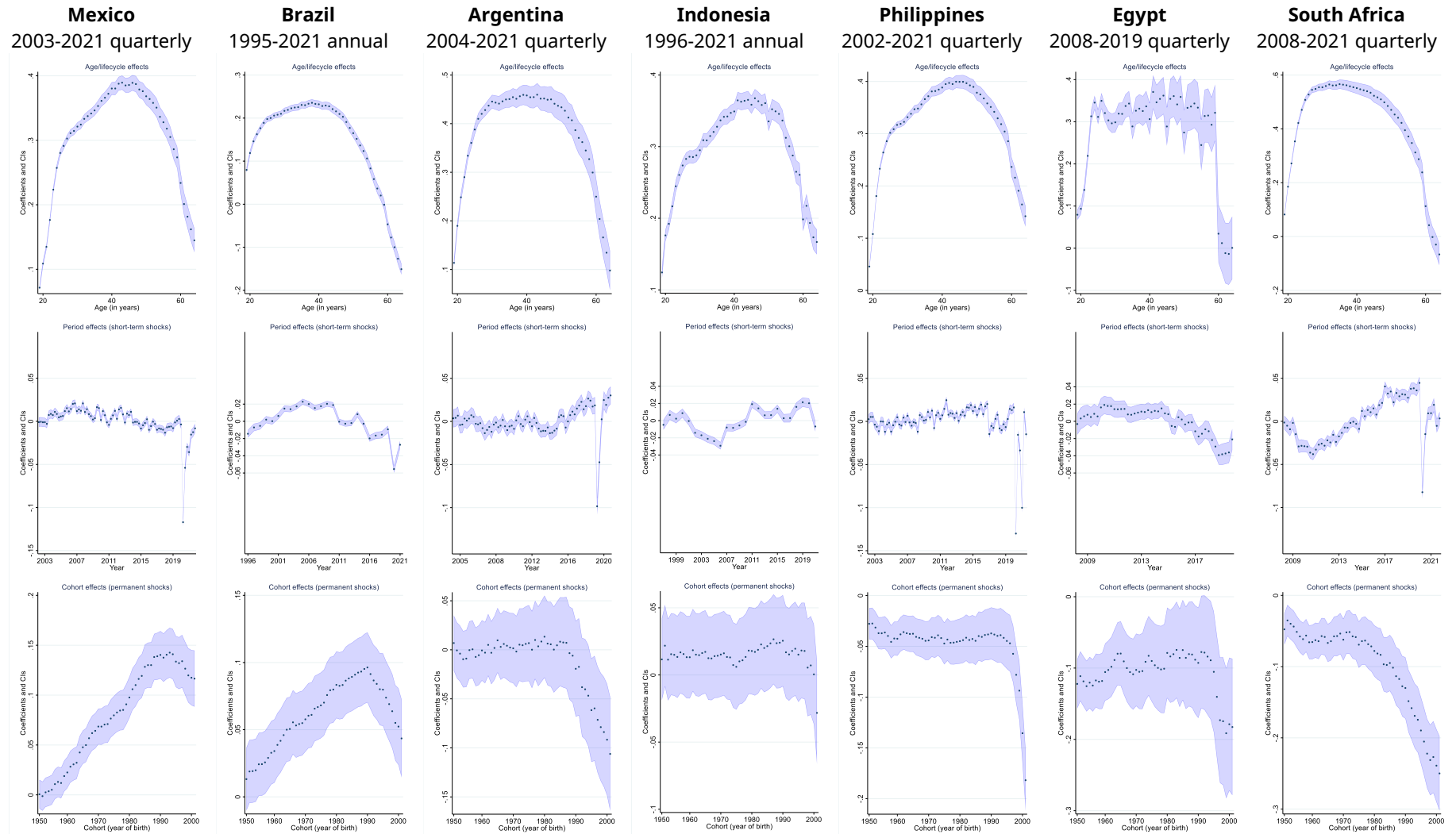


► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis

South Africa (2008-2021, quarterly data)

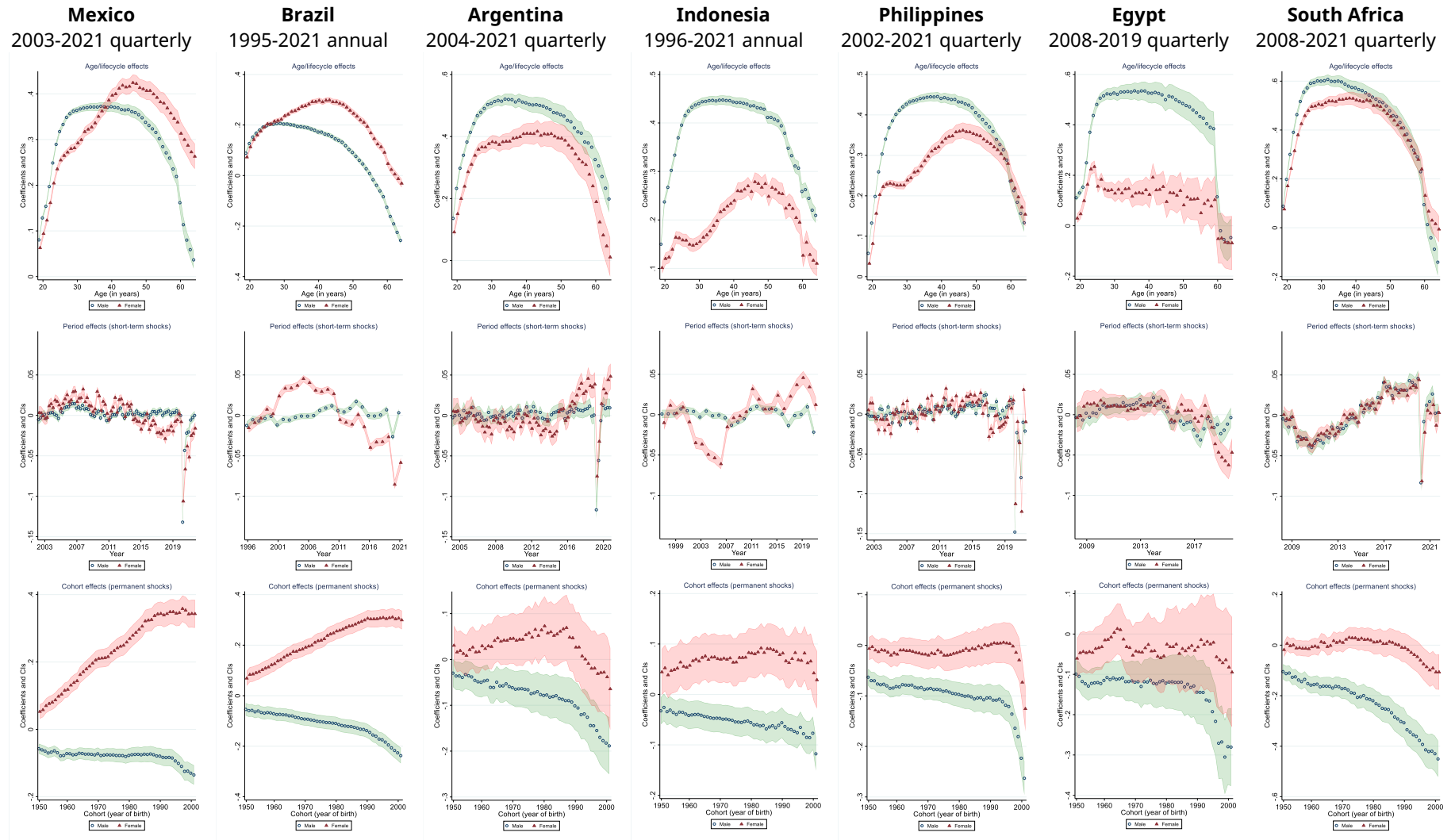


**Figure A2: Decomposition Results for Labour Force Participation**



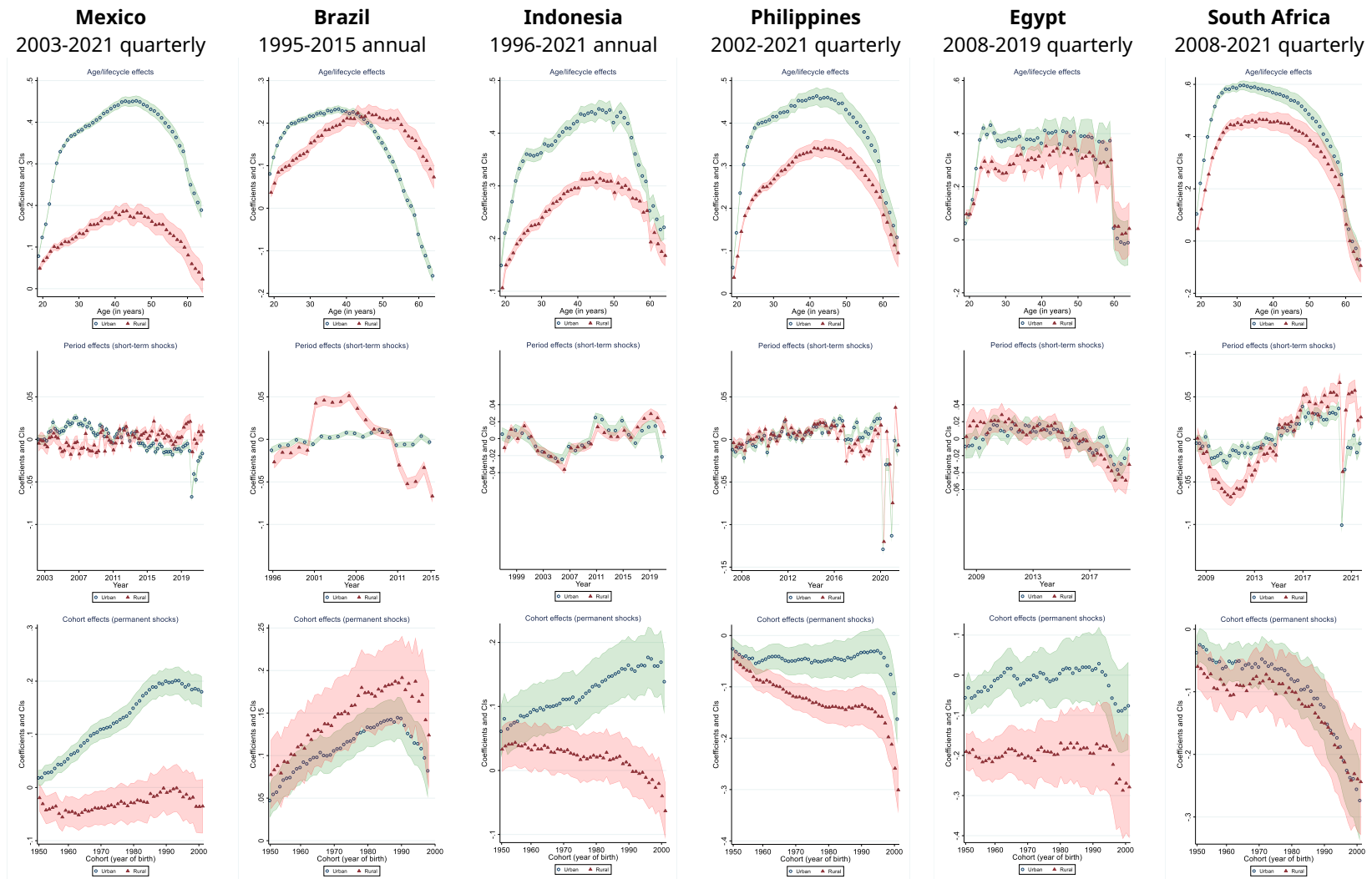
► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis

Figure A.3: Decomposition Results for Labour force Participation By Gender

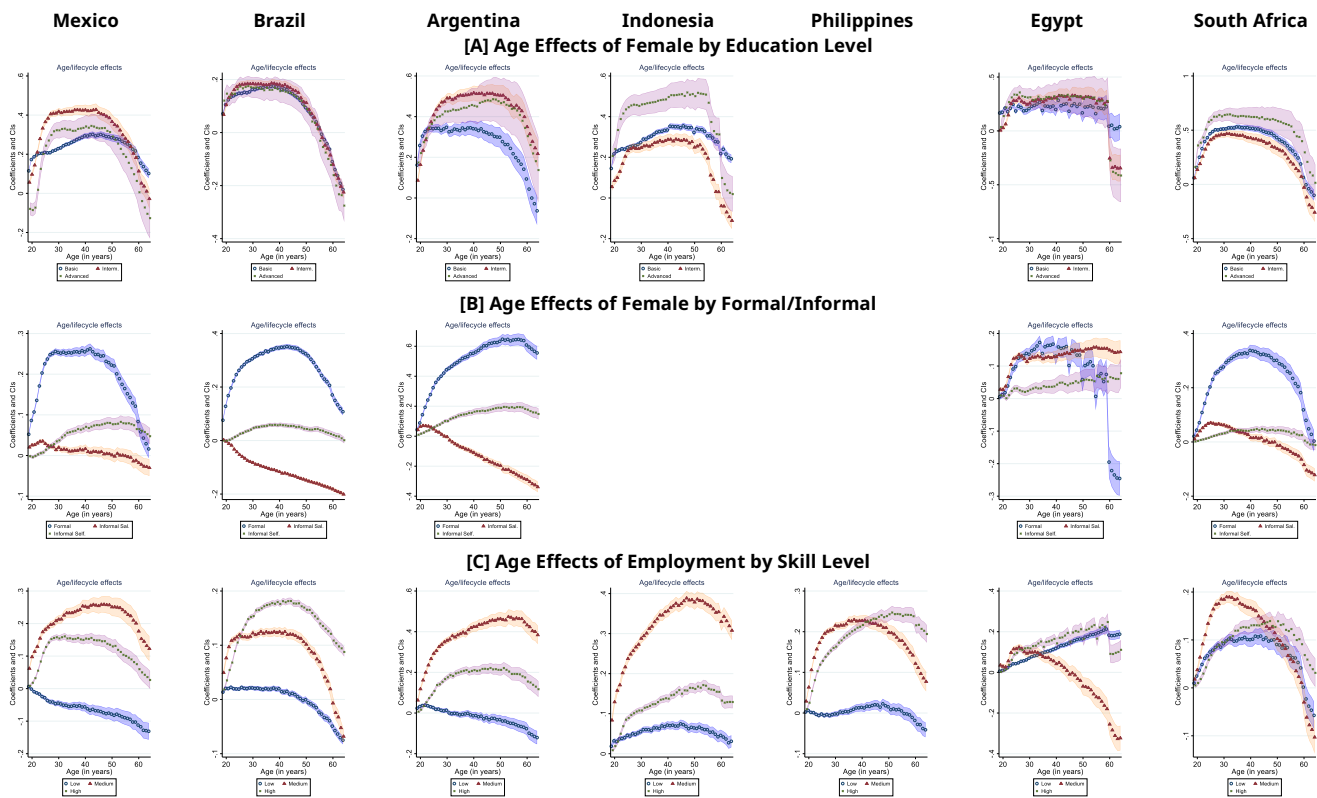


► Participation and employment in seven developing economies: an Age-Period-Cohort Analysis

**Figure A.4: Decomposition Results for Labour force Participation by Geographical Coverage (Urban-Rural)**



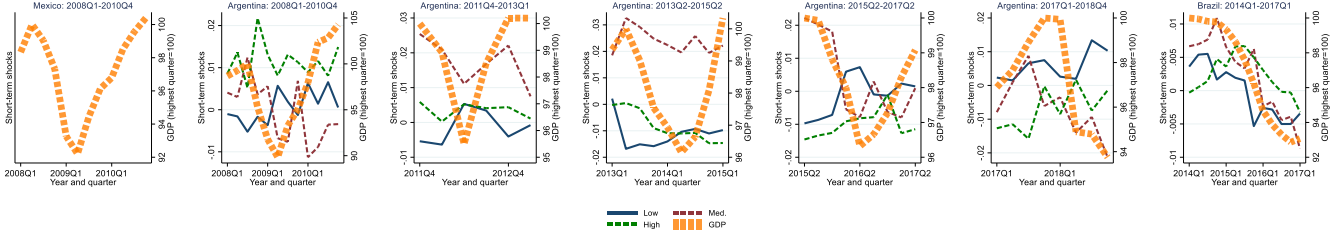
**Figure A5. Lifecycle Determinants of Total Employment by Group Age, Education, Formality and Skill Level**



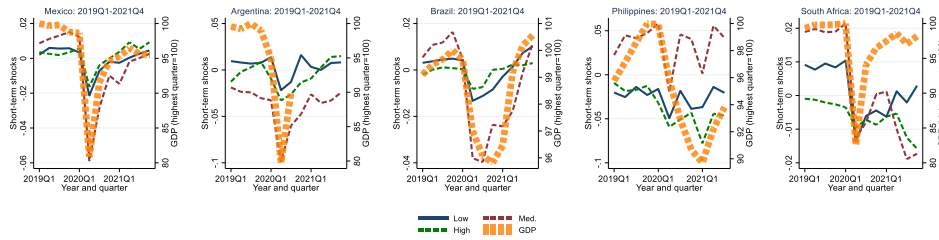


**Figure A6. GDP Contractions and Year Effects for Total Employment by Skill Level & Formal/Informal**

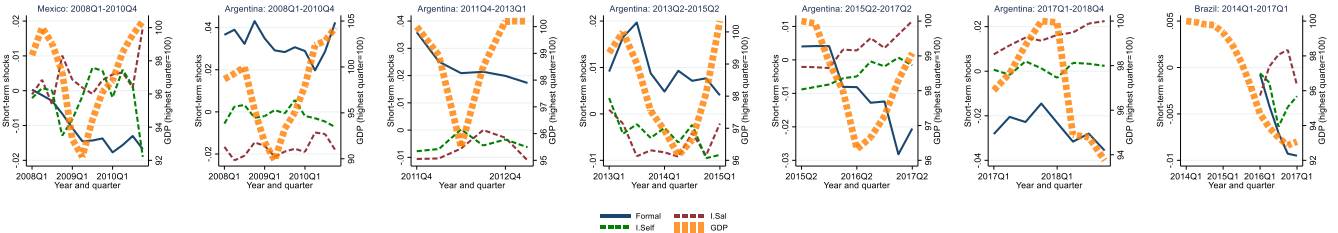
**[A.1] Skill Level: Large/Medium GDP Contractions (between 3% and 10% drop with respect to the previous peak) Before 2019**



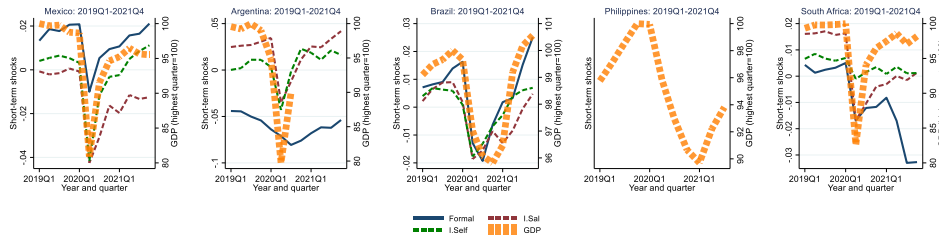
**[B.1] Skill Level: COVID-19 Episodes of GDP Contractions (Large)**



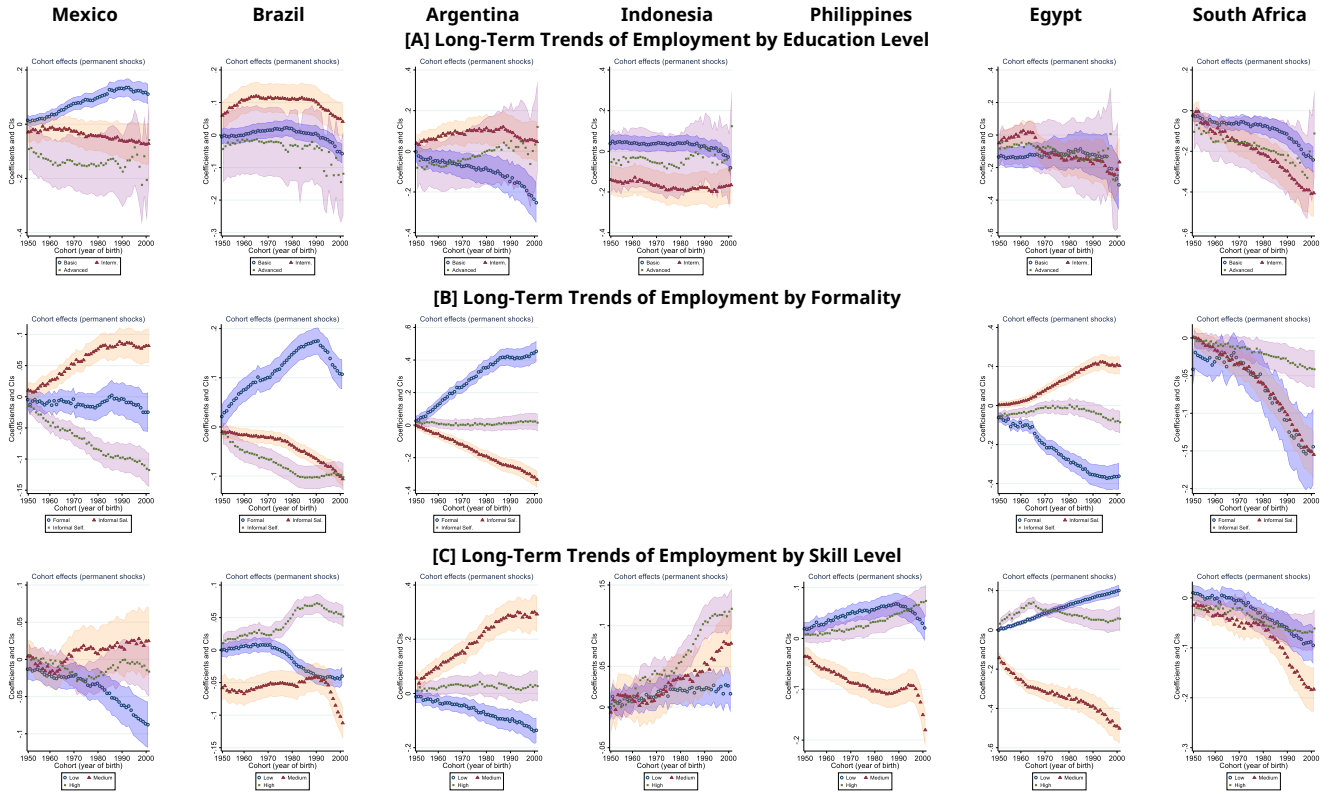
**[A.2] Formal/Informal: Large/Medium GDP Contractions (between 3% and 10% drop with respect to the previous peak) Before 2019**



**[B.2] Formal/Informal: COVID-19 Episodes of GDP Contractions (Large)**



**Figure A7. Cohort Effects of Total Employment by Education, Formality and Skill Level**



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