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Tracking workers across generations – a cohort-based analysis

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Abstract

Alongside rapid economic growth, India also saw steady de-agrarianisation of its economy in terms of contribution to GDP. In terms of employment, however, the movement out of agriculture was slower, and when they did exit, it was often a withdrawal from the workforce entirely. In general, more of the workforce are in salaried employment, however, these have filtered differently by gender, caste and religion. While cross-sectional data gives us a sense of how these structural changes affect workers at any given point in time, it cannot tell us how these play out for workers over their lifetime as well as how different generations or cohorts of workers have been affected. Here, we use seven rounds of nationally representative official data to construct cohorts who are tracked over these periods to observe employment participation and the patterns over time. We find that younger generations of women systematically less likely to be in paid employment whereas for men, after a certain age, generations look similar in terms of employment rate. Similarly, when examined from the perspective of cohorts, we find that access to salaried employment has changed by gender and caste, and increase in earnings over time over their lifecycle has slowed for certain groups.

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1. Introduction and Context

During the first four decades since Independence, India achieved an impressive rate of economic growth. Crucially, this period was also one that saw considerable employment generation. The growth elasticity of employment in the 1970s and 1980s stood at around 0.60, i.e. every percent increase in growth generated more than half a percent increase in employment. However, in the decades since, while economic growth has been maintained, more or less, the accompanying growth in employment has steadily slowed down. Consequently, between 2004 to 2009, while India was experiencing one of its highest economic growth phases (GDP growth rate of 8.7 %), employment growth had fallen to 0.1 percent resulting in a growth elasticity of employment of 0.01 percent (State of Working India 2018).

Alongside rapid economic growth, India has also seen a steady de-agrarianisation of its economy in terms of contribution to GDP. In 1950-51, agriculture accounted for more than half (60 percent) of GDP. By 2010-11, this had shrunk to only 14 percent. However, unlike other economies, it was India's services sector that expanded during this period from 28 percent to 58 percent. In contrast, manufacturing grew slower, starting from 13 percent in 1950-51 and growing to 28 percent by 2010-11 with most of this growth being concentrated in the construction sector ((Behera and Tiwari 2014; Basole 2022)). However, India's labour force showed a very different trajectory during the same period. In 1955, 78 percent of India's workforce was engaged in agriculture. By 2010, this share had declined to 51 percent. However, compare with the shrinking in terms of GDP to 14 percent, this clearly illuminates the skewed nature of India's structural transformation. Moreover, employment share in the services sector grew steadily during this period, absorbing the labour-force withdrawing from agriculture (as well as new entrants), rising from 9.5 percent in 1955 to 26.7 percent in 2010-11. However, the share of labour force in manufacturing remained more or less unchanged at around 11 percent ((Ghose 2021)).

Despite the slow and skewed structural transformation in employment, during this time the share of salaried employment in the workforce steadily increased. This was particularly so in the case of women workers (Table 1) where the share in salaried work nearly doubled from 25.8 percent in 1983 to 52.1 percent in 2017 in rural areas. The increase was much larger in urban areas. At the same time, informal work has become an increasingly pervasive phenomenon, and in more recent years, informal employment has become prominent in the formal sector. This takes the form of casualisation of salaried work, with salaried jobs coming with tenuous employment arrangements such as no written contract or social security benefits. Further, informality has perpetuated the pre-existing segmentation of the labour market on the basis of social identity (Srivastava 2019; Abraham 2017).

Table 1: Trends in employment arrangements from 1983 to 2018

	1983	1987	1993	1999	2004	2011	2018
Male							
Rural - SE	60.5	58.6	57.7	55	58.1	54.5	57.8
Rural - Regular	10.3	10	8.5	8.8	9	10	14
Rural - Casual	29.2	31.4	33.8	36.2	32.9	35.5	28.2
Urban - SE	40.9	41.7	41.7	41.5	44.8	41.7	39.2
Urban - Regular	43.7	43.7	42	41.7	40.6	43.4	45.7
Urban - Casual	15.4	14.6	16.3	16.8	14.6	14.9	15.1
Female							
Rural - SE	45.8	47.1	45.8	45.3	47.7	42.8	34.7
Rural - Regular	25.8	27.5	28.4	33.3	35.6	42.8	52.1
Rural - Casual	28.4	25.4	25.8	21.4	16.7	14.3	13.1
Urban - SE	61.9	60.8	58.6	57.3	63.7	59.3	57.7
Urban - Regular	2.8	3.7	2.7	3.1	3.7	5.6	10.5
Urban - Casual	35.3	35.5	38.7	39.6	32.6	35.1	31.8

Source: NSS Employment Unemployment Surveys and PLFS Employment Unemployment Surveys

Given the structural transformation of the Indian economy and the changes in the structure of the labour market, the question that this paper attempts to answer is how this played out for different generations of workers. The contraction of agriculture in the early years and the expansion of services and manufacturing may have increased the possibilities of non-agricultural employment, particularly in the public sector (given the increasing prominence of public sector) in this period. However, over time, for subsequent new entrants to the labour market, public sector and manufacturing opportunities have shrunk over time. Therefore, the nature of entry into the labour market is likely to be different across successive generations of workers. Moreover, the expansion of salaried work may mean that individuals are able to join the labour market as salaried workers or that they are more likely to transition into salaried work over their working age. For example, in the African context, Bandieras et al (2022) find that workers from the most recent generation were *no more likely* to hold a salaried job compared to their older counterparts. Given the structural changes that these economies witnessed, and an increase in salaried work, this is a puzzling and worrying trend. To what extent does the increase in salaried and non-agricultural employment affect lifetime earnings across successive generations? And, has India's growth process become more inclusionary for more recent generations with the access to good jobs and higher earnings similar across all communities and social groups in more recent generations?

As India undergoes a demographic transition, albeit slow, there is an increasing number of young workers entering the labour market. India's working age population increased from 383.5 million in 1983 to 865 million in 2019, while those without work and not in education increased from 102.3 million to 303.8 million (Kannan 2022). Therefore, despite high economic growth, it is likely that many young workers are increasingly displaced from or unable to access the labour market. Or, at the intensive margin, an access may be at a lower level in terms of type of employment and earnings. In this context, this paper uses a cohort-based approach to examine what India's economic growth has meant for successive generations of her workers.

2. Literature Review

The question of generational changes in engagement with the labour market has been tackled to some extent in the developed country context which has abundant data (Grigoli, Koczan, and Topalova 2021; Beaudry and Green 2000; Contreras, Puentes, and Bravo 2005). Ideally we would like panel data to understand the movements as well as track generations over time. In the absence of panel data spanning a long enough duration so as to cover multiple generations, cohort-based analysis has emerged as another approach. A cohort is a group of individuals who belong to a certain age group during a particular year. For example, we could identify cohorts of graduates in various years as those who were in the age of 18 to 21 years (assuming this is the age in which individuals typically graduate) in a given year. The cohort for the successive years would be those individuals who are between 18 to 21 years in the next years.

The literature using cohort-based analysis to understand the labour market broadly identifies three kinds of mechanisms - age effect, cohort effect and year effect. At initial ages, individuals may invest more in education and hence labour force participation is expected to be low. As individuals complete education, employment rate increases, falling again at the time of retirement or old age. Earnings as well as the quality of work are also expected to increase/improve as individuals gain more experience and acquire greater social capital over the course of their working life. Therefore, employment rate typically displays a hump-shaped relation with life cycle. Earnings steadily improves, and for those older individuals who continue to work, it is unlikely that earnings will fall, rather the rate of increase with age may slow down. In the literature, this is referred to as the *life cycle* or *age effect*. Examining the shape of the employment and earnings curve over the course of an individual's lifetime gives us an insight on the returns from experience for workers. For instance, Beaudry and Green (2000) confirm an inverted U shape in earnings over their lifetime for Canadian men, while for women, the earnings curve is relatively flat. More recent evidence from Lagakos et al ((2018) also confirm a steady increase in earnings as individuals gain more

experience, in both developed and developing countries, although the curve is relatively steeper in developed countries.

At the same time, secular improvements in an economy as a result of technological change, structural transformation and greater economic opportunities may also benefit workers, enabling the more recent cohort of workers more economic opportunities or higher earnings than their previous generations. This is the *cohort effect*. As Grigoli et al (2021), “a woman born in 1985 may be more likely to work at any given age than one born in 1945. Various factors can influence this propensity, including social norms, cultural attitudes and preferences about working as well as choices women within a certain cohort may make early in life about their educational attainment, fertility, and marriage.” In the Indian context, it is not unreasonable to expect women of earlier generations to have a different set of constraints and choices vis-a-vis their decision to work and earnings compared to women from the most recent generation. Additionally, in the context of steady structural transformation of the economy, more recent generations may be expected to enter as salaried non-agricultural workers rather than casual/self employed agricultural workers. This would have a long term impact over the life course of that generation.

Finally, year specific shocks may affect all cohorts at a particular point in time, although this effect will be felt by different age-groups across cohorts. For example, a slowdown in a given year, say 1995, will affect all workers, but in terms of the cohorts, each cohort will be at a different age in that year. Hence the effect will be felt by different age groups across cohorts in that year. Grigoli et al (2021) find that in the context of advanced economies, an ageing population and the economic shock of the financial crisis explained the declining labour force participation of men. In addition, using a cohort approach, they find, newer cohorts of women were more likely to seek work or be employed and this cohort-level effect counteracted the negative effects of an ageing labourforce and economic recessions. However, they find that these cohort effects have slowed down over time implying that the entry of new birth cohorts in the future alone cannot raise employment rates.

In the Indian context, cohort-based analyses have been used largely to understand inter-caste social mobility over time. Hnatskova et al (2012) explore the evolution of educational attainment, occupation and wages across different generations. They find a convergence in educational attainment and occupational distribution between SC/STs and non SC/STs, and a decline in the non SC/ST wage premium between 1983 and 2004-05. Additionally, comparing across father-son pairs, the authors an increase in intergenerational mobility for marginalised communities, i.e. sons from SC/ST households in more recent cohorts were more likely to converge in educational attainment and occupational mobility with non-SC/STs, compared to earlier cohorts. Deshpande and Ramachandran ((2019)) use birth cohorts and compare with SC/ST, OBC and General category. They find that while absolute and relative gaps in

primary education has narrowed across castes, in secondary education, there has been decline in relative gaps, but not absolute gaps. Similarly, in the lower earnings category too, there has been a convergence, but not so in the above-median wages.

By tracing cohorts of workers over their lifetime, we can compare the labour market trajectory of a young worker who joined in an earlier year (1983) with that of a more recent entrant. We are interested in comparing birth cohorts, for example, individuals born in 1960 and 1990, and tracing the evolution of their labour market experience over their working age. This is unlike in Hnatskova et al (2010) who consider age-cohorts, i.e. for example, 18-24 years olds in 1988 vis-a-vis 18-24 year olds in 1999. In this analysis we are interested both in the question of how 18-24 year olds compare across different generations, but also over their working age. This paper examines the difference in experiences across generational cohorts in terms of their likelihood of being employed at the time they enter the labour market, the nature of their employment and earnings from employment at the time of entry and over the course of their working age.

Using a cohort-based approach has certain advantages over a panel as discussed in Deaton (2019). Unlike panels, cohorts do not suffer from attrition since the sample is constructed anew each year. Since the outcome is an average for the cohort, this smoothens over measurement errors.

Section 3 describes the data and the cohort construction. Section 4 provides simple descriptive of the employment rate and earnings when using the cohort method. Section 5 provides regression estimates and Section 6 concludes.

3. Data and Methods

In the absence of long panels, cohorts are a useful way to construct ‘quasi-panels’ and track the same *group* of individuals over time. A cohort is constructed by identifying a group belonging to the same birth year (or a range of birth years, say 1975-1980). If survey data is available for a suitable length of time, then a cohort can be identified by their age at the time of that survey. They are then tracked in subsequent surveys. So a 1975 cohort would be 15 years during a 1990 survey. In the 1995 survey, they would be 20 years old. In doing so, we are able to construct a pseudo panel, tracking groups of individuals over staggered time points.

We use seven rounds of official Employment Unemployment Surveys (EUS) to track cohorts over time. The EUS are (mostly) quinquennial surveys conducted by the Government of India to collect information on important labour market and other demographic information. The data is nationally representative. The surveys correspond to the years 1983, 1988, 1993, 1999, 2004, 2011 and 2018. In 2018, although there was a change in the sampling technique, the surveys continue to remain comparable and nationally representative with the use of the appropriate weights (Bedi & Singh 2022).

Constructing cohorts

Beginning with the first of these EUS (1983), we identify the first or earliest cohort as individuals aged between 18-24 years in 1983.² If we were to choose narrower age bands, we might have more cohorts to track. However this comes at the cost of smaller sample sizes of each cohort. Consequently, in the interest of smoother trends and representative estimates we use 6 year cohorts. By the age of 18 and 19, most individuals would have completed their higher schooling and undergraduate training. Since most Indian youth, particularly men, enter the labour market in their early twenties or late teens, this was an appropriate year to start with.

The first cohort, by the time of the next EUS round five years later, would belong to the 23-29 age group. In this manner, we track this cohort over subsequent EUS rounds, till 2018, by when they are between 53 to 59 years old. Likewise, we construct the second cohort by identifying individuals who would have freshly entered the labour market in that year, i.e. 18-24 years in 1988. Table 2 provides the details of each cohort. In total, we identify four cohorts, with the first cohort being the generation born between 1959 and 1965, and potentially entering the labour market in 1983, and the final cohort being individuals born between 1975-1981 and entering the labour market in 1999.

Table 2: Description of cohorts

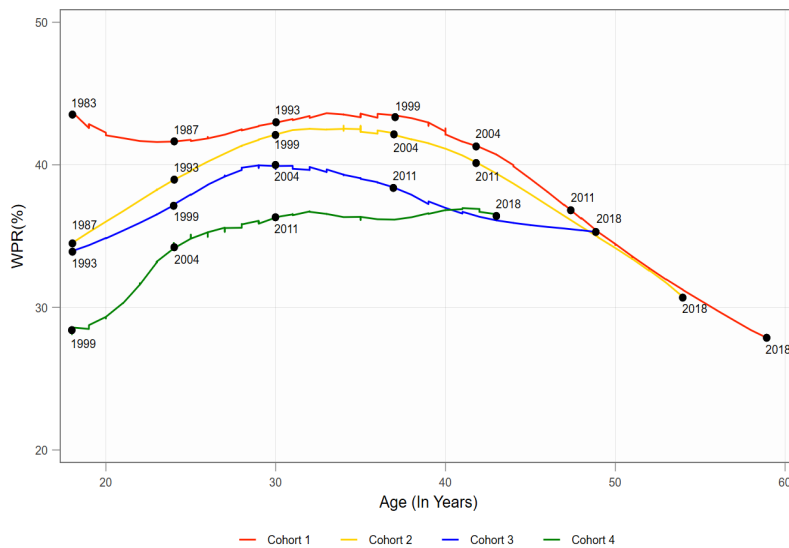
NSS Year	1983	1988	1993	1999	2004	2011	2018	Birth year
Cohort1	18-24	23-29	28-34	34-40	39-45	46-52	53-59	1959-1965
Cohort2		18-24	23-29	29-35	34-40	41-47	48-54	1964-1970
Cohort3			18-24	24-30	29-35	36-42	43-49	1969-1975
Cohort4				18-24	23-29	30-36	37-43	1975-1981

² Although the official working age is 15 years, we use 18 here since this is the time when individuals would have typically completed some higher education (undergraduate studies). While the ILO categorises youth as 18-29 year olds, we look at young adults as in Bandieras et al (2022).

We are able to effectively track the first cohort over their entire working age life-cycle, i.e. from 18 to 59 years. For later cohorts, though the life-cycle covered is shorter, we are able to cover up to at least 20 years of their working life from the age of 18.³

In graphically representing these cohorts, we can view them in terms of their lifecycle. Figure 1 provides such a representation. Note that when comparing across different cohorts of the same age, we are essentially comparing individuals at different points in time. So although they are at the same age, they would have been so at different years in time.

Figure 1: Visual representation of cohort and corresponding years and ages



³ Appendix Table A provides the sample size of each cohort in each year.

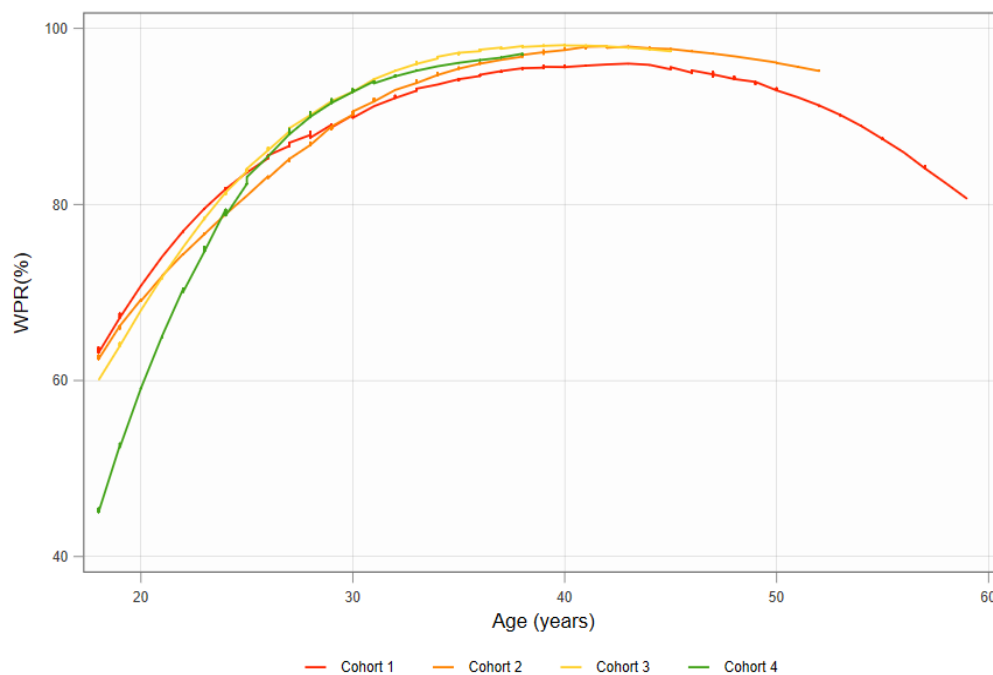
4. Descriptive results

a. Workforce participation rate

Men

For men, across all cohorts, employment rate demonstrates an inverted U relation, as expected - employment increases as individuals age, but beyond a certain peak, it begins to decline. Comparing across cohorts, most noticeable is the drastic drop in the initial employment rates (at around age 18 to 20 years), especially between the third and fourth cohort, from around 60% to 40%. This is not surprising given the increasing educational attainment over generations - men delayed entry into the labour market as they increased their time in education. However, despite the lower employment rate in initial years, this cohort does catch up with the prior cohort by late twenties and mid thirties. Although, there is an increase in levels of employment especially at prime working ages between Cohort 1, 2 and 3, for Cohort-4 we see that the employment rate is marginally lower than the previous cohort. Moreover, there is some slowing down of employment attainment post 30s for the fourth cohort compared to other cohorts, as can be seen by the slope of the line. This slowing down corresponds to the period between 2011 and 2018, a period of jobless growth for the Indian economy. Clearly, this has had implications for the labour market participation of prime, working age men.

Figure 2: Employment rate, men



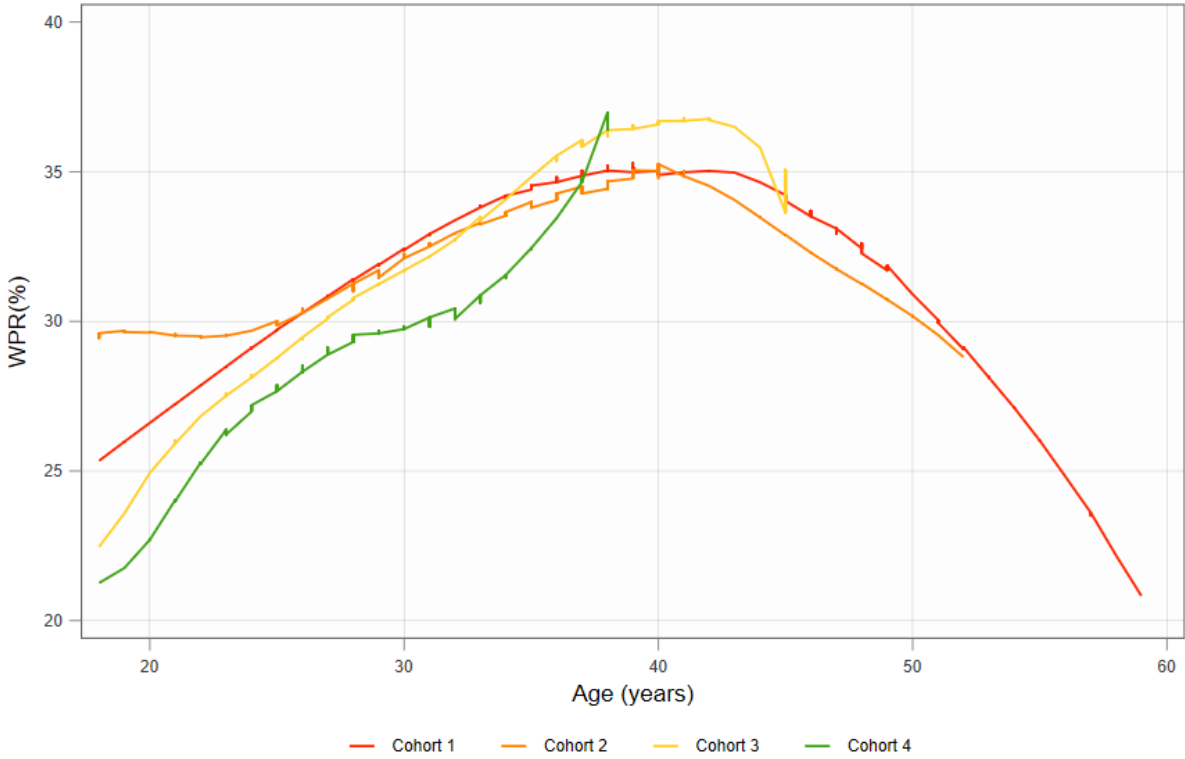
Source: Author's calculations using NSS and PLFS EUS rounds

We do not see major differences in the pattern of employment across men from different social groups. The only notable difference is the employment rate at the age of 18-20. For General category men, this rate declines substantially between cohorts as more and more are in education. For SC and ST although the decline is there, it is not to the same extent as for General. Therefore the generational shift towards further education in early years is more prevalent for the General category, not surprisingly.

Women

For women, with the curious exception of cohort 2, we can make two observations. First, there is a level downward shift in the employment rate for every cohort, except the most recent. For the most recent cohort, for nearly the entire lifecycle, the employment rate of this cohort is lower than that of the previous generations. Second, although for all cohorts we can see the expected life cycle trend - initial increase and then plateau and subsequent decline, what is notable is that the plateauing happens at an earlier age with each subsequent cohort.

Figure 3: Employment rate, women



Source: Author's calculations using NSS and PLFS EUS rounds

Moreover, we can see that, as in the case of men, the employment rate for the youngest workers is steadily declining with each cohort, indicative of more and more women in higher education. Between cohort 2 and 3, there is no significant difference in employment rates over their lifecycle, although there is an earlier plateauing and a faster decline of employment rate with the second cohort, compared to the first. With the third cohort, employment rates are much lower in the initial ages, however it catches up by mid 30s, although the decline in employment rate also seems to have set in earlier for this cohort. Linking this to the declining employment rate of women in India, we can see that in terms of lifecycle trajectories, this has implied an earlier withdrawal from older cohorts as well as a decline in participation rate of younger women.

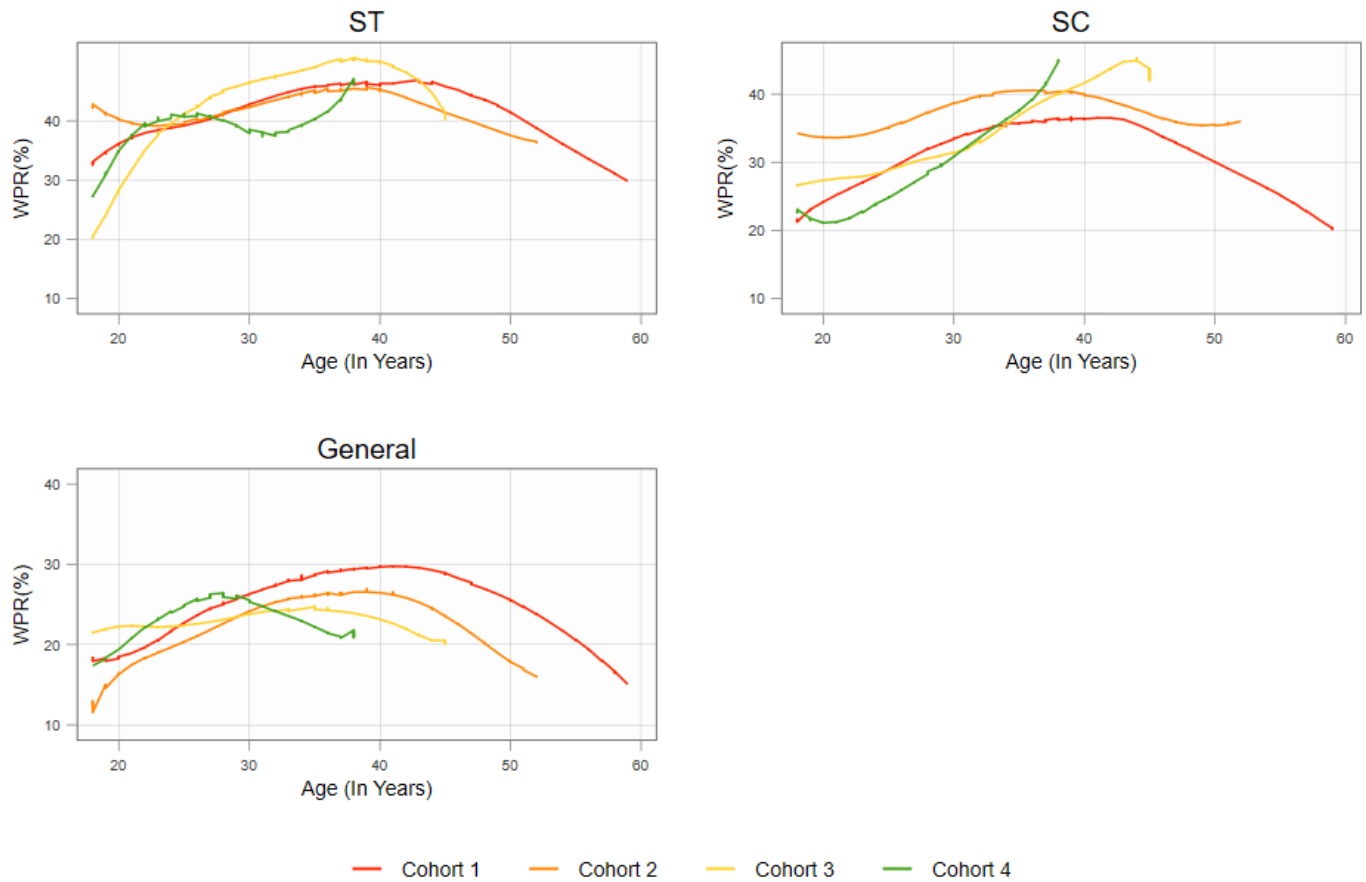
If the years are overlaid with the lifecycle profiles, it can be noted that for most cohorts there is a steepening of the curve between 1999 and 2004. This is a period that saw a distress-driven influx of women workers into agriculture as a result of preceding drought years. The flattening out thereafter is indicative of a 'return to normal' with employment rates restoring to the pre-2004 levels in subsequent years. This particularly so for the second cohort which corresponds to women who would have been in their mid 30s during this period.

It is interesting that for the fourth cohort, we do not see a downward decline of employment rates as women age. Therefore, for the most recent cohort, though fewer women are participating, there seems to be no downward trend in their employment even until their middle-ages.

A cohort-based perspective therefore provides further insight into the declining female employment rate while also highlighting the trend of falling participation rates for men from the most recent generations over their lifecycle - aspects that would be overlooked in a simple cross-section analysis.

When seen by social groups, unlike for men, we see striking difference in the patterns across women from different groups. First, the successive decline in employment rate is most apparent among General category women. Second, the earlier peaking of employment is also a marginalised community phenomenon. Finally, the upward sloping trend seen in the fourth cohort is only seen for SC/ST women.

Figure 4: Employment rates for women, by social group

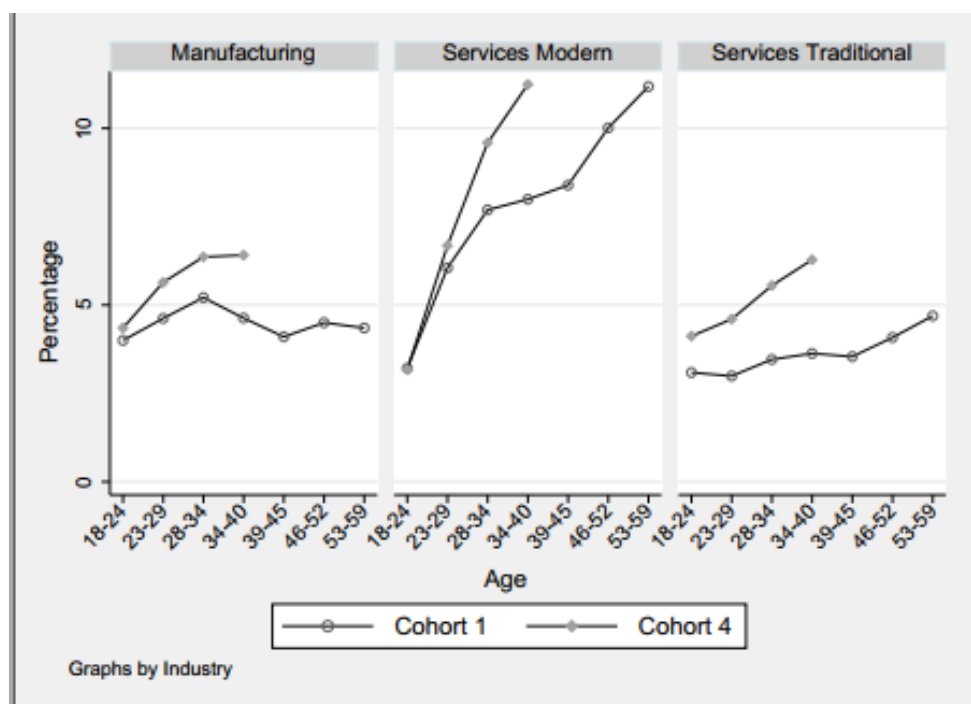


a. Share in salaried employment

As mentioned earlier, the Indian economy has seen a steady increase in the share of salaried work with a reduction in casual wage work. How does this percolate at the cohort level, when viewed across sectors? Comparing the earliest and latest cohort, Figure 5 describes the trends in share in salaried work across industries.

As is evident, across all industries, the most recent cohort has had better access to salaried jobs compared to the oldest cohort. In contrast, casual wage work has seen a steady decline in the recent cohort, at level and over their lifecycle, in comparison to the older cohort. The likelihood of being self-employed is higher for the most recent cohort compared to the oldest.⁴

Figure 5 : Share of workforce in salaried employment



Source: Author's calculations using NSS and PLFS EUS rounds

We examine how the increase in salaried employment manifests across cohorts over their lifetime. Typically, as individuals gain experience at work and build networks and social capital, there is an expected increase in their earnings as well as the kind of work being engaged in. Individuals are expected to shift to more secure work arrangements like salaried work with job security. In India this progression is seen across all cohorts, by gender, religion and social group but by differing extents.

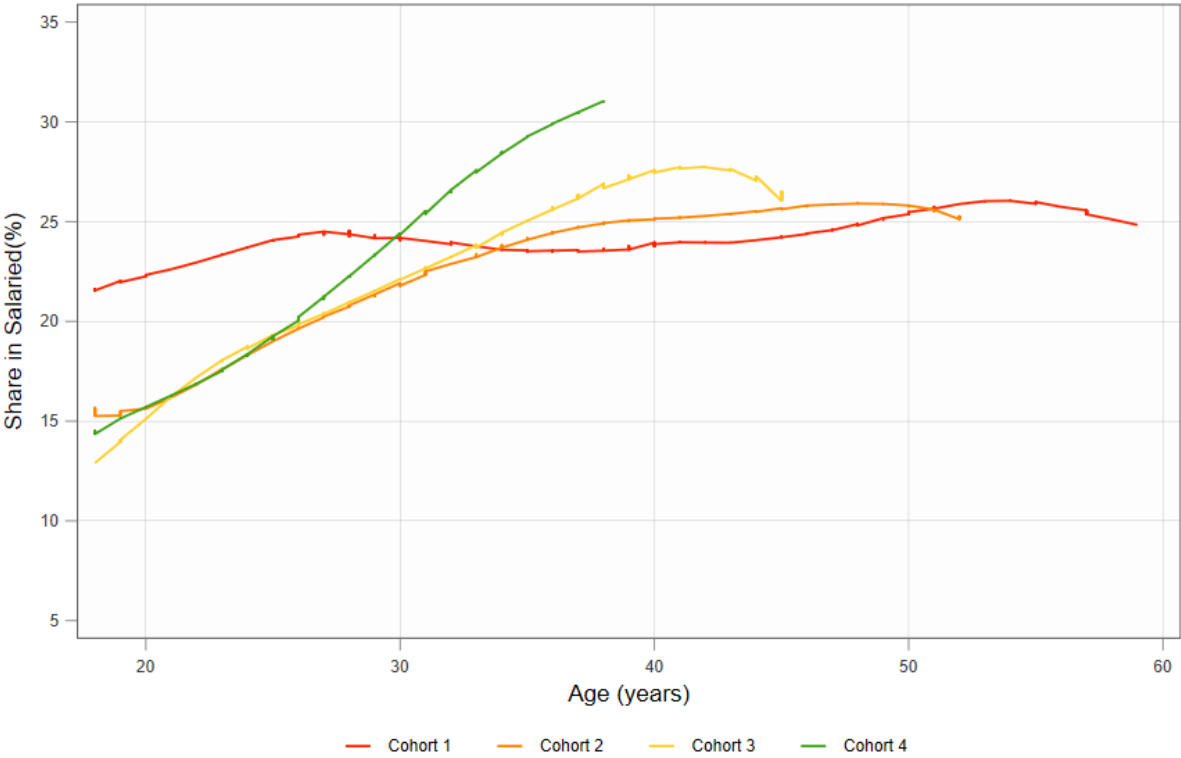
For men, in the earliest cohort, experience/age does not seem to be associated with an increased likelihood of acquiring salaried work. The share in salaried work remains more or less unchanged over the cohort's working age (18-59 years). However, from the next cohort onwards, we see a positive slope. As individuals age, the share in salaried employment increases. And, with every cohort, the likelihood of securing salaried employment steadily increases across all ages.

The most recent cohort has a relatively larger share in regular work by the time they are 34-40 years old, compared to previous cohorts in the same age group. This is not surprising, since there has been a general expansion of the possibilities of salaried work in the more recent years. Clearly, the increased availability

⁴ Graphs for casual work and self employment are in Appendix Figure A1 and A2

has enabled more workers to participate as regular salaried workers. Moreover, this increased access can be seen for both men and women in the most recent cohort. Therefore, in general, nearly a quarter of 34-40 year olds in the recent cohorts were in salaried work, compared to 21 percent of men and 10 percent of men among 34-40 year olds in the oldest cohort.

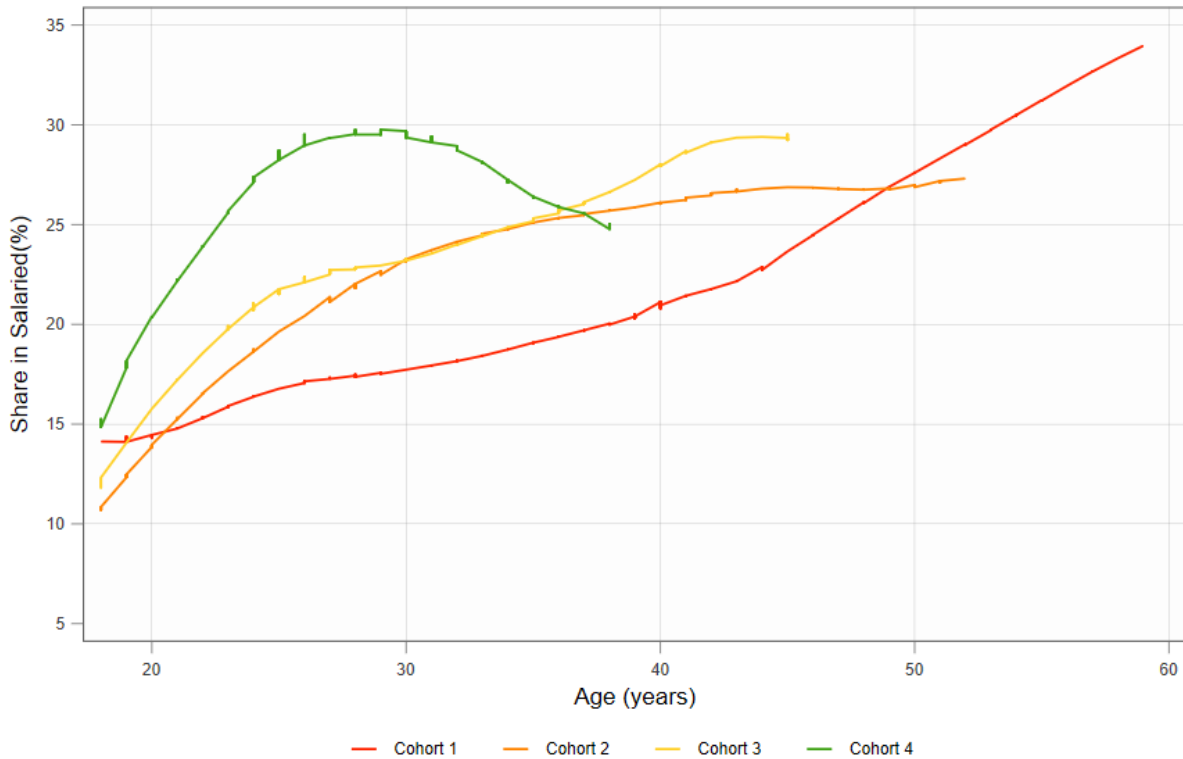
Figure 6 : Share in salaried work, men



Source: Author’s calculations using NSS and PLFS EUS rounds

However, for women, the trends are markedly different. For the earliest cohort, there is a steady increase in access to salaried work as women age, unlike what was seen for men. In addition, similar to men, there is a level shift in the cohorts, indicating that more recent cohorts have a greater likelihood of being salaried workers. However, for the most recent cohort, there is a slowing down in the share in salaried work, and beyond the age of 30, the share in salaried work among the youngest cohort actually begins to fall. This suggests that the increase in salaried work seen in a cross-sectional analysis is in fact experienced across women from older generations. More recent entrants to the labour market are less likely to have access to salaried work, compared to their counterparts of the same age from an earlier generation.

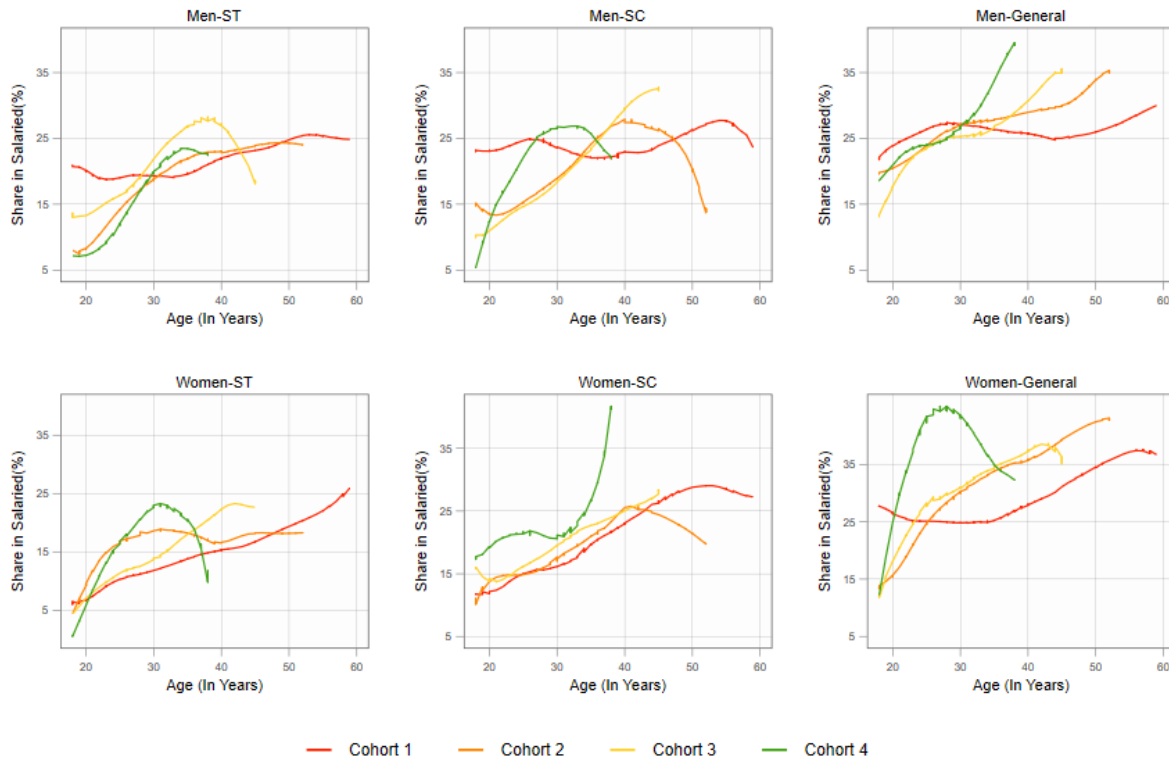
Figure 7 : Share in salaried work, women



Source: Author's calculations using NSS and PLFS EUS rounds

By social groups for men, we had seen earlier that there was no significant difference in access to employment over generations. However, when looked at in terms of salaried employment, there are significant differences and shows a persistence in the restricted access to salaried work for marginalised groups. Across all social groups, in Cohort 1, we find that there is relationship between age and share in salaried employment. However, the upward sloping trend that was observed in the overall employment rate of the youngest cohort (Cohort 4) is apparent only for the General category. Therefore, for General category workers, the most recent cohort has been able to increasingly access salaried work as they age, while for SC and STs although there has been a level increase, the share in salaried work falls after a certain age particularly in the recent cohort. For women from different social groups, the overall increase in share in salaried work can be seen across all groups, although it is largest in the case of SCs.

Figure 8: Share in salaried work, by gender



Source: Author's calculations using NSS and PLFS EUS rounds

For major religious groups of Hindus and Muslims, there has been an overall increase over time in the share in salaried work for both communities. However, comparing within cohorts, Muslims lag behind Hindus in the share in salaried work at any age.

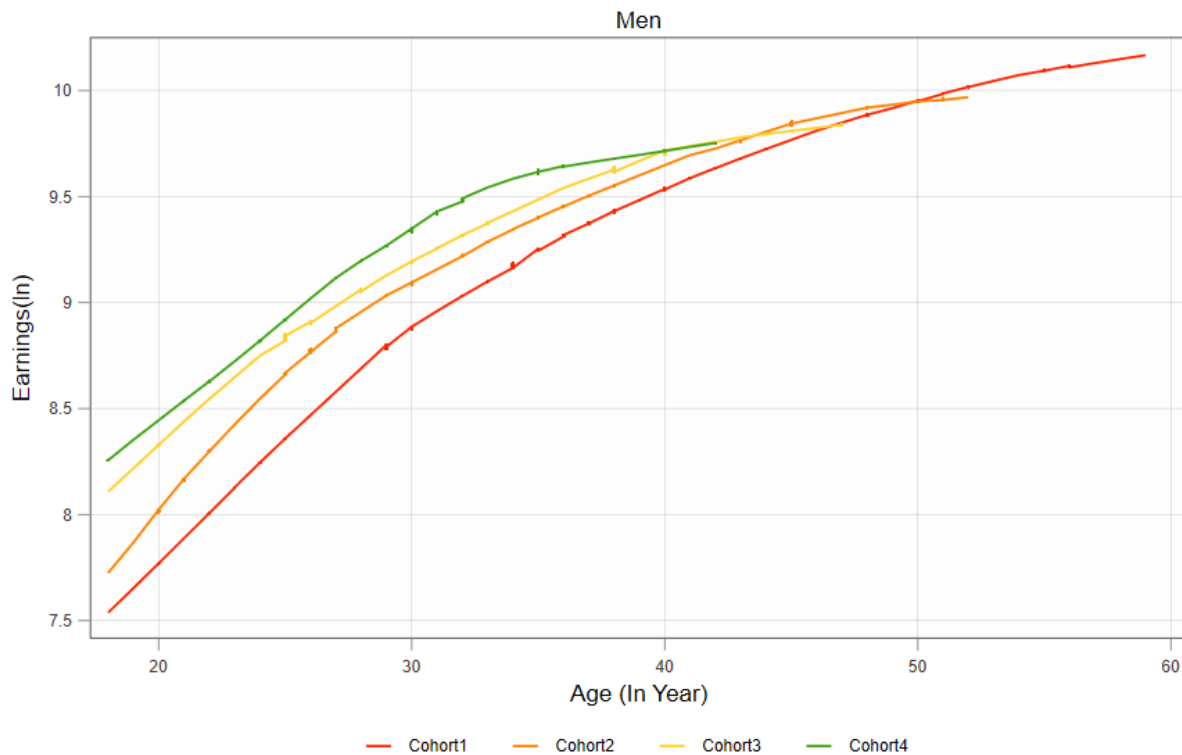
Therefore, overall there has been an increase in access to salaried work for more recent generations, and this is seen for both men and women. However, there is a stark difference in the extent of access across social groups with marginalised communities far less likely to secure regular salaried work over the course of their career, with the exception of SC women.

b. Earnings

Finally, we examine how earnings from wage work (salaried work) has changed for individuals across cohorts over their life cycle.⁵ We calculate monthly average earnings, separately for casual and salaried wage workers. Earnings are in real terms.⁶

For men, every successive cohort is earning more than the previous across all ages. However, the increase in earnings as individuals age has slowed down, as evidenced by the flattening of the slope of the line in the more recent cohorts. This indicates that the returns to experience has reduced for the newer cohorts.

Figure 9 : Trends in monthly salaried earnings, men



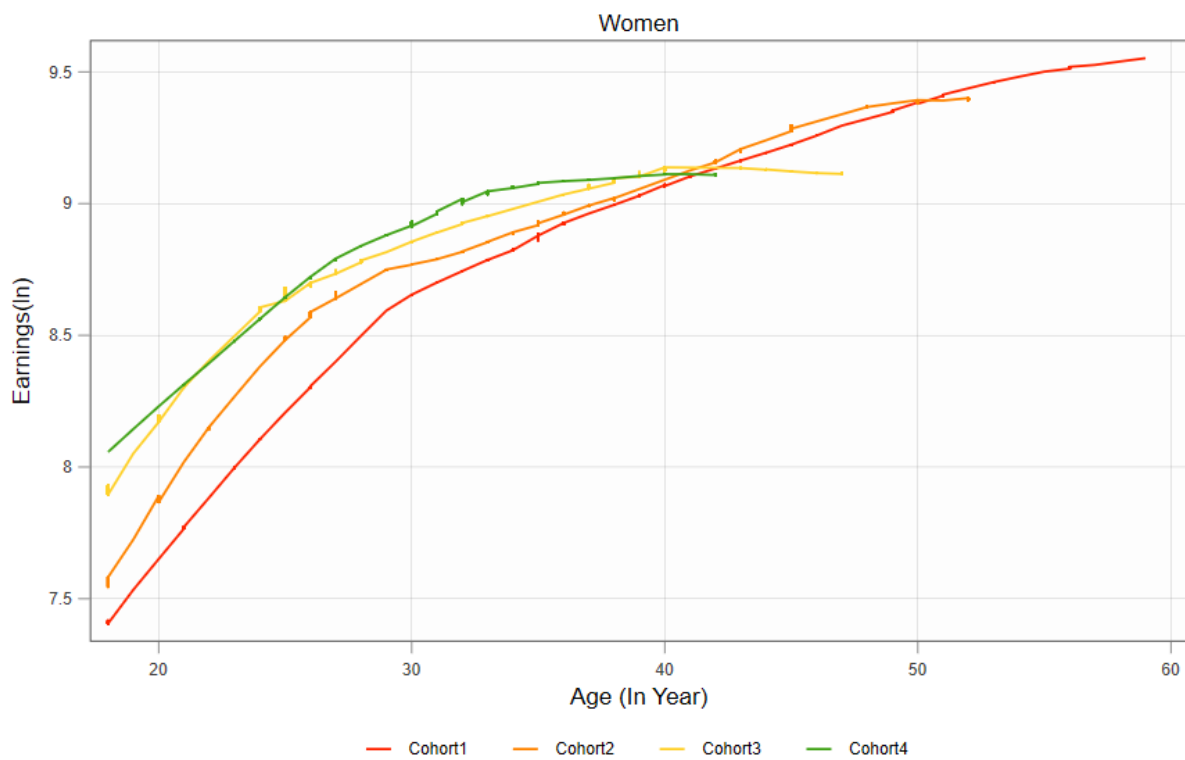
Source: Author's calculations using NSS and PLFS EUS rounds

For women, however, we do not see a similar levelling out of earnings, with the marginal increase in earnings slowing down at an earlier age for more recent cohorts. This indicates that although the more recent generation of women workers were more likely to access salaried work, their earnings trajectory is limited compared to their older counterparts. More recent salaried women workers will not be able to achieve the level of earnings at an older age, that their previous generations were able to achieve.

⁵ Since the early rounds of the Employment Unemployment Surveys did not collect information on self-employed earnings, we do this analysis only for wage workers - salaried and casual wage workers.

⁶ Earnings have been converted to real terms using CPI for rural and urban workers.

Figure 10 : Trends in monthly salaried earnings, women



Source: Author's calculations using NSS and PLFS EUS rounds

For casual wage workers, we do not find any such levelling out. Every successive cohort's earnings stochastically dominates the previous cohort's earnings. Figures for casual wage earnings are in Appendix.

Finally, when disaggregated by education level, we find that the levelling out of salaried earnings is largely a phenomenon limited to higher educated individuals (Figures in Appendix)

5. Econometric analysis

Based on Beaudry & Green (2000) we attempt to distinguish the role of cohort, age and year effects on (i) employment participation of women⁷ and (ii) earnings of men and women.

As discussed in Section 2, the age effect captures the lifecycle profile of employment and earnings, in both cases typically following an inverted U-shape. The likelihood of employment and returns from work increasing as people age. The year effect captures the secular effect of a year-specific shock/change. It simultaneously influences all cohorts, but at different ages. Finally, the cohort effect captures intrinsic differences between generations of workers. These may come from a change in norms, or overarching economic circumstances that are unique to that generation. The expectation is that each newer cohort is entering into a labour market which is more ‘structurally transformed’ than earlier, and in that sense they are in a position to better access non-agricultural jobs, and potentially regular salaried jobs.

We estimate the separate effects of these employment (for women) and earnings trends in a regression analysis. Each regression table presents the coefficient estimates for (logarithm of) earnings regressions for men.. Column (1) provides the estimates of regression of logarithm of monthly earnings on only the age and age squared term, effectively capturing the life-cycle effect. Column (2) includes cohort variables along with the age effects. The cohort variable is a discrete categorical variable ranging from 1 to 4 depending on which cohort an individual belonged to, with 1 being the oldest cohort (and the base category) and 4 being the most recent. Column (3) includes the year variable. Similar to the cohort variable, this is a discrete variable, with values of 1983 (base category), 1988, 1993, 1999, 2004, 2011 and 2018. Finally, we are interested in seeing to what extent lifecycle effects persist into subsequent cohorts over each year. We introduce age and cohort interactions alongside age and year interactions in the final column (column 4)

Men

To begin with, we can see a consistent lifecycle effect. As individuals gain more experience, their earnings increase, but beyond a certain age, the rate of increase slows down and becomes negative - there is a penalty for age. Adding the cohort effect (column 2), we see that for every successive cohort, there is an increase in earnings, compared to the earliest cohort. However, on adding the year variable, it is interesting to note that the cohort effect is no longer significant. Rather, the observed increase in earnings is entirely coming from secular improvements that are year-specific. It is the case that each subsequent

⁷ Since men’s employment did not show significant variation across cohorts or age groups, we do not discuss this regression here. However, estimates are provided in Appendix Table A2.

year has added more to earnings. But had there been a cohort-specific effect (for instance, the benefits of joining a structurally transformed, advanced economy), this increase in earnings would have been more.

When we introduce age interactions with cohort and year, the results indicate that (i) cohort 2 and 3 have a significant increase in earnings compared to cohort 4, (ii) it is only in the more recent years, (since 2004), that there has been an increase in earnings compared to 1983, (iii) the cohort-age interaction indicates that for more recent cohorts, there is a slowing down in the increment in earnings as a result of experience.

<Table 3: Regression estimates, men>

Women

For women, lifecycle effect is significant across Column (1) to (3). However, once age and cohort/year interactions are introduced, these disappear. The final column indicates that there is no significant improvement of women's earnings across cohorts, or during any year specifically.

<Table 4: Regression estimates, women>

Interestingly, when we estimate the same regressions for men and women in casual wage work, there are significant year-specific improvements since 1988. Therefore, for casual wage workers there has been a significant improvement in earnings over time, across all cohorts. However, female salaried workers do not seem to have enjoyed a similar increase.

6. Discussion

The cohort-based provides an insight into the major changes over the lifecycle of an individual from different generations. It offers new information that is often not clearly visible from a simple cross-sectional analysis of trends over time. In particular, standard intergenerational analysis using cross-section data misses out women owing to traditions of patrilocality where women leave the household after marriage. Cohort-based analysis overcomes this.

We find that while there has been an increased likelihood of participation of male workers in early age for more recent generations, there is a more recent phenomenon of earlier withdrawal of male workers. For

women too, the age of withdrawal has become earlier for each subsequent cohorts, and with the exception of the more recent cohort, the level of participation at any age is also lower. In terms of salaried work, the structural transformation of the economy over the last four decades should have yielded more opportunities for regular work for the population. Indeed, this is the case for both men and particularly so for women. The likelihood of being in salaried work has increased and for women, there is a steady increase over the generation's lifetime. However, for both men and women, this has often not translated into an improvement in their earnings. Not only are more recent cohorts not making significantly more than the earlier cohorts, the returns to experience (measured in terms of age) has steadily slowed down over time.

This preliminary work suggests that cohort-based analysis has valuable insights. Further work on discerning these trends by education groups as well as robustly disentangling the lifecycle, year and cohort affects is ongoing.

Table 3: Regression of monthly wage earnings (log) of salaried workers, men

	(1)	(2)	(3)	(4)
Age	0.12*** (0.00)	0.13*** (0.00)	0.10*** (0.00)	0.10*** (0.02)
Age-squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
cohort=1		0.00 (.)	0.00 (.)	0.00 (.)
cohort=2		0.13*** (0.01)	0.01 (0.02)	0.41*** (0.11)
cohort=3		0.21*** (0.02)	-0.01 (0.04)	0.57*** (0.16)
cohort=4		0.28*** (0.01)	-0.04 (0.05)	0.27 (0.22)
year=1983			0.00 (.)	0.00 (.)
year=1988			0.28*** (0.03)	-0.96*** (0.30)
year=1993			0.65*** (0.04)	-0.25 (0.32)
year=1999			0.78*** (0.05)	0.49 (0.36)
year=2004			0.84*** (0.06)	0.83** (0.41)
year=2011			1.07*** (0.08)	1.39*** (0.48)
year=2018			1.07*** (0.10)	1.22** (0.57)
cohort=1 # age				0.00 (.)
cohort=2 #age				-0.01*** (0.00)
cohort=3 # age				-0.02*** (0.00)
cohort=4 # age				-0.01 (0.01)
year=1983 # age				0.00 (.)
year=1988 # age				0.05*** (0.01)

year=1993 # age				0.03** (0.01)
year=1999 # age				0.01 (0.01)
year=2004 # age				-0.00 (0.01)
year=2011 # age				-0.01 (0.02)
year=2018 # age				-0.00 (0.02)
Constant	6.34*** (0.06)	5.96*** (0.06)	6.06*** (0.08)	6.00*** (0.24)
State FE	Yes	Yes	Yes	Yes
Observations	100935	100935	100935	100935

Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Table 4: Regression of monthly wage earnings (log) of salaried workers, women

	(1)	(2)	(3)	(4)
Age	0.09*** (0.01)	0.09*** (0.01)	0.06*** (0.01)	0.08* (0.05)
Age-squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00 (0.00)
cohort=1		0.00 (.)	0.00 (.)	0.00 (.)
cohort=2		0.09** (0.04)	-0.05 (0.06)	-0.24 (0.29)
cohort=3		0.13*** (0.04)	-0.11 (0.09)	-0.29 (0.44)
cohort=4		0.20*** (0.04)	-0.15 (0.13)	-0.78 (0.62)
year=1983			0.00 (.)	0.00 (.)
year=1988			0.29*** (0.07)	0.61 (0.82)
year=1993			0.69*** (0.10)	1.74* (0.90)
year=1999			0.79*** (0.14)	1.81* (1.01)
year=2004			0.84*** (0.18)	2.32** (1.15)
year=2011			1.14*** (0.23)	2.11 (1.34)
year=2018			1.15*** (0.28)	1.68 (1.56)
cohort=1 # Age				0.00 (.)
cohort=2 # Age				0.00 (0.01)
cohort=3 # Age				0.00 (0.01)
cohort=4 # Age				0.02 (0.02)
year=1983 # Age				0.00 (.)
year=1988 # Age				-0.02 (0.04)

year=1993 # Age				-0.04 (0.04)
year=1999 # Age				-0.04 (0.04)
year=2004 # Age				-0.05 (0.04)
year=2011 # Age				-0.04 (0.05)
year=2018 # Age				-0.03 (0.05)
Constant	6.43*** (0.15)	6.26*** (0.15)	6.38*** (0.22)	5.93*** (0.65)
State FE	Yes	Yes	Yes	Yes
Observations	24600	24600	24600	24600

Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

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Appendix

Table A1: Cohort sample size

NSS Year	1983	1988	1993	1999	2004	2011	2018
Cohort1	79,750	72,392	56,822	63,894	54,107	32,023	22,934
Cohort2	0	69,356	46,865	55,910	45,825	45,080	32,782
Cohort3	0	0	58,680	48,996	56,297	36,796	45,325
Cohort4	0	0	0	60,290	48,974	44,571	33,109

Figure A1:

Share of workforce in self employment , by industry and cohort

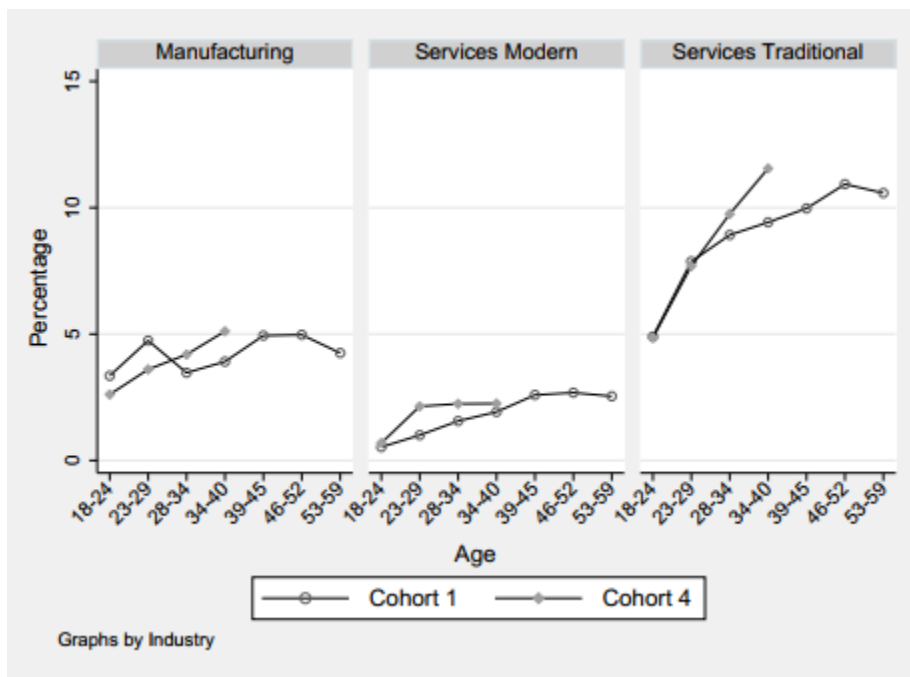


Figure A2: Share of workforce in casual wage work , by industry and cohort

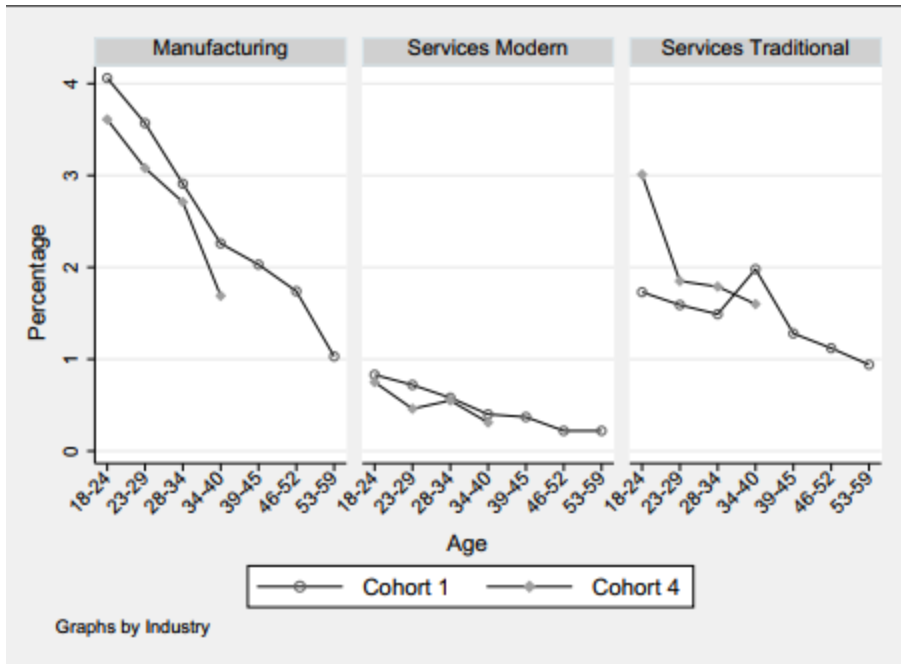


Figure A3: Casual worker earnings over their life cycle

