

UNIVERSIDAD DE OVIEDO



Universidad de Oviedo

TESIS DOCTORAL

# Efectos de la Gran Recesión en el mercado laboral español: un análisis de la población joven

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## RESUMEN DEL CONTENIDO DE TESIS DOCTORAL

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### RESUMEN (en español)

La inserción laboral es un periodo clave en el ciclo vital de las cohortes más jóvenes, dado que es un periodo en el que los individuos finalizan su etapa educativa y comienzan su vida profesional. De cómo sean las condiciones económicas a las que se enfrentan los jóvenes en su etapa de inserción laboral dependen en gran medida sus condiciones de vida y sus expectativas de desarrollo personal, las cuales pueden tener profundas consecuencias colectivas no sólo en el corto plazo, sino también en el medio y largo plazo, es decir, a lo largo de su carrera profesional.

Así, el contexto de la Gran Recesión que comenzó en 2008 puso de manifiesto la preocupación que existe por la situación laboral de las cohortes jóvenes en España, quienes parten de un escenario vulnerable como consecuencia del empeoramiento de las condiciones del mercado laboral. Los efectos de la crisis económica sobre las perspectivas laborales de los jóvenes en el corto plazo parecen claros: acceso a puestos de trabajo con peores condiciones laborales, destrucción de empleo y mayor dificultad en su acceso al mercado de trabajo.

En cambio, no resulta tan evidente si esas condiciones económicas adversas también pueden haber oscurecido los horizontes de futuro del colectivo juvenil. Dicho de otra manera, no resulta tan evidente si las condiciones económicas adversas a las que hacen frente los jóvenes también puedan llegar a tener un efecto en el largo plazo, afectando buena parte de su carrera profesional.

En base a esto, el objetivo principal de esta tesis doctoral es examinar en qué medida el impacto negativo de la crisis económica de 2008 ha afectado al colectivo juvenil en términos de salarios y empleo, una vez las cohortes jóvenes acceden al mercado laboral por primera vez. Para ello, se emplea un enfoque de cohortes, en el que se examinan un



grupo de individuos a lo largo de distintos puntos en el tiempo dentro del mercado laboral, y así se hace un rastreo dinámico de sus trayectorias salariales y de empleo.

En primer lugar, se analiza la situación de partida de los jóvenes entrantes al mercado laboral durante una crisis económica, así como la situación que van experimentando los siguientes años a su entrada, es decir, se analiza el impacto de la crisis en el corto y largo plazo sobre los jóvenes en términos de salarios y empleo. En términos generales, se encuentra que las cohortes que entran al mercado laboral durante una recesión se enfrentan a consecuencias a largo plazo tanto en términos de salarios como de empleo. Para las personas con menor nivel educativo, se encuentra que el efecto principal es a través del empleo, incluso bloqueando su entrada al mercado laboral. Para las personas con educación superior, en cambio, obtenemos un impacto a largo plazo en términos de salario, así como una reducción en los días trabajados.

En segundo lugar, se distingue a la población joven entre aquellos que han nacido en España frente a aquellos que han nacido fuera del país. Así, se analizan posibles diferencias en el impacto que la Gran Recesión ha tenido sobre los salarios y el empleo de los jóvenes nativos e inmigrantes entrando al mercado laboral bajo dicho contexto económico. Los resultados muestran que la crisis económica ha provocado inicialmente un bloqueo en la entrada del mercado laboral, reduciendo el número de participantes jóvenes, especialmente entre los inmigrantes. Además, se observa que los nativos se ven más afectados tanto a corto como a largo plazo en términos de salarios y empleo que sus pares inmigrantes, siendo el nivel educativo un factor importante a la hora de determinar la magnitud y persistencia de esos efectos negativos.

En tercer lugar, se incluye una perspectiva intergeneracional con el fin de estudiar si las condiciones económicas presentes durante la crisis pueden haber originado desigualdad en términos salariales entre las diferentes generaciones presentes en el mercado de trabajo. La evidencia indica que algunas generaciones, como la Millennial, están más desfavorecidas en términos de ganancias por su año de nacimiento que otras generaciones. Asimismo, los resultados señalan que el contexto económico que vive una generación en su transición al mercado laboral es un factor clave en el desarrollo de sus ingresos.

Por tanto, la evidencia hallada en esta tesis doctoral presenta una imagen clara pero preocupante de la posición económica del colectivo juvenil en su etapa de inserción en el mercado laboral español. Además de observar un efecto negativo de la crisis económica a lo largo de las trayectorias profesionales de los jóvenes, causando un



efecto “cicatriz” en términos de salarios y empleo, se encuentra que la recesión ahonda la posición desfavorecida que presentan los jóvenes en el mercado laboral en términos de renta en comparación con otras generaciones.

#### RESUMEN (en Inglés)

Labour insertion is a key period in the life cycle of the younger cohorts, since it is a period in which individuals finish their educational stage and begin their professional career. Their living conditions and expectations for personal development largely depend on the economic conditions faced by young people in their labour insertion stage, which can have deep collective consequences not only in the short-term, but also in the medium- and long-term, that is, throughout your professional career.

Thus, the context of the Great Recession that began in 2008 revealed the concern that exists about the employment situation of young cohorts in Spain, who are starting from a vulnerable scenario because of the worsening of labour market conditions. The effects of the economic crisis on the job prospects of young people in the short-term seem clear: access to jobs with worsening working conditions, job destruction and greater difficulty in their access to the labour market.

However, it is not so evident whether these adverse economic conditions may also have darkened the future horizons of the youth group. In other words, it is not so obvious whether the adverse economic conditions faced by young people may also have a long-term effect, affecting a large part of their professional careers.

Based on this, the main objective of this doctoral thesis is to examine to what extent the negative impact of the 2008 economic crisis has affected the youth group in terms of wages and employment, once young cohorts enter the labour market for the first time. For this, a cohort approach is used, in which a group of individuals are examined throughout different points in time within the labour market, and thus a dynamic tracking of their earnings and employment trajectories is carried out.

First, the labour situation of young people entering the labour market during an economic crisis is analysed, as well as the labour situation they experience in the following years after their entry, that is, the impact of the crisis in the short- and long-term on young people in terms of wages and employment. In general, cohorts entering the labour market during a recession are found to face long-term consequences in terms of both wages and employment. For people with a lower level of education, the main effect is found to be through employment, even blocking their entry into the labour market. For people with higher education, on the other hand, we get a long-term impact in terms of earnings, as well as a reduction in the days worked.

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## RESUMEN

La transición de la etapa educativa al mercado de trabajo es un periodo clave para las cohortes más jóvenes, dado que las condiciones económicas a las que se enfrentan pueden determinar no sólo su situación en el corto plazo, sino que también pueden tener consecuencias en el medio y largo plazo, es decir, a lo largo de su carrera profesional. Así, el contexto de la Gran Recesión que comenzó en 2008 puso de manifiesto la preocupación que existe por la situación laboral de las cohortes jóvenes, quienes parten de un escenario vulnerable como consecuencia del empeoramiento de las condiciones del mercado laboral. Los efectos de la crisis económica sobre las perspectivas laborales de los jóvenes en el corto plazo parecen claros: destrucción de empleo, bloqueo en la entrada al mercado laboral y acceso a puestos de trabajo con peores condiciones laborales. En cambio, lo que no resulta tan evidente es que esas condiciones económicas adversas también puedan llegar a tener un efecto en el largo plazo, afectando buena parte de la carrera profesional de los jóvenes. De esta manera, el objetivo principal de esta tesis doctoral es examinar en qué medida el impacto negativo de la crisis económica de 2008 en términos de salarios y empleo se prolonga en el tiempo, una vez las cohortes jóvenes acceden al mercado laboral por primera vez. Asimismo, se incluye en el análisis una perspectiva intergeneracional con el fin de estudiar si las condiciones económicas presentes durante la crisis pueden haber originado desigualdad en términos salariales entre las diferentes generaciones presentes en el mercado de trabajo, siendo probablemente la generación más joven sobre la que ha recaído buena parte del peso de los efectos de la crisis.

## SUMMARY

The transition from the educational stage to the labour market is a key period for the younger cohorts, since the economic conditions they face may determine not only their situation in the short-term but may also have consequences in the medium- and long-term, that is, throughout their professional career. Thus, the context of the Great Recession that began in 2008 revealed the concern about the employment situation of young cohorts, who are starting from a vulnerable scenario because of the worsening of labour market conditions. The effects of the economic crisis on the job prospects of young people in the short-term seem clear: job destruction, blocked entry to the labour market and access to jobs with worsening working conditions. However, it is not evident that adverse economic conditions may also have an effect in the long-term, affecting a large part of the professional careers of young people. Thus, the main objective of this doctoral thesis is to examine to what extent the negative impact of the 2008 economic crisis in terms of earnings and employment persists over time, once young cohorts enter the labour market for the first time. Likewise, an intergenerational perspective is included in the analysis in order to study whether the economic conditions under a crisis context may have caused inequality in terms of earnings between the different generations within the labour market, being probably the younger generation on whom much of the weight of the effects of the crisis has fallen.

## CAPÍTULO 1. PLANTEAMIENTO Y ESTRUCTURA DE LA INVESTIGACIÓN

La crisis financiera y económica de 2008, conocida como la “Gran Recesión”, ha tenido un importante impacto negativo en el mercado laboral español, afectando de manera particular a las cohortes más jóvenes. La juventud representa un periodo clave en el ciclo vital de las personas, dado que es un periodo en el que la mayoría de las personas finaliza su etapa educativa y comienza su vida profesional.

La situación laboral de las cohortes más recientes en España ha sido objeto de preocupación desde hace tiempo ya que la crisis económica, además de reducir sus perspectivas de empleo de modo muy sustancial, especialmente en términos de destrucción de empleo, y dificultar aún más su acceso al mercado de trabajo, ha oscurecido sus horizontes de futuro de modo más que notable. En línea con datos publicados por el INE, la tasa de empleo entre 2007 y 2013 sufrió una caída del 25% aproximadamente. Asimismo, entre 2008 y 2012, el número de jóvenes desempleados menores de 30 años aumentó en más de 2 millones, casi un 25%, superando la tasa de paro el 50% en 2013. Pese al periodo de recuperación económica que comenzó posteriormente, la situación laboral de los jóvenes continúa siendo preocupante, como consecuencia de la crisis del Covid-19, tal y como reflejan los datos de paro. La tasa de desempleo juvenil se sitúa en el 40% en el primer trimestre de 2021.

Por tanto, el bienestar de los jóvenes, los cuales parten de una situación más vulnerable en términos de oportunidades de vida, se ha visto afectado por la crisis económica a través de un empeoramiento de las condiciones del mercado laboral, con el impacto a largo plazo que esto puede tener en sus perspectivas laborales y vitales.

Parece más que evidente que las condiciones económicas que enfrentan las cohortes de trabajadores en su transición al mercado laboral son un factor clave para determinar su situación laboral en el corto plazo. Lo que no es tan evidente es que esas condiciones también pueden tener un efecto a largo plazo. Así, los jóvenes que finalizan sus estudios y se integran en el mercado laboral durante un contexto de crisis tienen que hacer frente a puestos de trabajo con peores condiciones laborales desde un inicio, esto es, menores salarios y más períodos de desempleo, en comparación con aquellos que se incorporan al mercado laboral bajo condiciones económicas más favorables, que pueden acceder a mejores salarios y más oportunidades de promoción.

En consecuencia, se pueden observar diferentes trayectorias salariales y de empleo en el corto y largo plazo entre cohortes de jóvenes en función de las condiciones económicas en el momento de entrada al mercado laboral porque un shock económico incide en diferentes puntos de las mismas. Más específicamente, las condiciones laborales en el momento de entrada al mercado

laboral resultan mejores para aquellos jóvenes que inician su etapa profesional en los años previos a la crisis económica. Sin embargo, en términos de largo plazo, es posible que estos jóvenes tengan que hacer frente a las duras condiciones económicas desde dentro del mercado laboral. En cambio, en el caso de aquellos capaces de superar el bloqueo de entrada al mercado de trabajo bajo un contexto de recesión, puede ocurrir que sus trayectorias laborales progresen porque las condiciones económicas después de la entrada ya sean más favorables, una vez finalizada la crisis.

Esto crearía desigualdades entre cohortes en términos salariales y de empleo en el corto y largo plazo. Del mismo modo, los efectos de la crisis económica también pueden resultar asimétricos en el corto y largo plazo en función del nivel educativo de las cohortes jóvenes.

Adicionalmente, el elevado grado de dualidad del mercado laboral español también ha agudizado las dificultades de acceso al empleo que presentan las cohortes jóvenes y ha empeorado sus perspectivas laborales. En particular, traza unas condiciones de empleo que inciden en bajos salarios para los trabajadores jóvenes. Mientras que se han reducido los trabajos con salarios situados en la parte alta de la distribución salarial, han aumentado de manera considerable aquellos empleos con sueldos concentrados en la parte baja de la distribución salarial. Este empeoramiento de las condiciones laborales también puede causar una lenta progresión tanto en términos de salarios como de empleo a lo largo del tiempo. Esto no sólo afectaría negativamente a la posición de las cohortes jóvenes en su etapa de inserción laboral, sino que llegaría a prolongarse a lo largo de su vida adulta, es decir, a lo largo de su carrera profesional, por la creciente dificultad para la adquisición y acumulación de experiencia profesional.

En otras palabras, el deterioro del mercado laboral en un contexto de crisis económica puede tener un impacto negativo sobre la trayectoria salarial y de empleo de las cohortes jóvenes en el corto y largo plazo, ocasionando un “efecto cicatriz”. Si bien existe una amplia literatura sobre los efectos de corto plazo, los efectos en el largo plazo de las crisis económicas sobre la carrera profesional de los jóvenes no se han estudiado en profundidad. El objetivo principal de esta tesis doctoral es analizar en qué medida el impacto negativo de la crisis económica en términos de salarios y empleo se prolonga en el tiempo, una vez las cohortes jóvenes acceden al mercado laboral por primera vez. El conocimiento de estos efectos puede ayudar a la hora de diseñar políticas efectivas por parte de los responsables políticos que faciliten reducir la desigualdad entre los distintos grupos de edad de la población trabajadora española.

Por otro lado, las condiciones económicas presentes durante la crisis - el persistente desempleo y la devaluación salarial- pueden haber originado una desigualdad en el bienestar entre diferentes generaciones, esto es, las cohortes más jóvenes frente a las mayores. En otras palabras, se puede haber creado una brecha económica intergeneracional entre la generación joven y el resto de las cohortes presentes en el mercado de trabajo, siendo sobre la primera donde ha recaído en mayor

proporción el peso de los efectos de la crisis, es decir, menores ingresos y más inestabilidad laboral.

Por tanto, el colectivo juvenil se enfrenta a la posibilidad de una transición educativo-laboral cada vez más larga e incierta ante un contexto de crisis y al riesgo de cronificación en el tiempo de unas peores condiciones salariales y de empleo. Por todo ello, es preciso realizar un análisis de la situación laboral de los jóvenes en el mercado laboral español, que haga especial énfasis en cómo la crisis económica afecta a las condiciones laborales de los jóvenes una vez acceden al mercado de trabajo. De igual modo, resulta vital extender el análisis examinando la situación laboral de los jóvenes los siguientes años a su entrada al mundo laboral, así como incorporar al análisis una perspectiva intergeneracional con el fin de mejorar las políticas laborales en favor del colectivo juvenil.

### 1.1. Objetivos de la investigación

El principal objetivo de esta investigación es contribuir a la comprensión de cómo se ve afectada la población trabajadora más joven en España durante una crisis económica, especialmente, la vivida a partir del año 2008. En concreto, las preguntas a las que se tratará de dar respuesta en esta tesis doctoral tratan de profundizar en el impacto que ha tenido la Gran Recesión sobre las trayectorias salariales y de empleo de los trabajadores jóvenes, tanto en el corto como en el largo plazo.

La tesis doctoral se compone de tres objetivos iniciales, en torno a los cuales se han desarrollado las hipótesis que se enunciarán más adelante:

- Examinar la magnitud y persistencia del impacto que tiene una recesión sobre la población trabajadora más joven que inicia su carrera profesional en dicho contexto económico en el mercado laboral español, aplicando una perspectiva de cohortes.
- Analizar el efecto diferencial que la crisis económica, por cuestión del país de nacimiento, produce entre los jóvenes nativos e inmigrantes.
- Identificar posibles desigualdades en términos de renta salarial entre las diferentes generaciones que se encuentran dentro del mercado laboral español durante una recesión económica.

A partir de los objetivos generales de la investigación planteados previamente se ha elaborado una serie de hipótesis a las que se pretende dar respuesta en la tesis doctoral, agrupándolas en tres bloques bien definidos:

### ***Primera parte. El impacto de la Gran Recesión sobre la población joven en España***

Se parte de la evidencia de que, en un contexto de crisis económica, la tasa de desempleo aumenta, especialmente, la tasa de paro juvenil, mientras que la calidad de los trabajos tiende a reducirse tanto en términos de salarios como de oportunidades laborales (Oreopoulos et al., 2012; Genda et al., 2010). Esto podría conducir a que las personas que se enfrentan a condiciones económicas difíciles en el momento de entrada al mercado laboral reciban, en promedio, salarios más bajos y sea más probable que tengan trabajos temporales o trabajos que ofrezcan menores oportunidades de promoción, en comparación con aquellos que entraron en el mercado laboral bajo condiciones más favorables.

***Hipótesis 1.*** Los jóvenes que inician su carrera profesional en un contexto de recesión ven afectados negativamente sus salarios y perspectivas de empleo en el corto plazo.

Existe una creciente literatura que muestra que ingresar al mercado laboral durante una recesión económica no solo tiene efectos negativos en el corto plazo sobre la trayectoria salarial y de empleo de los trabajadores, sino también en el largo plazo (Oreopoulos et al., 2012; Kahn, 2010; Cockx y Ghirelli, 2016). Esto implica que los efectos negativos que se producen al inicio de la vida laboral de los trabajadores se prolongan a lo largo de su carrera profesional.

***Hipótesis 2.*** Los efectos negativos de la Gran Recesión sobre los jóvenes en términos de empleo y salarios se prolongan en el largo plazo.

La literatura apunta que tanto la magnitud como la persistencia del impacto de las condiciones económicas iniciales adversas varían según el nivel de educación de aquellos que comienzan su etapa profesional (Cockx, 2016). Existe evidencia que indica que el impacto a corto plazo es particularmente severo para los jóvenes con bajo nivel educativo, pero los efectos son de corta duración (Genda et al., 2010). Los jóvenes cualificados, en cambio, se ven menos afectados inicialmente, pero los efectos persisten por más tiempo (Kahn, 2010; Oreopoulos et al., 2012). Otra evidencia señala que ingresar al mercado laboral durante una recesión puede causar menos daño a corto plazo, pero puede tener consecuencias económicas permanentes (Cockx y Ghirelli, 2016; Brunner y Kuhn, 2014).

***Hipótesis 3.*** La magnitud del impacto de la Gran Recesión sobre los salarios y el empleo de los jóvenes, así como su persistencia varía en función del nivel educativo con el que acceden al mercado de trabajo.

### ***Segunda parte. Diferencias entre la población joven nativa e inmigrante***

Una creciente literatura sugiere que los trabajadores inmigrantes, comparados con los nativos, son más sensibles a las condiciones económicas del mercado laboral, especialmente en épocas de



recesión económica (Xu, 2018; Orrenius y Zavodni, 2010). Esta sensibilidad a las fluctuaciones cíclicas por parte de los inmigrantes se traduce principalmente en un aumento en el riesgo de desempleo ya que estos tienden a trabajar en sectores vinculados a grandes fluctuaciones cíclicas. Por lo tanto, los inmigrantes suelen ser los primeros en ser despedidos durante una crisis económica (Bratsberg et al., 2018). Así, se analizan si las condiciones económicas pueden afectar el salario y el empleo de nativos e inmigrantes de manera diferente ampliando la brecha entre ambos grupos.

**Hipótesis 4.** Tanto la magnitud como la persistencia del impacto de la Gran Recesión sobre los salarios y el empleo de los jóvenes varía en función del país de nacimiento.

**Hipótesis 5.** El nivel educativo de los jóvenes nativos e inmigrantes también juega un papel clave en la magnitud y persistencia del impacto de la Gran Recesión sobre los salarios y el empleo.

### ***Tercera parte. La desigualdad de renta entre generaciones en un contexto de crisis económica***

Con el inicio de la crisis, la desigualdad y el riesgo de exclusión social aumentaron, afectando especialmente al colectivo juvenil. Por ello, una vez conocida la situación de los jóvenes en el mercado laboral durante la crisis económica, se amplía la perspectiva incorporando a otros colectivos. Este enfoque añade una comparación entre diferentes generaciones en términos de renta, con el ánimo de ahondar en la posición desfavorecida que presentan los trabajadores más jóvenes durante una recesión económica.

La evidencia existente muestra que hay “generaciones afortunadas y menos afortunadas”, en las que el año de nacimiento de los trabajadores resulta de gran importancia (Chauvel, 2013). Más específicamente, algunos autores encuentran que algunas generaciones se han beneficiado más de su cohorte de nacimiento en comparación con otras generaciones, en términos de ingresos (Chauvel y Schröder, 2014, 2015; Freedman, 2017). Además, se encuentra evidencia de que aquellos que ingresan al mercado laboral durante una recesión económica se encuentran en una posición más desfavorecida, en comparación con aquellos que entran durante un crecimiento económico (Berloff y Villa, 2010; Karonen y Niemelä, 2020).

**Hipótesis 6.** Existen desigualdades de renta en términos relativos entre diferentes generaciones.

El análisis de la desigualdad de renta en términos absolutos permite examinar si el desarrollo de las ganancias de algunas generaciones aumentó durante un determinado contexto económico mientras que el de otras se detuvo o desaceleró. Tal y como señalan en sus resultados Chauvel y Schröder (2015), la evolución de las ganancias de los trabajadores más jóvenes en Francia se estanca en comparación con el de los trabajadores nacidos antes. Sin embargo, Karonen y Niemelä

(2020) evidencian un crecimiento positivo de las ganancias en Finlandia, independientemente del grupo poblacional.

En el caso del estudio que se incluye en esta tesis doctoral, este análisis permite examinar si la crisis económica afectó particularmente la dinámica del ingreso absoluto de algunos trabajadores, pero no la de otros.

**Hipótesis 7.** Existen diferencias entre generaciones en cómo han evolucionado los ingresos en términos absolutos durante una crisis económica.

Finalmente, tal y como apuntan Bonhomme y Hospido (2017), la evolución de la desigualdad de ingresos a lo largo del tiempo difiere según el género. Por tanto, incluir este enfoque permite observar posibles diferencias de género en la dinámica de la desigualdad de ingresos entre trabajadores nacidos en diferentes épocas en un contexto de crisis.

**Hipótesis 8.** Las desigualdades de renta en términos absolutos y relativos entre generaciones pueden ser diferentes entre mujeres y hombres.

## 1.2. Interés de la investigación y justificación del objeto de estudio

El empleo juvenil es un elemento clave en el estudio del mercado laboral, que se ha visto afectado como consecuencia de la prolongada crisis económica y posterior recuperación. Sin embargo, buena parte de la investigación centrada en el análisis de los jóvenes en el mercado de trabajo se restringe a un análisis a nivel de individuo.

Analizar las trayectorias salariales y de empleo de los jóvenes que acceden por primera vez al mercado laboral durante una crisis económica, agrupando a los jóvenes por una característica común –como es la cohorte–, nos conduce a examinar la magnitud de la crisis analizada, por un lado, y a discernir sus posibles impactos diferentes sobre los jóvenes en función de dicha característica común, por otro lado. Por tanto, podemos decir que el interés de la investigación en esta tesis doctoral reside en:

- Aportar evidencia relativa al impacto de la Gran Recesión sobre los trabajadores más jóvenes usando un enfoque de cohortes. El análisis por cohortes se basa en la idea de seguir a un grupo de individuos que comparten una característica común (es decir, una "cohorte") a lo largo de distintos puntos en el tiempo dentro del mercado laboral, y así hacer un rastreo dinámico de sus trayectorias salariales y de empleo. Este enfoque representa una alternativa a estudios previos donde la unidad de observación es el individuo, porque analiza a grupos poblacionales agregados. En concreto, se emplea en toda la tesis doctoral un enfoque de cohortes jóvenes,

es decir, se analiza a aquellos trabajadores con una edad por debajo de los 30 años. Por otro lado, tanto en el capítulo 2 como en el capítulo 3 de esta tesis, se utiliza, además, la cohorte de entrada al mercado laboral como unidad de observación, es decir, se considera como una cohorte a todos aquellos jóvenes que han entrado en el mercado de trabajo en un determinado año.

La cohorte de entrada al mercado laboral 2007 agrupa a aquellos que inician su carrera profesional el año previo al inicio de la crisis. Este grupo pudo disfrutar de un periodo muy corto de estabilidad laboral antes de que la recesión comenzara. Por otra parte, las cohortes 2008-2013 entran al mercado laboral ya bajo condiciones económicas difíciles mientras que las cohortes 2014-2015 comienzan a acumular experiencia profesional cuando la economía comienza a recuperarse. Por tanto, esta perspectiva en el análisis nos permite comparar cohortes entre sí y observar diferentes impactos de la crisis sobre sus trayectorias salariales y de empleo.

- Ampliar el foco de análisis relativo al impacto que la crisis económica tiene sobre la transición de los jóvenes de la etapa educativa al ámbito laboral, su acceso a un primer empleo y cómo se desarrolla su trayectoria laboral posteriormente. Desde el punto de vista laboral, la situación de los jóvenes se ha visto negativamente afectada por la crisis económica de 2008, especialmente su inserción en el mercado de trabajo. En concreto, la fuerte destrucción de empleo afectó de manera más intensa al colectivo juvenil en comparación con otros grupos, dado que el empleo juvenil tiene unas características estructurales que implican un menor nivel de protección y una mayor inestabilidad. Esta precariedad laboral impide tanto el crecimiento personal como laboral de los trabajadores más jóvenes, originando dificultades no solo en términos de empleo sino también en términos de perspectiva de carrera profesional. Por tanto, este análisis nos permite averiguar los impactos a corto y largo plazo que la Gran Recesión ha tenido sobre los salarios y el empleo de los jóvenes que acceden por primera vez al mercado laboral en ese contexto económico.
- Ahondar en la posición desfavorecida que presentan las cohortes más jóvenes en términos de renta durante una recesión económica en comparación con otras generaciones. Uno de los principales efectos de la crisis ha sido el aumento de la desigualdad y el riesgo de exclusión social, afectando especialmente al colectivo juvenil debido a las particularidades que caracterizan su empleabilidad. Entre la población trabajadora, los jóvenes tienen menores niveles de renta media, mayores tasas de desempleo, mayor riesgo de pobreza y mayor inseguridad laboral, lo cual origina mayor desigualdad de renta entre diferentes generaciones y beneficia a la población de mayor edad.

Por ello, el análisis de las trayectorias salariales y de empleo de los jóvenes una vez acceden al mercado laboral por primera vez bajo un contexto de crisis económica resulta de gran relevancia. El estudio aquí planteado permite una búsqueda más amplia sobre cuál es la posición laboral que presenta el colectivo juvenil en un contexto de crisis económica. Así pues, se abordan preguntas frecuentemente planteadas como cuál es el impacto de la crisis sobre el colectivo juvenil, no sólo cuando los jóvenes inician su carrera profesional sino también a medida que van acumulando experiencia profesional. Asimismo, el uso de una perspectiva de cohortes en el análisis supone un nuevo enfoque en el tema abordado, que nos separa de los análisis a nivel de individuo. Por último, una vez conocida la situación de los jóvenes en el mercado laboral durante la crisis económica, se amplía la perspectiva incorporando a otras cohortes. Este planteamiento añade una comparación entre diferentes generaciones en términos de renta con el ánimo de profundizar aún más en conocer cuál es la posición laboral que presentan los jóvenes en el mercado de trabajo en comparación con otros grupos de edad.

### 1.3. Fuentes de información

A lo largo de toda la tesis doctoral se emplea una única base de datos, que es la Muestra Continua de Vidas Laborales (MCVL y, en inglés, CSWH). En este apartado se abordan las características principales de esta base de datos, así como las ventajas que presenta y sus puntos débiles.

La Muestra Continua de Vidas Laborales es un extracto de datos individuales anonimizados, procedentes de registros administrativos de la Seguridad Social, a los que se añaden otros que se toman del Padrón Continuo Municipal (INE) y del resumen anual de retenciones e ingresos a cuenta del IRPF (Modelo 190) de la AEAT. Esta base de datos cuenta con una muestra representativa de todas las personas que han estado en situación de afiliado en alta, o recibiendo alguna pensión contributiva de la Seguridad Social en algún momento en el año de referencia, sea cual sea el tiempo que hayan permanecido en esa situación. Dicha cotización puede deberse tanto a la situación de trabajo, a la de percepción de prestaciones por desempleo como a los beneficiarios de alguna pensión contributiva de la Seguridad Social. Por tanto, la MCVL incluye distintos sucesos de la historia laboral del individuo, siendo los más importantes para el análisis económico del mercado de trabajo los de empleo, tanto por cuenta propia como ajena, desempleo y jubilación.

El conjunto de variables que se incluye en la MCVL es muy amplio. En primer lugar, el conjunto de características sociodemográficas referidas al individuo (incluye fecha de nacimiento, sexo, nacionalidad, provincia donde se afilió por primera vez, nivel educativo y país de nacimiento). En segundo lugar, contiene variables relativas al empleo desempeñado (régimen de la Seguridad

Social, fechas de alta o baja, tipo de contrato, tipo de jornada y grupo de cotización). Para cada uno de estos puestos o períodos de cotización se ofrece la base por la que se ha cotizado cada mes. Finalmente, se incluyen variables referidas al empleador: actividad económica, tamaño, y antigüedad como empleador.

La MCVL se publica anualmente en dos versiones: la primera contiene información sobre las personas incluidas en la población de referencia, su afiliación y sus bases de cotización; la segunda incluye información de la Agencia Estatal de la Administración Tributaria, y contiene toda la información de la primera versión y, además, datos fiscales. La segunda versión está disponible a partir de la edición 2006. Pese a que corresponden a las mismas personas, los datos de una versión no pueden enlazarse con los de la otra, porque los identificadores de persona física se transforman de manera diferente; es decir, a una misma persona, en cada versión se le asigna una clave de identificación distinta, que es alfanumérica en el caso de la primera versión y puramente numérica en el de la segunda versión.

Los datos que incluye la versión con datos fiscales proceden del modelo 190, “resumen anual de retenciones e ingresos a cuenta del IRPF” por rendimientos de trabajo, de actividades económicas y por otros ingresos. Además, sólo incorpora información de personas incluidas en la población de referencia de la MCVL. Por tanto, en general, no figurarán en ella datos de personas que perciben ingresos declarados en el modelo 190 en situaciones que, sin embargo, no dan lugar a la inclusión en la MCVL como ocurre, por ejemplo, con los funcionarios y pensionistas del régimen de Clases Pasivas.

Cada edición anual de la MCVL toma como año de referencia el último año natural finalizado. A efectos de su inclusión en una edición anual de la MCVL, la persona debe haber formado parte de la población de referencia, como afiliada o como pensionista, al menos un día dentro del año de referencia. La muestra de cada año está formada por cuatro de cada cien de las personas que forman parte de la población de referencia, seleccionando así a más de un millón de personas.

Una importante característica de la MCVL es que, aunque está referida a la población cotizante o pensionista en el año de referencia, reproduce el historial laboral de las personas seleccionadas, remontándose hacia atrás hasta donde se conserven registros informatizados. Cabe señalar que cada edición anual de la MCVL es representativa sólo de la composición de la población de referencia a lo largo del año de referencia. Por tanto, la edición de la MCVL de cada año, aunque incluya datos históricos que pueden remontarse a muchos años atrás, no permite extraer conclusiones sobre la situación de la población de referencia en años anteriores.

Otro aspecto esencial es mantener la estructura de panel de la misma, es decir, cada año desde 2004 se actualiza la información existente sobre la mayoría de los individuos incluidos en la MCVL del año anterior por lo que, para ellos, se tiene un seguimiento en el tiempo. Cada año

desaparecen de la muestra algunos individuos y aparecen otros, en la misma proporción de lo que ocurra en la población de referencia, manteniéndose la representatividad de la muestra. Así, la MCVL ofrece información más exhaustiva sobre las trayectorias laborales de una muestra amplia de trabajadores (se tiene información detallada sobre la duración de los episodios de empleo).

Sin embargo, al proceder de ficheros cuyo principal objetivo es la gestión administrativa, se requiere un esfuerzo a la hora de adaptar la estructura de la información de la MCVL para realizar un análisis en concreto. De ese modo, se necesita una homogeneización, estructuración y filtrado de los registros de la MCVL de cara a su utilización en el trabajo estadístico específico para cada investigación. Asimismo, cabe señalar que la naturaleza administrativa de esta base de datos puede originar un alto porcentaje de casos incompletos. El proceso de recogida de datos solo se realiza de forma exhaustiva en aquellos campos cuya cumplimentación es estrictamente obligatoria, como la gestión de prestaciones o cotizaciones de los individuos. En cambio, el resto de la información demandada puede no ser facilitada por los propios ciudadanos o incluso no ser actualizada.

Del mismo modo, al tratarse de una fuente de información que recoge las relaciones administrativas mantenidas con la Seguridad Social, esta no refleja a los colectivos que quedan al margen de su acción protectora: los trabajadores de la economía sumergida, inactivos o desempleados que no reciben prestaciones de carácter contributivo.

Otra limitación relevante de la MCVL radica en la falta de información sobre las horas de trabajo, que permitirían el cálculo del salario diario o semanal percibido por el trabajador. Dado que no disponemos de este tipo de información y, según los convenios colectivos existentes, la jornada laboral semanal puede oscilar entre 37,5 y 40 horas, los supuestos necesarios para estimar un salario diario o semanal pueden conducir a sesgos importantes en las conclusiones a las que se lleguen en un análisis concreto. Aunque la MCVL dispone de información sobre el coeficiente de parcialidad, la ausencia de información sobre las horas trabajadas de un individuo origina que los supuestos que se lleven a cabo para estimar un salario por hora acarreen sesgos importantes.

#### 1.4. Estructura de la investigación y relación de capítulos

Esta tesis doctoral se compone del presente capítulo introductorio, tres capítulos en los que se analiza el impacto de una recesión sobre las carreras profesionales de la población joven española, y un último capítulo donde se presentarán las conclusiones de la investigación. Más específicamente, el contenido de esta tesis doctoral puede desglosarse de la siguiente manera:

Los tres siguientes capítulos constituyen el análisis principal de esta tesis doctoral. Así, en el primero se aborda cuál es el impacto que experimentan los jóvenes en términos de salarios y empleo cuando inician su carrera profesional bajo condiciones económicas adversas, es decir, en un contexto de recesión. Este estudio no sólo se centra en el corto plazo, sino también en el largo plazo. Por tanto, ello nos acerca a la situación de partida de los jóvenes entrantes al mercado laboral durante una crisis económica, así como a la situación que van experimentando los siguientes años a su entrada. En términos generales, se encuentra que las cohortes que entran al mercado laboral durante una recesión se enfrentan a consecuencias a largo plazo tanto en términos de salarios como de empleo. Para las personas con menor nivel educativo, se encuentra que el efecto principal es a través del empleo, incluso bloqueando su entrada al mercado laboral. Para las personas con educación superior, en cambio, obtenemos un impacto a largo plazo en términos de salario, así como una reducción en los días trabajados.

En el siguiente capítulo se lleva a cabo un estudio similar, pero en este caso, el foco del análisis reside en distinguir a la población joven entre aquellos que han nacido en España frente a aquellos que han nacido fuera del país. Dicho de otra manera, se analizan posibles diferencias en el impacto que la Gran Recesión ha tenido sobre los salarios y el empleo de los jóvenes nativos e inmigrantes entrando al mercado laboral bajo dicho contexto económico. Los resultados muestran que la crisis económica ha provocado inicialmente un bloqueo en la entrada del mercado laboral, reduciendo el número de participantes jóvenes, especialmente entre los inmigrantes. Adicionalmente, se observa que los nativos se ven más afectados tanto a corto como a largo plazo en términos de salarios y empleo que sus pares inmigrantes. El logro educativo también marca la diferencia. Cuanto mayor es el nivel educativo, mayor es el impacto negativo de la crisis en términos de empleo y salarios, así como su persistencia en el tiempo.

En el último de estos tres capítulos se profundiza en la posición desfavorecida que presentan los jóvenes en el mercado de trabajo en comparación con otros grupos de edad en un contexto de recesión. Concretamente, en este capítulo se analizan posibles desigualdades de renta en términos relativos y absolutos entre generaciones diferentes. Esto nos permitirá examinar si la crisis económica afectó particularmente la dinámica de renta de algunos trabajadores pertenecientes a grupos poblacionales, pero no a la de otros. Así, la evidencia obtenida sugiere que algunas generaciones están más desfavorecidas en términos de ingresos por su año de nacimiento que otras generaciones. Asimismo, los resultados señalan que el contexto económico que vive una generación en su transición al mercado laboral es un factor clave en el desarrollo de sus ingresos.

En el capítulo final se presentan las conclusiones de la investigación, tanto en lo que concierne a la discusión del impacto a corto plazo que puede tener una recesión sobre los jóvenes en términos de empleo y salarios, como a las consecuencias que esto pueda acarrear en el largo plazo.

Asimismo, este capítulo también aborda las conclusiones a las que se llegan en el análisis distinguiendo entre jóvenes nativos e inmigrantes. Del mismo modo, se desarrollan las conclusiones sobre el estudio del impacto de la Gran Recesión en la desigualdad de ingresos entre generaciones tanto en términos relativos como absolutos. Por tanto, se intenta ofrecer una respuesta a los interrogantes planteados a lo largo de la tesis doctoral.



# CAPÍTULO 2: LONG-TERM EFFECTS ON YOUTH CAREER OF ENTERING THE LABOUR MARKET DURING THE GREAT RECESSION<sup>1</sup>

## 2.1. Introduction

There is an increasing literature showing that entering the labour market during an economic downturn not only has temporary negative effects but also lasting scars on workers' professional careers. During a recession, the quality of jobs tends to be reduced both in terms of wages and career opportunities and the level of inequality increased (Oreopoulos et al., 2012; Bonhomme and Hospido, 2013). Therefore, individuals facing tough economic conditions at the time of entry earn, on average, lower wages and are more likely to hold temporary jobs or jobs offering lower training and promotion opportunities. To catch up with their luckier peers, who entered the labour market under more favourable conditions, individuals may engage in a more intense search for better quality jobs or invest in human capital (Oreopoulos et al., 2012; Cockx and Ghirelli, 2016). However, the process of recovery may be influenced by factors such as workers' qualifications, information imperfections, search frictions or the functioning of the labour markets (see, for instance, Cockx and Ghirelli, 2016), and the gap between workers may persist in the long run.

In fact, both the magnitude and persistence of the impact of adverse initial economic conditions vary according to the degree of flexibility of the labour market and the level of education of new entrants (Cockx, 2016). In flexible labour markets, such as US and Canada, the impact of a recession on wages is more severe for low-skilled workers, but it is short-lived (for instance, Genda et al., 2010). On the other hand, high-skilled young workers are initially less affected, but the impact persists for longer (Kahn, 2010; Oreopoulos et al., 2012, among others). In contrast, due to stricter regulation, adverse economic conditions tend to impose more persistent negative consequences on new entrants' careers in more rigid European labour markets. Moreover, these effects are likely to be more pronounced in the case of low-skilled workers (Cockx and Ghirelli, 2016; Brunner and Kuhn, 2014).

This second chapter adds to this literature by analyzing the impact of initial economic conditions on the professional career of young workers who entered the labour market in Spain between 2007 and 2015. The specific characteristics of the Spanish labour market, a dual employment

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<sup>1</sup> This chapter is published in *Applied Economics*. Escalonilla, M., Cueto, B. and Perez-Villadoniga, M.J. (2021): "Long-term effects on youth careers of entering the labour market during the Great Recession", *Applied Economics*, <https://doi.org/10.1080/00036846.2021.1927966>

protection legislation and a rigid collective bargaining system, make it an interesting case to analyse. First, it is a highly segmented labour market, where a segment of temporary workers, hired under flexible conditions, coexists with a segment of permanent employees that enjoy higher employment protection. In fact, Spain exhibits the highest proportion of fixed-term contracts among EU countries, 20.1% in 2020 versus an average of 11.2% in the EU in 2019, according to Eurostat. Moreover, the incidence of temporary employment is remarkably high among young workers, surpassing a 70% share since 2015.<sup>2</sup> Second, as in many European countries, the wage-setting process is characterized by the strong presence of unions, with a clear predominance of industry-wide agreements, where minimum wages are set by professional category. Currently, over 90% of covered workers have their wages set by industry-wide contracts (either at the regional, inter-regional or national level).<sup>3</sup> This intermediate level of centralization of wage determination has been argued to yield the worst results in macroeconomic terms (Calmfors and Driffill, 1988) and has contributed to job destruction following the Great Recession (Jimeno and Thomas, 2011).

Therefore, in a context of dual employment protection legislation together with downward wage rigidities, adjustment to adverse economic shocks is likely to take place mostly through dismissals rather than through wage restraint or working time reduction (Bentolila et al., 2012). In this sense, Font et al. (2015) find significant asymmetries in the response of wages to the economic cycle in Spain. In particular, while during expansions real wages tend to be more sensitive to the business cycle, the semi-elasticity of wages to unemployment in recessions is estimated to be quite low.

In light of the above discussion, we analyse the long-term effects of entering the labour market during the Great Recession both in terms of wages and employment. We focus on young people aged 16-30 who enter the labour market for the first time between 2007 and 2015 and begin to work full-time, and we follow their work trajectory until 2017.

Previous evidence for Spain is provided by Fernández-Kranz and Rodríguez-Planas (2018), who use the 2008 edition of the CSWH focusing on young males who graduated between 1979 and 1991 from high school, vocational training or college and follow them up to 2008. They find that graduating in a recession leads to substantial earnings losses, which are greater and more persistent for workers without a college degree.

Although we use a similar approach than that of Fernández-Kranz and Rodríguez-Planas (2018), there are relevant differences between both articles.

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<sup>2</sup> Díaz and Sánchez (2008) find that older individuals are more likely to have a permanent contract than younger people.

<sup>3</sup> In 2012, a new regulation was introduced in order to introduce some flexibility in the wage bargaining system (Ley 3/2012, de 6 de julio, de medidas urgentes para la reforma del mercado laboral).

First, while Fernández-Kranz and Rodríguez-Planas (2018) focus on the crisis of the early 1990s and the economic expansion of the 2000s, our article considers a time period that encompasses one of the most important recessions that have occurred in the last decades and the subsequent economic recovery (2007-2017). This allows us to analyse the effect of the Great Recession on youth careers. Spain was among the countries most severely hit by the economic recession. At the same time, while unemployment rates soared after 2008, it was not until 2010 that wages started to react.<sup>4</sup> In this context, young workers were particularly affected. The youth unemployment rate increased from 24% in 2008 to 55% in 2013, and although it has gradually fallen, it is still above 33%, according to the Labour Force Survey.

Little evidence is found examining the period of the Great Recession because much of the literature on the topic analyses the period between the early 1980s and early 2000s. Evidence shows that young people in Portugal have difficulties at the time of entering the labour market and accessing high quality jobs, especially during the Great Recession (Suleman and Figueiredo, 2020). Similar results are found by Aronson et al. (2015), who observe young workers in a region of U.S. fare the worst in terms of their employment status and income levels during the Great Recession. Therefore, the time period examined in our article represents a contribution to the existing literature.

Second, we include the least qualified young people in our study because they represent a relevant group to take into account in the Spanish case. Unemployment rates are lower for more educated workers, ranging from 54.4% for the lowest educated young workers in 2019 to 23.3% for those with a university degree. In addition, the early school dropout rate among 18-24 years is one of the highest rates in the European Union and peaked at 31.7% in 2008. Likewise, the percentage of young workers aged 16-24 years with less than secondary education compared to the total number of workers with this educational attainment is 12% between 2005 and 2013. Thus, the inclusion of this group represents a contribution when studying the impact that an economic crisis has had on individuals who are working in the labour market, because it allows us to obtain a clearer picture of how the economic crisis has affected them and to observe possible differences between workers with different educational levels.

Finally, we use several editions available to date of the CSWH (from 2007 to 2017). Thus, we include in our analysis all workers who entered the labour market between 2007 and 2015 and are working between 2007 and 2017. Using all these editions, we have a sample of all individuals who are working in any moment during the period 2007 and 2017. In this sense, we avoid problems derived from using only one edition because the information of those people who worked in the past but are not active in the considered year is not missing.

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<sup>4</sup> Annual Survey on Labour Costs.

Our results show a relatively high and persistent wage penalty for high-qualified young workers, but no significant effect on wages for low-skilled individuals. This result may be explained by the existence of a legal minimum wage, which is particularly binding for low-educated young workers. In terms of employment probability, we find a negative and persistent effect for individuals with university education. On the contrary, we fail to find a significant effect for those with primary education or vocational training. This result is consistent with the fact that in Spain, low skilled workers have faced an entry barrier that prevented a high proportion of them from entering the labour market.

The rest of the chapter is organized as follows. Section 2.2. summarizes the main empirical results found in the literature. In Section 2.3., we describe our database, the sample and the empirical specification. Section 2.4. presents the main results. Finally, Section 2.5. presents brief conclusions of the article.

## 2.2. Literature Review

A first evidence of how entering the labour market under adverse economic conditions between the late 1970s and early 1990s affects labour market outcomes of young people was found by Hershbein (2012) and Oreopoulos et al. (2012). Using the NLSY79 and including men and women in the analysis, Hershbein (2012) finds that, following a recession, entry hourly wages of high school graduates in US fall by 2.4% due to a 1% increase in the unemployment rate, becoming non-significant after 4 years. However, Oreopoulos et al. (2012) find a small but more persistent negative effect of entering the labour market under an economic downturn on the annual earnings of male college graduates in Canada. Specifically, the negative impact on earnings falls over time and fades after 10 years. Using a Canadian administrative employer-employee matched dataset for this study, the authors conclude that the continuous exposure of workers to adverse economic conditions throughout their professional careers can play a key role in the persistence of earnings losses.

Most work on this topic has focused on the period covering the early 1980s and early 2000s, just before the start of the 2008 economic crisis. Both Kahn (2010) and Liu et al. (2016) focus their analysis on college graduates but their evidence differs. In particular, Kahn (2010) uses the NLSY79 for U.S. males and estimates an initial hourly wage loss of 6.2% due to a 1% increase in the unemployment rate. This effect diminishes gradually and becomes only significant at the 10% level after 15 years. Liu et al. (2016), instead, find that the persistence of the negative effects of an economic downturn is lower in the case of Norway. Using administrative registers by

Statistics Norway, the author states that a 1% increase in the unemployment rate leads to a fall in entry annual earnings of males and females by 4%, that becomes non-significant after 4 years.

Brunner and Kuhn (2014) and Stevens (2008) also examine the period between the early 1980s and early 2000s and both focus on male young people with non-university education. While the former examines the Austrian case, using the Austrian Social Security database, the latter analyses the German case, using an administrative dataset available by the Institute for Employment Research (IAB). In both cases, the authors find a small negative effect by 0.5%-0.9% on entry daily wages. Nevertheless, different long-term effects on wages are shown. In fact, Brunner and Kuhn (2014) show that the negative and significant effect of labor market conditions on daily wages remains as much as 20 years after the first entry into the labor market. The evidence found by Stevens (2008), instead, shows that the negative effect extends up to 5 years. Both authors point out that labour mobility plays a key role on the persistence of these negative effects on wages.

Despite Gaini et al. (2012) examine the same period than previous articles using the French Labour Force Surveys, interestingly, they fail to find a significant effect on monthly wages of male and female low-skilled workers in France either in the short or in the long run. The authors suggest that a high minimum wage may prevent wages of new entrants from falling. Yet, they find a negative effect in terms of employment. The probability of being employed decreases by about 1%-1.3% the first year, and this effect vanishes after 3 years. Thus, being unemployed during an economic downturn may be considered as a less negative signal and employers may therefore rely less on it in the hiring process.

Comparing high-school graduates with university graduates, Fernández-Kranz and Rodríguez-Planas (2018) use administrative data of the Spanish Social Security, covering the period between 1980s and 2000s and estimate a fall of around 2.4% and 1.6% on entry annual earnings of high-school graduates and high-educated workers, respectively. This negative impact persists 5 and 7 years for low and high-educated workers, respectively. The low quality of the first job and exposure of workers to adverse economic conditions throughout their professional career might explain the persistence of the wage penalty. Larger and more persistent negative effects are found in the case of Japanese males. Specifically, Genda et al. (2010) use data of Japanese Labour Force Surveys also covering the period between the early 1980s and early 2000s and find a negative effect of around 6% on entry annual earnings of low-skilled workers and 4.6% for high-educated workers. This negative impact lasts 12 years in both cases. According to the authors, this substantial persistence is due to the generation of temporary and unstable employment caused by the segmentation of Japanese labour market between permanent and temporary jobs.

Covering a shorter analysis period, between the early 1990s and early 2000s, Cockx and Ghirelli (2016) analyse the Belgian case distinguishing between low- and high-educated young people. Using the Sonar Surveys, their results show that a 1% increase in the unemployment rate has negligible effects on the average hourly wage for low-educated men. However, the number of hours worked drop by about 4.4%. This effect persists up to 12 years. In the case of high-educated workers, they find an initial but not persistent negative effect on employment. However, there is a penalty on hourly wages that increases with experience, starting at 3.2% after 3 years and reaching 4.4% after 10 years.

Recent research extends the analysis period from the early 1990s to 2010. In the UK, Taylor (2013) uses the British Household Panel Survey and finds that an additional point on the unemployment rate is associated with 4.3% lower hourly wages for male and female workers who leave full-time education during a recession. However, the wage loss becomes non-significant after 4-5 years. Additionally, Umkehrer (2019) examines German male apprenticeship graduates between 1990 and 2010 using administrative linked employer-employee data. They show that less advantaged graduates experience larger and more persistent annual earnings losses than more advantaged graduates. In sectors with higher collective bargaining coverage, the effect is mainly due to reduced employment stability. In sectors with lower coverage, instead, they are mainly driven by lower average annual earnings.

On the other hand, Speer (2016) and Schwandt and von Wachter (2019) cover the broadest period found in the literature on this topic. In particular, they focus on period from the late 1970s to 2010 for the former and to 2015 for the latter. Regarding the former, Speer (2016) examines the effects for young men of leaving school in a recession in U.S. using the NLSY79. The results show that they take longer to find a job, earn lower hourly wages and work more part-time weeks. A 1% rise in the initial unemployment rate leads to a decline in year one average hourly wage of about 4%. However, this effect of entry economic conditions disappears after the first year. Regarding the latter, Schwandt and von Wachter (2019) use repeated cross-sections from the Current Population Survey. They find that entering the labour market in times of high unemployment in U.S. leads to a substantial initial effect on annual earnings. This effect persists for 10 years into workers' careers. Their evidence implies that for a moderate recession that raises unemployment rates by 3%, the loss on cumulated earnings is predicted to be on the order of 60% of annual earnings. Moreover, they find that the negative effects are particularly large for high school dropouts.

In sum, the evidence shows that entering the labour market in a recession context has substantial negative effects on wages and earnings. These effects vary according to the flexibility of the labour market and the educational level of the new entrants. Nevertheless, the evidence also shows

that wages may not be affected during a recession in rigid labour markets, but there may be a negative effect in terms of employment, such as the French case (Gaini et al., 2012).

## 2.3. Data and Empirical Strategy

### 2.3.1. Sample Selection and Main Variables

The analysis is focused on workers aged 16-30 entering the labour market during the period 2007-2015. Following Oreopoulos et al. (2012), we have selected those who had a full-time contract for the first time in those years. We have then followed them since their first job to the last observed position in 2017 to construct their work trajectory in terms of employment and wages. As CSWH contains detailed information about entry and exit dates of employment, it is possible to create a panel dataset, where the first observation for each individual corresponds to the first employment spell in the corresponding year. Using the subsequent waves of the dataset, for each individual in the sample, we obtain their labour market situation as well as their wages for the following years. Our final sample contains 1,106,754 observations corresponding to 153,562 unique individuals entering the labour market between 2007 and 2015. Descriptive statistics are displayed in Table 1.

On average, the age at which individuals enter the labour market for the first time increases with the level of education, ranging from less than 21 for low educated worker to 22.7 for those with an University degree. The proportion of females in the sample is 50% and over 25% of all individuals in our sample hold a university degree. Interestingly, the proportion of males decreases with education, and they represent just 37.7% of the University education category.

**Table 1: Descriptive Statistics**

		Mean	Std. Dev.
<i>Less than primary education</i>	Age of first employment	20.975	3.925
	Man	0.604	0.489
<i>Primary education</i>	Age of first employment	21.968	4.155
	Man	0.568	0.495
<i>Compulsory secondary education</i>	Age of first employment	20.755	3.626
	Man	0.546	0.498
<i>Vocational training</i>	Age of first employment	21.054	3.345
	Man	0.490	0.500
<i>Post-compulsory secondary</i>	Age of first employment	21.364	3.453
	Man	0.482	0.500
<i>University education</i>	Age of first employment	22.651	3.436
	Man	0.377	0.485
Sample size		153,562	

Source: own elaboration from the CSWH.

Regarding earnings, we can obtain two different measures. On the one hand, CSWH provides information on the contribution bases that are used as a proxy for wages.<sup>5</sup> We compute monthly wage as the average of annual monthly earnings. Contribution bases are top- and bottom-coded by law in Spain, i.e, there is a maximum and minimum contribution base that increase over time and by occupation groups. Given that the selected sample corresponds to young workers, their bases are not expected to reach the maximum legal limit. In fact, only 0.5% of observations reach this limit. Additionally, CSWH contains fiscal data allowing us to use a second measure of earnings, which is total annual labour income. The advantage of this variable is that it is not top or bottom-coded. In both cases, we consider missing values for non-employed workers.

Regarding employment outcomes, the data related to employment history (i.e. information about entry and exit dates into employment), allow us to calculate the number of days worked each year. Therefore, we can obtain two measures related to employment: the number of days worked during the year, considering missing values for non-employed workers, and employment probability, defined as the probability of working at least six months during a year. Summing up, our analysis focuses on two outcomes related to earnings - monthly wages and annual labour income- and two outcomes related to employment - days worked and employment probability.<sup>6</sup>

The information on employment spells also allows calculating worker's potential experience, as the years that the individual has been working since they began their professional career. Potential experience is computed as the difference between the last year in which workers are observed and the year in which they entered the labour market. Hence, our period of interest covers up to 11 years of (potential) working experience.

While a good deal of the literature focuses on highly qualified young male workers, in this chapter, we analyse all young entrants, including both genders and less-educated individuals. On the one hand, female participation rates have increased continuously, even during the recent crisis and, although there is still a significant employment gap, female participation rates are almost the same as those of males in the case of people under thirty.<sup>7</sup> In fact, females in the sample slightly outnumber males. Although it has been argued that female labour supply decisions and earnings are more sensitive to external factors such as childbearing (Hotchkiss et al., 2016) or discrimination,<sup>8</sup> in the case of young female workers in Spain, the birth rate for mothers aged 16-

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<sup>5</sup> Nominal wages are adjusted to real prices using the 2016 CPI (Consumer Price Index).

<sup>6</sup> The used dataset does not contain information about working hours.

<sup>7</sup> The gap between female and male participation rates for people under 30 was 9 pp in 2006 and it reduced to 4 pp since 2010, according to Labour Force Survey data.

<sup>8</sup> See Kahn (2010), Oreopoulos et al. (2012), Brunner and Kuhn (2014), Stevens (2008), Cockx and Ghirelli (2016), among others.



30 is low.<sup>9</sup> Thus, estimations for both genders would provide a better understanding of the dynamics of wages.

On the other hand, according to the Labour Force Survey, less-educated workers represent one third of total youth employment in Spain. Since the purpose of this second chapter is to estimate the effect of a recession on youth career, excluding low-skilled workers from the analysis would provide a biased estimation. Accordingly, we distinguish by educational level in order to provide a more comprehensive picture of the evolution of youth labour market trajectory.

Table 2 displays the sample size of cohorts by entry year and by potential experience. From inspection of the data, it becomes quite clear that, apart from a likely effect on wages, the economic crisis may have had a very relevant impact in terms of employment. In particular, new entrants' cohort size reduces almost by 50% during the crisis. While our sample exceeded 20 thousand individuals in 2007-2008, it went below 15 thousand between 2009 and 2013. For instance, in 2012, when youth unemployment rate exceeded 40%, the number of new entrants into the labour market was less than 40% of those entering before the onset of the economic crisis. In 2013, the trend reversed and, in 2015, the number of new entrants was similar to the figure before the crisis. Thus, results from our empirical analysis should be interpreted bearing in mind the sharp drop in new entrants' cohort size.

**Table 2: Sample size by entry year and potential experience**

Entry year	Year of experience											Total
	0	1	2	3	4	5	6	7	8	9	10	
2007	26,416	26,416	26,416	26,416	26,416	26,416	26,416	26,416	26,416	26,416	26,416	290,576
2008	20,270	20,270	20,270	20,270	20,270	20,270	20,270	20,270	20,270	20,270	0	202,700
2009	13,727	13,727	13,727	13,727	13,727	13,727	13,727	13,727	13,727	0	0	123,543
2010	14,280	14,280	14,280	14,280	14,280	14,280	14,280	14,280	0	0	0	114,240
2011	14,355	14,355	14,355	14,355	14,355	14,355	14,355	0	0	0	0	100,485
2012	12,116	12,116	12,116	12,116	12,116	12,116	0	0	0	0	0	72,696
2013	13,826	13,826	13,826	13,826	13,826	0	0	0	0	0	0	69,130
2014	17,668	17,668	17,668	17,668	0	0	0	0	0	0	0	70,672
2015	20,904	20,904	20,904	0	0	0	0	0	0	0	0	62,712
Total	153,562	153,562	153,562	132,658	114,990	101,164	89,048	74,693	60,413	46,686	26,416	1,106,754

Notes: The table contains the number of observations in our sample by entry year and experience years. *Own elaboration from the CSWH.*

### 2.3.2. Empirical specification

Our main goal is to analyse the impact of the economic conditions faced by new entrants on wages and employment, as well as paying attention to its evolution over time. As a proxy for economic

<sup>9</sup> The data provided by Eurostat show that the average birth rate for mothers between 16 and 30 years does not reach 10% during the period 2010-2016.

conditions, we use the unemployment rate at the regional level during the period analysed. Following Oreopoulos et al. (2012), we exploit variation in the rate of unemployment at the regional level over the period 2007-2017. Since the rate of unemployment varies across regions and cohorts, individual level data were collapsed by entry cohort ( $c$ ), entry region ( $r$ ) and calendar year ( $t$ ), and we work with group-specific means of the variables, weighted by the corresponding cell sizes.

Yet, workers' professional career is affected not only by initial economic conditions, but also by economic conditions in every moment. Then, as in Oreopoulos et al. (2012), we estimate a dynamic model that controls not only for the initial regional unemployment rate, but also for regional unemployment rates faced by the cohort throughout their professional career. This allows us to distinguish between the effect of entry conditions into the labour market and the impact of labour market conditions during their professional career. The dynamic model can be written as follows (Oreopoulos et al. 2012):

$$\bar{y}_{crt} = \alpha + \beta_0 * Exp_0 * UR_{cr}^0 + \beta_1 * Exp_1 * UR_{re=1} + \beta_2 * Exp_2 * UR_{re=2} + \dots + \beta_{10} * Exp_{10} * UR_{re=10} + \delta_e + \rho_c + \theta_r + \gamma_t + e_{crt} \quad (1)$$

where  $\bar{y}_{crt}$  is the group-specific mean of our outcome variables (annual labour income, monthly wages, days worked and probability of employment) for entry cohort ( $c$ ) in entry region ( $r$ ) in calendar year ( $t$ );  $Exp_e$  is a dummy variable that takes value 1 if the cohort experience in a given year is equal to  $e$ .  $UR_{cr}^0$  is the regional unemployment rate faced by the entry cohort  $c$  when entering the labour market in region  $r$ ;  $UR_{re}$  denotes the regional unemployment rate to which a cohort was exposed in each year of experience ( $e$ ) in the corresponding region ( $r_e$ ). Once the data were collapsed, we have 1,071 cells.

Fixed effects related to potential experience  $\delta_e$ , entry cohort  $\rho_c$ , entry region  $\theta_r$ , and calendar year  $\gamma_t$  are also included in the empirical specification. Potential experience fixed effects  $\delta_e$  capture time-invariant differences among all cohorts with the same amount of (potential) work experience. Entry cohort fixed effects  $\rho_c$  capture time-invariant differences between the characteristics of the different entry cohorts. Calendar year fixed effects  $\gamma_t$  capture the component of regional business cycle variation that is common to all regions. Entry region fixed effects  $\theta_r$ , capture time-invariant differences across regions. Finally,  $\alpha$  is the constant term and  $e_{crt}$  is the error term.

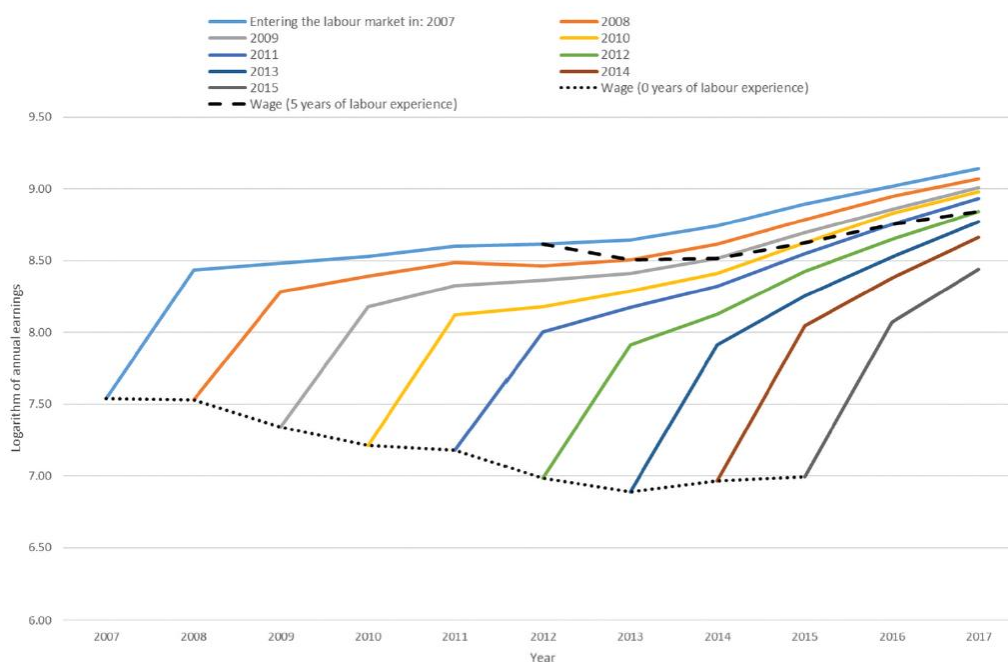
Our coefficients of interest are  $\beta_0, \beta_1, \beta_2, \beta_3, \dots, \beta_{10}$ , which capture changes in experience profiles on wages and employment that are attributable to entering the labour market during an economic crisis or during periods of economic growth, net of the effect of the future sequence of unemployment rates (that are correlated with the initial conditions). The model is estimated using

Weighted Least Squares (WLS) where weights are group sizes. To account for group specific error-components, we cluster standard errors at the entry cohort-region (*cr*) level.<sup>10</sup>

## 2.4. Results

Before presenting our results, we show descriptive evidence of the labour market experiences of different entry cohorts. Figure 1 plots the evolution of annual earnings (in logarithms) of entry cohorts (2007-2015) during the 2007-2017 period. For each entry cohort, each line represents the evolution of the average annual wages as they gain professional experience. Thus, according to the dotted black line, we observe that between 2008 and 2013 wages in the entry year decreased, showing that those entering during a business cycle slump tend to receive lower entry earnings than their peers entering during the recovery. In fact, a slight recuperation is observed in 2014-2015. However, with five years of experience (dashed black line in the figure), the initial gap reduces, suggesting a convergence in cohorts wages (Annex 1 in Supplementary Material 1 shows this figure by educational level).

**Figure 1: Annual labour income experience profile by entry year into labour market.**



Notes: The figure shows graphical evidence on the evolution of the logarithm of annual income by entry cohort and (potential) working experience. In particular, the dotted black line represents the average entry wages into the labour market over the period 2007-2015. Additionally, each colour line represents the evolution of the average annual wages of each entry cohorts as they gain professional experience. As we noted in the text, cohorts entering the labour market in 2007 or 2008 have greater entry income than those

<sup>10</sup> As highlighted by (Angrist and Pischke, 2008, pp. 318-319), this is the simplest and most widely used way of addressing serial correlation in studies using group-structured panel data.

who begin their professional career in the crisis. However, the initial wage gap reduces over time. Specifically, the dashed black line represents the average wages by entry year when cohorts accumulate 5 years of potential experience. This evidence finally shows that there is a convergence among all cohorts. *Own elaboration from the CSWH.*

#### 2.4.1. The impact of entry economic conditions on wages

Table 3 displays the results of estimating equation (1) for the whole sample and by educational level. In terms of annual earnings, our estimations show a negative and persistent effect over time on wages of an increase in the unemployment rate, as shown in Panel A of Table 3. For all young workers (Column 1), a one percentage point increase in the unemployment rate at the time of entry leads to an initial wage penalty of 0.9%. This negative effect is quite stable afterwards, increasing to 1.2% after nine years and to 1.7% after ten years. Taking into account that the unemployment rate raised by 10% in less than three years, entry wages reduced by 9% for cohorts entering the labour market during 2007-2009.

Yet, this scarring effect differs by levels of education. We distinguish six education groups: (a) less than primary education; (b) primary education; (c) compulsory secondary education; (d) vocational training; (e) post-compulsory secondary education and (e) university education. The effect of an increase in the regional rate of unemployment is non-significant for workers with vocational training or lower education, as shown in Columns (2) to (5). Only in the case of workers with primary education (Column 3), a negative and significant effect comes up after 3-6 years of experience in the labour market.

On the contrary, the impact for cohorts with post-compulsory secondary and university education is larger. At the beginning of their professional career, cohorts with post-compulsory secondary education are not affected in terms of wages, but in the fifth year, a negative effect of 1.1% appears and it increases to 2.4% after ten years (Column 6). Young workers with university degree exhibit more pronounced impacts, as shown in Column (7), throughout the entire analysed period. Following a 1 percentage point increase in the regional rate of unemployment, their entry wages fall by 2.1% and the effect is above 1.5% during the following years reaching 2.8% after 9 years.

Our findings are largely consistent with those found in Belgium (Cockx and Ghirelli, 2016) and in France (Gaini et al., 2012). In particular, results found for low-skilled workers may be explained by the existence of a statutory minimum wage that affects mainly young cohorts with lower qualifications. Thus, our hypothesis is that less-educated cohorts were not significantly affected by the crisis in terms of wages because their earnings were already low and close to the legal minimum wage. Additionally, the rigid system of collective bargaining in Spain is considered partly responsible for the delay in wage adjustment during the recession. In this sense,

during 2009, employment decreased by 1.36 million workers while wages increased by 3.6%<sup>11</sup>. Therefore, it is likely that the adjustment to the recession has taken place largely via employment rather than through wage moderation, and less-skilled young workers were particularly affected.

In the case of high-qualified cohorts, the wage penalty is relatively large and persists over time. Our hypothesis is that, under poor economic conditions, this group of workers has an alternative to unemployment (unlike those with lower education), which is over-qualification. Instead of being unemployed, they can accept low-qualified jobs, under temporary contracts or offering few opportunities of promotion. Then, this would be reflected in a negative and significant effect in terms of earnings. Moreover, the fact that this wage penalty persists over time is consistent with the possibility that after obtaining a lower quality job, due to low labour market mobility, high-skilled young workers may find it difficult to make their way to better quality jobs.

**Table 3: Effect of one pp rise in contemporaneous unemployment rate on annual income and monthly wage, by level of education**

*Panel A: Impact of one pp rise in unemployment rate on annual income*

	All workers (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post-compulsory education (6)	University education (7)
0	-0.009*** (0.003)	-0.007 (0.006)	-0.006 (0.006)	-0.004 (0.006)	-0.002 (0.004)	-0.007 (0.007)	-0.021*** (0.005)
1	-0.005 (0.003)	0.001 (0.006)	-0.002 (0.006)	-0.002 (0.005)	0.002 (0.004)	-0.003 (0.008)	-0.015*** (0.004)
2	-0.008*** (0.003)	-0.003 (0.006)	-0.005 (0.005)	-0.008* (0.005)	0.000 (0.003)	-0.005 (0.007)	-0.016*** (0.004)
3	-0.009*** (0.003)	-0.003 (0.006)	-0.009* (0.005)	-0.006 (0.005)	-0.001 (0.003)	-0.009 (0.007)	-0.017*** (0.004)
4	-0.011*** (0.003)	-0.003 (0.006)	-0.011** (0.005)	-0.009* (0.005)	-0.002 (0.003)	-0.011* (0.006)	-0.018*** (0.004)
5	-0.010*** (0.003)	-0.001 (0.006)	-0.009* (0.005)	-0.001 (0.005)	-0.003 (0.003)	-0.012* (0.006)	-0.018*** (0.004)
6	-0.010*** (0.003)	-0.003 (0.005)	-0.011** (0.005)	-0.002 (0.005)	-0.004 (0.003)	-0.010 (0.006)	-0.018*** (0.004)
7	-0.010*** (0.003)	-0.004 (0.006)	-0.008 (0.006)	0.003 (0.006)	-0.004 (0.003)	-0.012* (0.007)	-0.018*** (0.005)
8	-0.010*** (0.004)	-0.003 (0.006)	-0.007 (0.005)	0.006 (0.008)	-0.002 (0.004)	-0.013* (0.007)	-0.021*** (0.005)
9	-0.012*** (0.004)	0.000 (0.005)	-0.010 (0.006)	0.005 (0.007)	-0.004 (0.004)	-0.018** (0.009)	-0.023*** (0.005)
10	-0.017*** (0.004)	0.002 (0.005)	-0.010* (0.006)	-0.009 (0.006)	-0.002 (0.004)	-0.024* (0.013)	-0.028*** (0.006)
Constant	8.204*** (0.034)	8.316*** (0.078)	8.282*** (0.080)	8.164*** (0.059)	8.086*** (0.051)	8.052*** (0.075)	8.405*** (0.056)
Observations	1,071	1,054	1,069	1,071	1,069	1,068	1,071
R-squared	0.985	0.884	0.851	0.934	0.943	0.904	0.970

<sup>11</sup> According to the Annual Survey on Labour Costs. However, we should consider the existence of a composition effect because job destruction affected mainly low-paid jobs.

**Panel B: Impact of one pp rise in unemployment rate on monthly wage**

	All workers (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	-0.001 (0.001)	0.002 (0.002)	0.001 (0.002)	0.000 (0.002)	0.001 (0.002)	-0.001 (0.002)	-0.005** (0.002)
1	-0.000 (0.001)	0.002 (0.002)	0.000 (0.002)	-0.001 (0.001)	0.001 (0.001)	-0.000 (0.002)	-0.004* (0.002)
2	-0.001 (0.001)	0.003* (0.002)	0.001 (0.002)	-0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.005** (0.002)
3	-0.002** (0.001)	0.004** (0.002)	0.001 (0.002)	-0.001 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.005*** (0.002)
4	-0.002** (0.001)	0.005*** (0.002)	-0.000 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.005*** (0.002)
5	-0.002** (0.001)	0.005** (0.002)	-0.000 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.005*** (0.002)
6	-0.003*** (0.001)	0.004** (0.002)	-0.001 (0.002)	-0.001 (0.001)	-0.002 (0.001)	-0.003** (0.001)	-0.006*** (0.002)
7	-0.004*** (0.001)	0.003* (0.002)	-0.001 (0.002)	-0.002* (0.001)	-0.002 (0.001)	-0.004*** (0.002)	-0.006*** (0.002)
8	-0.004*** (0.001)	0.004** (0.002)	-0.001 (0.002)	-0.002 (0.001)	-0.001 (0.002)	-0.004** (0.002)	-0.007*** (0.002)
9	-0.005*** (0.001)	0.003 (0.002)	-0.001 (0.002)	-0.003* (0.001)	-0.001 (0.002)	-0.007*** (0.002)	-0.009*** (0.002)
10	-0.007*** (0.001)	0.003 (0.002)	-0.003 (0.003)	-0.003** (0.002)	-0.001 (0.002)	-0.009*** (0.002)	-0.012*** (0.003)
Constant	7.027*** (0.013)	6.999*** (0.022)	6.995*** (0.025)	6.978*** (0.022)	6.970*** (0.017)	7.009*** (0.024)	7.221*** (0.026)
Observations	1,071	1,071	1,071	1,071	1,071	1,071	1,071
R-squared	0.952	0.681	0.753	0.866	0.871	0.825	0.910

Robust standard errors in parentheses \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Panel B of Table 3 displays the results using monthly wages as the dependent variable. Results are qualitative similar to those found using annual earnings. Again, the most affected cohorts by an increase in the rate of unemployment are those with a university degree, as shown in Column 7. Specifically, an increase by 1 percentage point in the regional rate of unemployment at the beginning of their career, leads to a reduction in initial wages by 0.5%, and this effect lasts for almost the entire period. After 10 years accumulating experience, the negative effect is above 1%. Cohorts with a post-compulsory secondary education are not affected initially in terms of monthly wages, but they are in the medium- and long-run (Column 6).<sup>12</sup>

All in all, the evidence shows that entering a tough labour market negatively affects new entrants' wages both in the short and in the long term, although this penalty varies across workers' qualifications. Moreover, in the presence of downward wage rigidities, due to the existence of a legal minimum wage and/or a rigid system of wage determination, it is likely that many young

<sup>12</sup> The equality of coefficients between regressions has been tested (Wald's Test) and the null hypothesis is rejected, that is, the coefficients are statistically different (see Annex 2 in Supplementary Material 1).

individuals may not even manage to access the labour market. This suggests the existence of an impact not only in terms of wages, but also in terms of employment. We address this issue in the next Section.

#### 2.4.2. The impact of entry economic conditions on employment

As pointed out in Section 2.3., at the beginning of the crisis, the number of new entrants in our sample into the labour market fell sharply. In particular, between 2008 and 2009 the number of new workers fell by 34%, but even fell by 25% between 2011 and 2012. Furthermore, if we compare the number of entrants in 2007 with those who entered in 2012 to the Spanish labour market, we see a serious fall by 48%. Therefore, the first impact of the crisis is the complicated access to the labour market of the younger generations. Many of those searching for a job for the first time did not succeed, even in low-quality jobs. Thus, entering the labour market seems to have been blocked for young workers, especially for the least qualified. For this group, the size of the cohort entering in 2012 is 62% lower than that of those entering in 2007.<sup>13</sup>

In the case of low-qualified workers, an alternative to unemployment is returning to the educational system. Traditionally, Spain has had one of the highest early school dropout rates in the context of the European Union. According to Eurostat, it exceeded 30% until 2009. From this year on, we can observe a downward tendency and the dropout rate fell to 18.3% in 2017. Although we cannot conclude that this results from the lack of opportunities due to the economic crisis, it has probably played a role. According to Guio et al. (2018), the persistence of the recession may have had a significant impact on the perceptions of the youth, changing their expectations towards education. Unfortunately, our data do not allow us to analyse if those low-qualified workers not entering the labour market stayed -or returned- to the educational system.

Second step in the analysis of employment effects is to investigate what happened to those who entered the labour market during the crisis. In Table 4, we present the results of estimating the effects of an increase in regional unemployment using as dependent variables two different indicators of employment: the number of days worked during the year and the probability of working for six or more months a year. In any case, we should take into account that the interpretation of the results is conditioned by the impact of the limited entry into the labour market discussed above. That is to say, we expect smaller employment effects for those who succeed in

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<sup>13</sup> This is in line with Sutton (2013), who find a higher probability of making the transition from employment to unemployment and a lower probability of moving from unemployment to employment during a recession. Xu and Couch (2017), instead, find that younger workers are more likely to move from unemployment to employment in US during the Great Recession.

entering the labour market, given that half of the new cohorts in 2009-2012 did not even manage to enter the labour market.

Panel A of Table 4 displays results of estimating Equation (1) using the number of days worked as the dependent variable. The evidence for all cohorts (Column 1) shows an initial negative impact of 1.7% on the number of days worked following an increase by one percentage points in the regional rate of unemployment at the time of entry. This negative effect decreases to 0.9 after six years of experience and becomes non-significant the following two years. However, when we perform the estimation by levels of education, we observe that the effect is concentrated mainly on those with higher qualifications. Again, we fail to find a significant effect for young workers with primary education (Column 3) or vocational training (Column 5). In the case of individuals with compulsory secondary (Column 4) and post-compulsory secondary education (Column 6) there is a negative effect that disappears after five years of experience. Finally, for workers with a university degree, the effect is negative and persistent. In particular, a one percentage point increase in the unemployment rate decreases the number of days worked by 3.6 during the first year of experience. The effect is between 2.4 and 2.9 for the following 10 years.

Similar results are found for the probability of working for at least six months in a year. Only a negative and significant effect is found in the case of workers with university degree.<sup>14 15</sup>

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<sup>14</sup> The equality of coefficients between regressions has been tested (Wald's Test) and the null hypothesis is rejected, that is, the coefficients are statistically different (see Annex 2 in Supplementary Material 1).

<sup>15</sup> In Annex 3 of Supplementary Material 1, we carry out the analysis by age groups and we observe that the youngest people are the most affected in the short and long run in terms of income and employment by an increase in unemployment. In Annex 4 of Supplementary Material 1, we carry out the analysis by entry cohorts and educational level. We observe that the cohorts entering the labour market previously the crisis are the most affected in terms of income and employment by an increase in unemployment. By gender, we find that a negative effect in the short and long term on the most qualified women in terms of earnings and employment. Men, on the other hand, are negatively affected in terms of earnings and employment, both the most qualified and those with less educational attainment (see Annex 5 of Supplementary Material 1).



**Table 4: Effect of one pp rise in cotemporaneous unemployment rate on worked days and employment probability, by level of education**

*Panel A: Impact of one pp rise in unemployment rate on worked days*

	All workers (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	-1.702*** (0.517)	-2.035* (1.175)	-0.817 (0.973)	-2.196*** (0.631)	-0.388 (0.563)	-1.307* (0.741)	-3.640*** (0.677)
1	-1.212** (0.538)	-1.741 (1.175)	-0.133 (0.992)	-1.984*** (0.686)	0.104 (0.544)	-1.234* (0.709)	-2.443*** (0.623)
2	-1.561*** (0.516)	-1.630 (1.163)	-0.158 (0.928)	-2.194*** (0.664)	-0.164 (0.547)	-1.630** (0.751)	-2.904*** (0.616)
3	-1.317*** (0.484)	-1.037 (1.096)	0.249 (0.882)	-1.699*** (0.637)	-0.109 (0.548)	-1.392* (0.739)	-2.727*** (0.609)
4	-1.080** (0.451)	-0.586 (1.020)	0.457 (0.880)	-0.993 (0.624)	0.266 (0.525)	-0.979 (0.689)	-2.703*** (0.606)
5	-1.120** (0.470)	-0.733 (1.034)	0.107 (0.954)	-0.635 (0.603)	0.339 (0.537)	-1.100 (0.724)	-2.568*** (0.594)
6	-0.955* (0.497)	-0.152 (1.092)	0.454 (1.012)	-0.635 (0.572)	0.495 (0.518)	-0.826 (0.779)	-2.379*** (0.582)
7	-0.790 (0.521)	0.218 (1.195)	0.604 (1.037)	-0.281 (0.628)	0.742 (0.535)	-0.456 (0.715)	-2.340*** (0.605)
8	-0.663 (0.545)	0.356 (1.282)	1.411 (0.981)	-0.314 (0.700)	1.087* (0.634)	0.039 (0.785)	-2.491*** (0.720)
9	-0.931* (0.531)	0.212 (1.214)	0.994 (1.135)	-0.606 (0.767)	1.244 (0.793)	-0.880 (0.986)	-2.789*** (0.777)
10	-1.208** (0.554)	0.311 (1.163)	0.514 (1.270)	-1.262 (0.971)	1.277 (0.867)	-1.361 (1.036)	-2.678** (1.071)
Constant	133.395*** (6.298)	188.323*** (15.402)	156.229*** (14.146)	148.353*** (9.417)	113.551*** (6.337)	117.390*** (9.148)	119.549*** (7.932)
Observations	1,071	1,064	1,070	1,071	1,070	1,070	1,071
R-squared	0.935	0.691	0.623	0.849	0.907	0.842	0.941

Robust standard errors in parentheses \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

**Panel B: Impact of one pp rise in unemployment rate on employment probability 6 months**

	All workers (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	0.002 (0.002)	0.002 (0.003)	0.003 (0.003)	-0.000 (0.003)	0.006*** (0.002)	0.001 (0.003)	-0.005*** (0.002)
1	0.000 (0.002)	-0.000 (0.003)	0.000 (0.002)	-0.003 (0.003)	0.005** (0.002)	-0.001 (0.002)	-0.003* (0.002)
2	0.000 (0.001)	-0.000 (0.003)	0.001 (0.002)	-0.002 (0.003)	0.005** (0.002)	-0.000 (0.002)	-0.004** (0.002)
3	-0.000 (0.001)	0.001 (0.003)	0.001 (0.002)	-0.001 (0.003)	0.004** (0.002)	-0.001 (0.002)	-0.004** (0.002)
4	-0.000 (0.001)	0.002 (0.003)	0.001 (0.002)	0.000 (0.003)	0.004* (0.002)	-0.002 (0.002)	-0.005** (0.002)
5	-0.000 (0.001)	0.002 (0.003)	0.001 (0.002)	0.002 (0.003)	0.004** (0.002)	-0.001 (0.002)	-0.005** (0.002)
6	0.000 (0.002)	0.002 (0.003)	0.001 (0.002)	0.002 (0.003)	0.005** (0.002)	-0.001 (0.002)	-0.004** (0.002)
7	0.000 (0.002)	0.002 (0.003)	0.002 (0.002)	0.003 (0.003)	0.005** (0.002)	-0.000 (0.002)	-0.004** (0.002)
8	0.002 (0.002)	0.005 (0.003)	0.004* (0.003)	0.006* (0.003)	0.007*** (0.003)	0.003 (0.003)	-0.005* (0.002)
9	0.001 (0.002)	0.004 (0.003)	0.006* (0.003)	0.006 (0.004)	0.007** (0.003)	0.000 (0.003)	-0.006** (0.003)
10	0.002 (0.002)	0.006** (0.003)	0.006** (0.003)	0.007 (0.004)	0.008** (0.003)	-0.000 (0.004)	-0.005* (0.003)
Constant	0.145*** (0.019)	0.206*** (0.031)	0.186*** (0.034)	0.199*** (0.035)	0.078*** (0.025)	0.147*** (0.028)	0.173*** (0.024)
Observations	1,071	1,071	1,071	1,071	1,071	1,071	1,071
R-squared	0.955	0.736	0.702	0.870	0.910	0.867	0.949

Robust standard errors in parentheses \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

## 2.5. Conclusions

In this second chapter, we examine the effects of entering the labour market during the Great Recession on the professional career of young workers in Spain. Using the CSWH, we can identify a representative sample of young individuals who enter the labour market for the first time between 2007 and 2015 and follow their work trajectories until 2017. This period covers one of the deepest recessions and the subsequent economic recovery. After 2008, there is a dramatic increase in the rates of unemployment that particularly affected young workers, especially those low-skilled.

Our results show that entering the labour market during the economic downturn has had long-term consequences on youth careers in terms of wages and employment (*Hypothesis 1 and 2*), and these effects differ by educational level (*Hypothesis 3*). While we find a persistent wage penalty for high-skilled individuals, less-educated cohorts are not significantly affected via

wages. Similar findings have been documented in France (Gaini et al., 2012) and in Belgium (Cockx and Ghirelli, 2016). These authors attributed them to the existence of a legal minimum wage which may act as a floor for entry-level wages and affects mainly low-skilled young workers. Moreover, in the presence of downward wage rigidities, adjustment to adverse economic conditions is likely to take place mainly via redundancies rather than via wage cuts (Bentolila et al., 2012). As a consequence, many individuals, especially those with lower qualifications, are more likely to face a barrier that prevents them from entering the labour market, even to precarious jobs. Therefore, lack of opportunities causes a delay in entering the labour market. If this delay encourages young individuals to stay in the educational system, this may represent an opportunity for better prospects in the future. Unfortunately, answering this question is not possible with the data used in this chapter so more research that addresses this topic is needed.

Conversely, high-skilled workers suffer a great wage penalty that persists during most of their observed professional career. In particular, their lifetime earnings loss is around 22% after 10 years. It is likely that workers with high levels of education end up accepting low-qualified jobs and displacing those with low levels of education. These jobs, which usually entail lower wages and fewer opportunities of training and promotion, lead to long-term effects in labour careers. As Fernández-Kranz and Rodríguez-Planas (2018) argue, in a segmented labour market, like the Spanish case, more educated workers may be trapped in the secondary sector, finding it difficult to make it to the primary sector, characterized by higher wages and better working conditions. According to human capital theory, starting low-quality jobs in times of recession means fewer options for human capital accumulation. In this way, wage losses persist over time.

In sum, our results document that entering the labour market under tough economic conditions has severe consequences on the labour market outcomes of the youngest cohorts. Moreover, employment prospects for the lowest skilled individuals were particularly harmed and, despite the economic recovery, youth unemployment rates are still too high. Furthermore, many young individuals are employed in precarious jobs, which do not only entail low current earnings, but also lower human capital accumulation and less chances of accessing better quality jobs. The temporary employment rate in Spain is remarkably high among young workers, exceeding a 70% share since 2015. Thus, more research is needed to find out to what extent temporality is responsible for the long-term effects of the recession experienced by the younger population group because there is a high frequency of these workers working under this type of contract.

It is essential to generate an employment policy aimed specifically at young people, with the objective of improving their personal, social, and labour development. This means that policy makers should carry out policies aimed at ensuring that society and the labour market are capable of responding to these problems, which will also be reflected in a better personal and work situation of the young population. Concretely, more specific labour market policies are needed to

improve the precarious situation of the youth, not only in terms of employment but also in terms of career prospects. The evidence obtained in this chapter on the young population highlights the importance of carrying out an employment policy in a broad sense, capable of responding to the problems and needs of youth in their transition from the educational stage to the workplace and access to a first job, especially in a context in which young people have suffered the greatest consequences of the economic crisis and face significant uncertainties and challenges. This implies adopting measures aimed at tackling the problems faced by young people in the field of the labour market such as education and training policies to provide youth the qualifications and competencies necessary for their professional career and employment policy, which will be especially important for less qualified workers.

This situation is even more important in the current context and the one that may come in the near future due to the new economic and social crisis as a consequence of COVID-19, which will make it necessary to reflect and carry out new measures in order to face the unemployment situation of many working people. Once again, the youth population will once again be one of the groups most affected by the loss of employment or the greatest difficulty in accessing the labour market without ignoring, in the shortest term, the problems that social protection systems may have at the time to attend them.

## CAPÍTULO 3: LABOUR MARKET OUTCOMES OF IMMIGRANT-NATIVE ENTRANTS FACING A RECESSION

### 3.1. Introduction

The labour market insertion of immigrants is a topic of great interest as it favours both economic and social integration of individuals in the host country. Thus, a wide literature analyses the assimilation of immigrants in the labour market, its effects on the native population both in terms of earnings and employment, and the differences among both groups (Izquierdo et al., 2009; Peri, 2014; Edo, 2016).

Economic conditions may affect salary and employment of natives and immigrants differently widening the gap between both groups. In fact, several authors suggest that immigrants, compared to natives, are particularly sensitive to business cycles, especially in times of economic downturns (Xu, 2018; Orrenius and Zavodni, 2010). This sensitivity to cyclical fluctuations translates mainly into job losses. Immigrants tend to be employed in sectors linked to large cyclical fluctuations and the widespread practice of last-in-first-out principles. Hence, immigrants usually are the first to be laid off during an economic crisis (Bratsberg et al., 2018).

However, not only are immigrants particularly sensitive to recessions but also young participants in the labour market bear the brunt of the effects of economic downturns. In general, young workers usually hold temporary contracts and low-paid jobs concentrated mainly in sectors such as manufacturing, construction and services (OECD, 2009). One of the most direct impacts of an economic crisis is the worsening of the quantity and the quality of jobs, which may lead to the depreciation of skills and lower earnings for young people (Marcus and Gavrilovic, 2010). Moreover, tough economic conditions create significant difficulties for new entrants into the labour market because of limited job vacancies (Marcus and Gavrilovic, 2010). As a consequence, making a successful school-to-work transition becomes increasingly difficult.

The Great Recession ended a period of economic growth and hit the labour markets hard in many countries, causing a rapid deterioration of working conditions, an increase in unemployment rates and a decrease in migration dynamics (OECD, 2009). Consequently, a large set of studies that focus on the impact of this last economic crisis on the patterns of immigrant insertion into the labour market (Tilly, 2011; Fellini, 2018), suggest an overall slowdown of migratory inflows and a significant increase of unemployment risk.

One of the countries where immigrant population was deeply hit by the crisis in Europe was Spain. During the years of economic expansion, Spain led the European immigration ranking

(Domínguez-Mujica et al., 2014) because of job opportunities for immigrants in employment niches at the secondary sector, which required low qualifications (Sanromá et al., 2009; Gonzalez and Ortega, 2010; Stanek and Veira-Ramos, 2012). Data provided by Eurostat show that the inflow of immigrants increased by 164% between 2000 and 2007.

Nevertheless, employment opportunities were drastically reduced by the Great Recession, hence the influx of immigrants to Spain suffered negative growth rates of around 34%-36% in the first two years of the crisis. Consequently, there was a slump in both participation and employment of this population group, especially on precarious and unstable jobs in the construction and service industries (see Carrasco et al., 2019; Bentolila et al., 2012a, Bernardi et al., 2011; Papademetriou and Terrazas, 2009). According to the Spanish National Institute of Statistics (INE), the immigrant unemployment rate raised steadily since 2007, exceeding 35% in 2013. Despite being also high, the unemployment rate of natives in 2013 was around 25%.

The Spanish case also turns out to be of great interest because the effect of the Great Recession has been particularly significant among the youngest workers (Bentolila et al, 2012a; Dolado et al., 2013; Malo and Moreno, 2018). Youth unemployment rates were above 40%-50% during the crisis and continued to be high when the economy started to recover. Together with a greater vulnerability to unemployment, this group is characterized by having precarious working conditions i.e. a high temporary employment rate and part-time employment, which translates into job turnover and lower earnings.

Although there is evidence of the short-term impact of a recession on the immigrant population and its differences with natives, little is known about the long-term effects. The objective of this third chapter is to analyse to what extent the Great Recession affected earnings and employment of young foreign workers who entered the Spanish labour market during the period 2007-2015 and its persistence over time.

Our evidence shows substantial differences between natives and immigrants. First, immigrants have higher difficulties entering the labour market. Second, natives are more negatively affected in the short- and long-term in terms of wages and employment than immigrants, possibly because the entry of the latter is more blocked and those who enter are more self-selected. By educational levels, our results show that the higher the educational level, the greater the negative impact of the crisis in terms of employment and wages.

The rest of this chapter is organized as follows. Section 3.2. summarizes the literature review. Section 3.3. describes the data. Section 3.4. describes the empirical strategy. Section 3.5. presents the results. Section 3.6. presents a discussion of results and Section 3.7. concludes.

### 3.2. Literature Review

Economic conditions can affect labour market outcomes of natives and non-natives in a different way. In terms of employment, evidence shows that immigrants are particularly affected by job loss during a recession because of their great sensitiveness to business cycles (see Bratsberg et al., 2018; Dustmann et al., 2010; Carrasco and García-Pérez, 2015).

The analysis of Orrenius and Zavodny (2010) about employment and unemployment rates over the past 15 years in U.S. reveals that immigrants' labour market outcomes are more cyclical than those of natives. Also, for US, Hoynes et al. (2012) find that the impacts of the Great Recession have been felt most strongly by immigrants, young and low-educated workers. They find that an increase of 1 percentage point in the state unemployment rate leads to almost a one-and-a-half-point decrease in the employment rate for immigrant workers. In the case of Spain, Motellón and López-Bazo (2015) show that the rate of job loss for immigrant males in the first quarter of 2012 was around 23.2% while that for natives was 9.5%.

In terms of earnings, there is also evidence of differences in the sensitivity of income to the business cycle between immigrant and native workers. Barth et al. (2006) examine the relationship between local labour market conditions and the earnings of immigrants and natives in the U.S. and find that immigrants' hourly earnings are more sensitive than natives' earnings to changes in state-level unemployment rates. A similar pattern has been found in Norway (Barth et al., 2004).

This greater vulnerability of immigrants during an economic downturn is explained by the differences between immigrant and native-born populations in terms of human capital, age, the sectors where they are employed and the type of jobs they hold (Xu, 2018).

First, as Kalleberg (2011) points out, the educational level has become the great dividing line between workers performing good jobs and those performing bad jobs. In this sense, an extensive literature shows that immigrants tend to accumulate less human capital than natives, pushing them to the bottom of the job ladder (Hoynes et al. 2012; Orrenius and Zavodny 2010; Fromentin, 2016; Rodríguez-Planas and Nollenberger, 2016). As Papademetriou and Terrazas (2009) suggest, employers are more willing to shed employees with low marginal productivity or with little specialized training. Workers with higher educational attainment, instead, may move down the skill ladder, displacing less skilled workers (Papademetriou and Terrazas, 2009; Devereux, 2004). Therefore, low-educated workers are more vulnerable to structural changes than more educated ones (Bratsberg et al., 2018).

Second, immigrants are overrepresented in sectors vulnerable to the business cycle, such as construction, manufacturing and services (OECD, 2009, McKenzie, 2008). These sectors have been severely affected by the economic crisis causing great job losses.<sup>16</sup>

Third, there is a high concentration of immigrants in *atypical* jobs, understood as temporary or part-time jobs (Fernández and Ortega, 2008; European Commission, 2011), and higher shares of fixed-term contracts are typically associated to larger inflows into unemployment (see Dolado et al., 2002).

Fourth, there is an overrepresentation of young immigrants<sup>17</sup> in the labour market relative to total immigrants (McKenzie, 2008). Young workers constitute one of the most vulnerable groups to an economic slowdown, suffering a greater probability of losing their jobs (Marcus and Gavrilovic, 2010; European Commission, 2011). The results of Hoynes et al. (2012) for U.S. show that cyclicality declines with age. In particular, a one percentage point increase in the state unemployment rate leads to a decrease between 1.5% and 2% in the employment rate for workers aged 16-20 years. The employment rate for individuals between 21 and 30 is reduced by 1%-1.5%.

There is evidence that the initial impact of a crisis in terms of earnings and employment of young workers persist over time. In the case of Belgium, Cockx and Ghirelli (2016) find negative effects in terms of number of hours worked and earnings that persist up to 12 years. In Chapter 2, we have examined the Spanish case and found that for low-educated individuals, the main effect is via employment, even blocking their entry into the labour market. For high-skilled individuals, we have obtained a long-term penalty in terms of wages, as well as a reduction in the days worked.

In contrast, little is known about the persistence of the effects of a crisis on the immigrant population and the difference with native peers. Aslund and Rooth (2007) analyse the Swedish immigrant cohorts who started their professional career between 1987 and 1991 and estimate the long-term effects on immigrant earnings and employment from adverse labour market conditions faced upon arrival. Based on their results, one percentage point higher unemployment decreases the chances of employment by 3-5 percentage points and lowers earnings by 13-17 percentage points during 5-7 years after immigration. Therefore, facing tough economic conditions has a clear impact on immigrant earnings and employment for at least ten years.

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<sup>16</sup> Between 2008 and 2009, employment in the construction sector fell by 24.5% in Spain.

<sup>17</sup> Annex 1 of Supplementary Material 2 shows the percentage of the population born outside of Spain in 2005 and 2020, according to their age.



In summary, facing poor labour trajectories increases the unemployment likelihood, which involves negative work and earnings scars in the long run (Gregg, 2001; Gregory and Jukes, 2001; Hansen and Lofstrom, 2001).

### 3.3. Data

#### 3.3.1. Sample and main variables

We consider all immigrants and natives aged between 16 and 30 who began their professional career between 2007 and 2015. We define as immigrants those individuals who were born abroad. The sample is selected on the basis of entry year into the labour market. Using all the available editions of the CSWH, we reconstruct the labour trajectories of workers to their last observed position in 2017.

Our final sample encompasses 853,923 employment spells. In terms of labour market participants, it includes 121,356 workers (natives and immigrants altogether), of whom about half are women (Table 5). Nearly 70% of young workers are aged between 16 and 22. By educational level, we observe that a significant proportion of workers are low educated. In fact, 41% of young workers in our sample have compulsory studies or lower, followed by 32% with vocational training or post-compulsory education. Only 26% of individuals have completed a university degree.

**Table 5: Descriptive Statistics by country of origin**

		All workers		Natives		Immigrants	
		Number of workers	%	Number of workers	%	Number of workers	%
Sex	Men	60,119	49.54	44,959	48.47	15,160	53.01
	Women	61,237	50.46	47,800	51.53	13,437	46.99
Age	16-22	83,858	69.1	70,446	75.95	13,412	46.9
	23-30	37,498	30.9	22,313	24.05	15,185	53.1
	Compulsory education	49,814	41.05	32,340	34.86	17,474	61.1
Educational attainment	Vocational or Post-Compulsory education	39,424	32.49	32,350	34.88	7,074	24.74
	High education	32,118	26.47	28,069	30.26	4,049	14.16
TOTAL		121,356	100	92,759	76.44	28,597	23.57

*Source: own elaboration from the CSWH.*

About 24% of workers in our sample were born in a foreign country. We observe differences in personal characteristics between those who were born in Spain and abroad. First, immigrants are older than native-born. Second, whereas the percentage of native-born in each educational level

is similar, the majority of immigrants are low educated (61%). About 25% of immigrants have post-compulsory studies and only 14% are highly educated.<sup>18</sup>

Our analysis focuses on three labour market outcomes related to income and employment. As a measure of workers' earnings, we use the logarithm of total annual labour income. Regarding employment outcomes, we use two different measures: the total number of days worked each year and the employment probability, defined as the probability of being working at any moment during the year.

### 3.3.2. Entry cohort as unit of observation

Our analysis is carried out using *fictitious cohorts*, understood as delimited groups whose members share the same characteristic in the same period. We define as cohort all individuals that share the same entry period into the labour market. Thus, we use entry cohort as the unit of observation. Taking into account our time span, we examine cohorts entering the labour market between 2007 and 2015, which amounts to nine different cohorts.

Descriptive statistics are displayed in Table 6. On average, native-born individuals enter the labour market for the first time at the age of 20.5 while immigrants enter, on average, at age 23.2. The proportion of males is around 50% in both cases. Regarding educational attainment, there is a similar percentage of natives in each educational level, while immigrants are concentrated in the less-educated group.

**Table 6: Descriptive statistics for natives and immigrants' cohorts**

Variable	Natives		Immigrants	
	Mean	Std. Dev.	Mean	Std. Dev.
Man	0.48	0.05	0.54	0.10
Compulsory education	0.31	0.10	0.65	0.12
Vocational or Post-Compulsory education	0.34	0.06	0.24	0.09
University education	0.35	0.11	0.12	0.07
Spanish nationality	0.99	0.00	0.14	0.12
Age of first employment	20.56	0.89	23.24	0.96
Observations	918		918	

Source: own elaboration from the CSWH.

<sup>18</sup> Annex 2 of Supplementary Material 2 shows the number of immigrant workers by country of origin, according to their age and educational level. As can be seen, most of the immigrants come from South America and European countries that do not belong to the EU15. In addition, it is observed that most of them have a low educational level.

The evolution of new entrants has changed over the different entry cohorts we analyse. Table 7 displays the size of our baseline sample by cohort (2007-2015) at the moment of entry. Although both groups were negatively affected in terms of employment following the Great Recession, there are different patterns between natives and immigrants. New entrants' cohort size of natives was drastically reduced in 2008 and 2009 and started to recover from 2013. In the case of immigrants, the number of entrants began to decrease in 2009 but to a lesser extent than natives and continued decreasing until 2013. Yet, the trend was reversed in 2013, when the number of new entries started to recover, growing by 56% between 2013 and 2014 and recovering pre-crisis level.<sup>19</sup>

Summing up, data reinforce the idea that the Great Recession caused a negative impact in terms of cohort size for natives, but these effects were short-lived. However, the negative effect on cohort size for immigrants lasted longer. Hence, this evidence on the sharp drop in new entrants' cohort size should be taken into account when interpreting the results in terms of earnings and employment.

**Table 7: Sample size for native and immigrant new entrants in Spain over the period 2007-2015**

			Cohort 2007	Cohort 2008	Cohort 2009	Cohort 2010	Cohort 2011	Cohort 2012	Cohort 2013	Cohort 2014	Cohort 2015	All Cohorts
Natives	All	n	15,394	11,149	7,285	8,127	8,600	7,391	8,823	11,651	14,339	92,759
		Growth (%)		-27.58	-34.66	11.56	5.82	-14.06	19.37	32.05	23.07	
	Compulsory education	5,423	3,770	2,399	2,732	2,962	2,502	2,920	4,109	5,523	32,340	
	Post-Compulsory education	4,792	3,498	2,306	2,751	2,909	2,659	3,191	4,458	5,786	32,350	
	University education	5,179	3,881	2,580	2,644	2,729	2,230	2,712	3,084	3,030	28,069	
Immigrants	All	n	3,076	4,109	3,654	3,420	2,989	2,173	2,131	3,321	3,726	28,597
		Growth (%)		33.58	-11.07	-6.40	-12.66	-27.25	-1.93	55.84	12.20	
	Compulsory education	1,874	2,551	2,367	2,212	1,840	1,265	1,216	1,990	2,159	17,474	
	Post-Compulsory education	787	1,045	857	767	705	556	554	815	988	7,074	
	University education	415	513	430	441	442	352	361	516	579	4,049	
All workers	All	n	18,470	15,258	10,939	11,547	11,587	9,564	10,954	14,972	18,065	121,356
		Growth (%)		-17.39	-28.31	5.56	0.35	-17.46	14.53	36.68	20.66	

Source: own elaboration from the CSWH.

<sup>19</sup> Annex 3 of Supplementary Material 2 shows graphically the number of native and immigrant entrants, by entry cohort and educational level.

### 3.4. Empirical Strategy

In this section, we describe our estimation strategy to identify the effects of labour market conditions on different labour market outcomes of natives and immigrants. More specifically, our main goal is to analyse the impact of the economic conditions faced by new entrants on earnings and employment, as well as paying attention to their evolution over time. Following Oreopoulos et al. (2012), we exploit the variation in the rate of unemployment at the regional level over the period 2007-2017 as a proxy for economic conditions.

Yet, workers' professional career is affected not only by initial economic conditions, but also by economic conditions in each moment. Then, as in Oreopoulos et al. (2012), we estimate a dynamic model that controls for the initial regional unemployment rate as well as for regional unemployment rates faced by the cohort throughout their professional career. This allows us to distinguish between the effect of entry conditions and the impact of labour market conditions during their professional career.

Since the rate of unemployment varies across regions and cohorts, individual level data were collapsed by entry cohort ( $c$ ), entry region ( $r$ ) and calendar year ( $t$ ), and we work with group-specific means of the variables, weighted by the corresponding cell sizes.<sup>20</sup> The dynamic model can be written as follows (Oreopoulos et al. 2012):

$$\bar{y}_{crt} = \alpha + \beta_1 * Exp_1 * UR_{r_{e=1}} + \beta_2 * Exp_2 * UR_{r_{e=2}} + \dots + \beta_{10} * Exp_{10} * UR_{r_{e=10}} + \delta_e + \rho_c + \theta_r + \gamma_t + e_{crt} \quad (1)$$

where  $\bar{y}_{crt}$  is the group-specific mean of our outcome variables for entry cohort ( $c$ ) in entry region ( $r$ ) in calendar year ( $t$ );  $Exp_e$  is a dummy variable that takes value 1 if the cohort experience in a given year is equal to  $e$ ;  $UR_{r_e}$  denotes the regional unemployment rate to which a cohort was exposed in each year of experience ( $e$ ) in the corresponding region ( $r_e$ ).

Fixed effects related to potential experience  $\delta_e$ , entry cohort  $\rho_c$ , entry region  $\theta_r$ , and calendar year  $\gamma_t$  are also included in the empirical specification. Potential experience fixed effects  $\delta_e$  capture time-invariant differences among all cohorts with the same amount of (potential) work experience. Entry cohort fixed effects  $\rho_c$  capture time-invariant differences between the characteristics of the different entry cohorts. Calendar year fixed effects  $\gamma_t$  capture the component of regional business cycle variation that is common to all regions. Entry region fixed effects  $\theta_r$ ,

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<sup>20</sup> When collapsing the data at the cohort-region-year level, the resulting variable referred to the employment probability is transformed from a binary variable to a proportion variable. As our dependent outcome takes values in the interval [0,1], we need to restrict  $E(y|x)$  to be in [0,1]. To do so, we estimate a fractional response regression that captures non-linear relationships, using a probit model:  $E(y|x) = \Phi(x\beta)$ .

capture time-invariant differences across regions. Finally,  $\alpha$  is the constant term and  $e_{crt}$  is a random error term.

Our coefficients of interest are  $\beta_1, \beta_2, \beta_3, \dots, \beta_{10}$ , which capture changes in experience profiles on earnings and employment that are attributable to entering the labour market during an economic crisis or during periods of economic growth, net of the effect of the future sequence of unemployment rates (that are correlated with the initial conditions). The model is estimated using Weighted Least Squares (WLS) where weights are group sizes. To account for group specific error-components, we cluster standard errors at the entry cohort-region ( $cr$ ) level.<sup>21</sup>

### 3.5. Results

Before presenting and discussing the results, we show graphical evidence on the evolution of days worked by entry cohort and potential experience accumulated over time. Since our observation unit is the cohort, each line corresponds to an entry cohort and its potential experience.

#### 3.5.1. Descriptive evidence

Figure 2 shows the average evolution of days worked by entry cohorts over time. The green line represents the evolution of days worked by entry cohorts when they gain 1 year of experience. The coloured curves capture the evolution of days worked of each entry cohort as they gain professional experience in the labour market. The black line represents the average days worked by entry cohorts when they accumulate 5 years of experience.

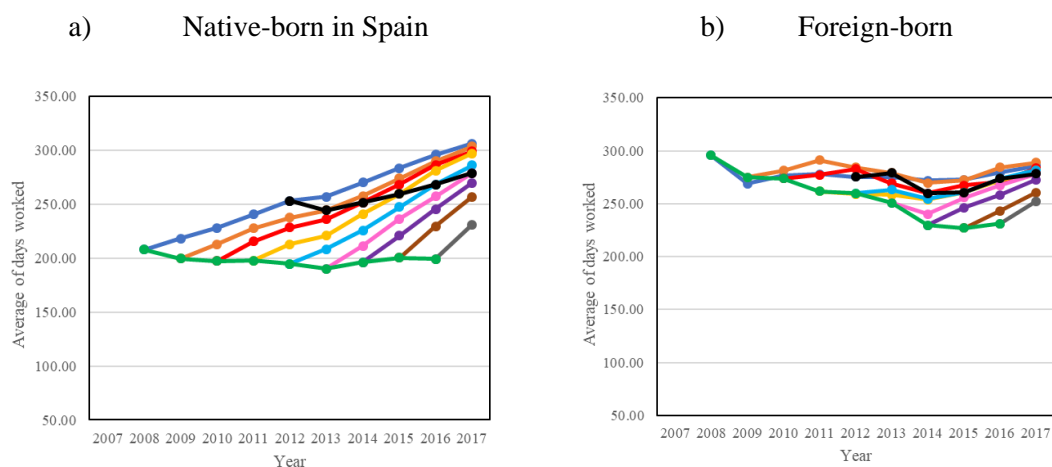
Immigrants initially work more days than natives, regardless of their entry year. On average, immigrants work 55 days more than their native peers do at the beginning of their professional career. The trend changes as cohorts accumulate experience. While the days worked by immigrants tend to fall once the crisis begins, the opposite happens in the case of natives for whom the number of days worked increase with professional experience, although at a lower rate for those facing the crisis at the moment of entry in the labor market. When cohorts accumulate 5 years of experience, the difference in the number of days worked between natives and non-natives is considerably reduced. Hence, once young natives enter the labour market, they progress in terms of employment as they accumulate experience. Immigrants, however, despite working

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<sup>21</sup> This is the simplest and most widely used way of addressing serial correlation in studies using group-structured panel data (Angrist and Pischke 2008).

more days in their early career, do not progress over time as natives, but slowdown in terms of employment. Similar evidence is found for employment probability and earnings.<sup>22</sup>

**Figure 2: Average annual days worked by entry cohorts over experience**



Note: Entry can take place in any moment of the year. Therefore, to avoid bias and consider the first full year, we exclude the first observation from the analysis. In this figure, the green line represents the evolution of days worked by entry cohorts when they gain 1 year of experience. The coloured curves capture the evolution of days worked by each cohort as they gain professional experience in the labour market. The black line represents the average days worked by entry cohorts when they accumulate 5 years of experience. *Source: Own elaboration from the CSWH.*

### 3.5.2. The long-term impact of a recession on average days worked

The estimated average marginal effects of the impact of the unemployment rate on the average days worked are displayed in Table 8. All regressions are estimated separately by natives and non-natives. Additionally, we distinguish by three educational groups: (a) Compulsory education; (b) Vocational or Post-Compulsory education; (c) University education. The coefficients presented in the table are estimates of  $\beta_1, \beta_2, \dots, \beta_{10}$  from Equation 1.

As shown in column (1), immigrants are negatively and long-term affected in terms of employment by an increase in the regional unemployment rate. When we split the sample by education, we see that this effect is mainly driven by the least qualified workers. In particular, a negative and significant impact appears when the cohorts with low education accumulate 2 years of professional experience (Column 2). The average number of days worked is reduced by 2.3 days if the unemployment rate increases by 1%. This negative effect increases and persists 9 years, reaching a drop in the number of days worked of around 4 days. Therefore, following a 1% annual increase in the unemployment rate, low-skilled immigrant cohorts would accumulate a reduction of 23.6 days worked after 9 years. This is in line with the evidence found by Aslund

<sup>22</sup> Annexes 4, 5, 6 and 7 of Supplementary Material 2 show a detail analysis for earnings.

and Rooth (2007). In contrast, we do not observe any significant effect for non-natives with medium or high education (Columns 3 and 4).

Natives, on the other hand, face an employment scar that persists over time, regardless of their educational attainment. Cohorts born in Spain as a whole work about 3 days less if the regional unemployment rate increases by 1% when they accumulate 1 year of potential experience (Column 5). This negative impact increases over potential experience, reaching losses of around 5 days after 10 years in the labour market. In other words, a rise by 8 pp in the unemployment rate translates into a loss of about 21 days worked in the first year in the labour market and of around 40 days 9 years later if the unemployment growth rate remains constant.

By educational level, we find a similar employment penalty for less qualified native cohorts as for immigrants, although slightly larger in the first years of experience. Specifically, a 1% increase in the unemployment rate means a reduction in the number of days worked by less educated cohorts with one year of potential experience of around 2.4 days (Column 6). This adverse effect in terms of employment persists throughout the professional career of cohorts and eventually becomes relatively larger for immigrants.

**Table 8: Impact of a 1-pp increase in unemployment rate on the number of days worked**

	Immigrants				Natives			
	All Immigrants	Compulsory education	Post-compulsory education	University education	All Natives	Compulsory education	Post-compulsory education	University education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	-0.924 (1.079)	-1.692 (1.340)	0.098 (1.108)	0.180 (1.239)	-2.706*** (0.562)	-2.393*** (0.663)	-2.351*** (0.595)	-3.491*** (0.797)
2	-1.49 (0.981)	-2.311* (1.204)	-0.242 (1.078)	-0.186 (1.285)	-3.057*** (0.527)	-2.643*** (0.652)	-2.723*** (0.574)	-3.626*** (0.761)
3	-1.214 (0.917)	-2.105* (1.150)	0.192 (1.059)	0.024 (1.269)	-3.053*** (0.498)	-2.241*** (0.639)	-2.939*** (0.577)	-3.738*** (0.737)
4	-1.584* (0.858)	-2.467** (1.044)	0.031 (1.127)	-0.511 (1.312)	-2.998*** (0.493)	-2.001*** (0.613)	-2.825*** (0.560)	-3.928*** (0.742)
5	-1.713* (0.964)	-2.598** (1.144)	0.347 (1.136)	-0.645 (1.247)	-3.285*** (0.516)	-2.004*** (0.667)	-3.320*** (0.564)	-4.161*** (0.746)
6	-2.215** (0.993)	-3.269*** (1.183)	-0.004 (1.126)	-0.967 (1.228)	-3.602*** (0.544)	-2.529*** (0.573)	-3.616*** (0.685)	-4.096*** (0.796)
7	-2.635** (1.181)	-3.822*** (1.411)	-0.597 (1.162)	-0.231 (1.411)	-3.834*** (0.549)	-2.719*** (0.602)	-3.559*** (0.652)	-4.357*** (0.777)
8	-2.113* (1.109)	-3.212** (1.263)	-0.272 (1.335)	-0.029 (1.497)	-4.190*** (0.616)	-2.862*** (0.683)	-3.916*** (0.635)	-4.820*** (0.900)
9	-1.909 (1.192)	-3.679*** (1.357)	0.183 (1.362)	2.466 (1.652)	-4.410*** (0.697)	-2.764*** (0.734)	-4.343*** (0.708)	-5.018*** (1.030)
10	-1.033 (1.240)	-2.282 (1.429)	0.930 (2.248)	2.390 (2.602)	-4.857*** (0.671)	-3.411*** (0.707)	-4.514*** (0.768)	-5.223*** (1.043)
Constant	331.104*** (15.759)	355.939*** (18.455)	298.320*** (19.972)	281.044*** (23.949)	235.904*** (7.542)	253.013*** (10.889)	227.724*** (8.057)	229.843*** (10.922)
Observations	915	903	878	821	918	908	918	916
R-squared	0.526	0.540	0.389	0.369	0.934	0.805	0.891	0.900

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Although we do not observe a significant effect for immigrant cohorts with post-compulsory or university studies, we find an employment scar in the case of natives, which is more severe for those highly educated. In particular, an increase in the unemployment rate by 8 pp reduces the number of days worked of cohorts with a high educational level by approximately 28 days when they accumulate 1 year of experience (Column 8). This employment penalty increases and persists over the labour history of the cohorts, reaching a decrease in the number of days worked up to 34 days after 5 years and 42 days after a decade in the labour market.

Summing up, the evidence shows uneven employment scars between native and immigrant young workers following the great Recession. Natives are negatively affected both in the short and long term, and the magnitude of this effect is larger for higher educational levels. In the case of immigrants, there is only a harmful effect in the short and long run in terms of employment for less-educated cohorts.<sup>23</sup>

### 3.5.3. The long-term impact of a recession on employment probability

Now, we focus on the results if our dependent variable is the employment probability (Table 9). The evidence found for immigrants shows a non-significant impact of an increase of the regional unemployment rate on the employment probability (Column 1). Similarly, we do not observe significant effects for those immigrants with medium or high educational level (Columns 3 and 4). However, we find a negative and significant effect at the 10 percent level in the case of low-educated immigrants (Column 2). A 1 pp increase of the unemployment rate when cohorts accumulate 1 year of experience reduces employment probability by 0.3 pp. This negative impact persists 2 years.

Compared to non-natives, the employment probability of native population is negatively affected by an increase of the unemployment rate. The employment probability of native-born as a whole decreases by 0.6 pp following a 1-pp increase of unemployment rate when cohorts accumulate 1 year of professional experience (Column 5). This negative impact increases and persists over the later labour trajectory of cohorts.

The magnitude of the employment scar differs across educational levels. The highest negative effect is found for natives with university education (Column 8). In particular, an increase by 8

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<sup>23</sup> In Annex 8 of Supplementary Material 2 we find that younger immigrant and native workers (aged 16-22) are negatively affected in the short and long term in terms of days worked. Further, our results in Annex 9 of Supplementary Material 2 suggest that those immigrants from European countries not belonging to the EU15 are negatively affected in the short and long term in terms of days worked. A negative long-term effect is also observed for those born in Africa. By gender, we find similar results as for the whole immigrants and natives (see Annex 10 of Supplementary Material 2).



pp in the unemployment rate leads to a decrease by 6.4 pp of the employment probability. This negative impact in terms of employment opportunities increases over time and lasts up to 10 years. In the case of low educated natives, an increase by 8 pp in the unemployment rate leads to a decrease by 4 pp of their employment probability (Column 6). This negative impact persists and increases over time, reaching similar levels to those faced by highly qualified workers after 8 years.

**Table 9: Average marginal effects of the impact of a 1-pp increase in unemployment rate on the employment probability**

	Immigrants				Natives			
	All Immigrants	Compulsory education	Post-compulsory education	University education	All Natives	Compulsory education	Post-compulsory education	University education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	-0.002 (0.002)	-0.003* (0.002)	0.002 (0.003)	0.000 (0.004)	-0.006*** (0.001)	-0.005*** (0.002)	-0.005*** (0.002)	-0.008*** (0.002)
2	-0.003 (0.002)	-0.003* (0.002)	0.000 (0.003)	0.002 (0.004)	-0.007*** (0.001)	-0.007*** (0.002)	-0.006*** (0.002)	-0.009*** (0.002)
3	-0.002 (0.002)	-0.003 (0.002)	0.001 (0.003)	0.003 (0.004)	-0.007*** (0.001)	-0.007*** (0.002)	-0.005*** (0.001)	-0.008*** (0.002)
4	-0.000 (0.002)	-0.000 (0.002)	0.002 (0.003)	0.003 (0.004)	-0.007*** (0.001)	-0.006*** (0.002)	-0.006*** (0.001)	-0.008*** (0.002)
5	0.000 (0.001)	-0.000 (0.002)	0.003 (0.003)	-0.000 (0.004)	-0.007*** (0.001)	-0.006*** (0.002)	-0.005*** (0.002)	-0.008*** (0.001)
6	0.000 (0.002)	-0.000 (0.002)	0.002 (0.003)	0.003 (0.005)	-0.007*** (0.001)	-0.005*** (0.002)	-0.005*** (0.002)	-0.008*** (0.001)
7	0.002 (0.002)	0.001 (0.002)	0.004 (0.003)	0.004 (0.005)	-0.007*** (0.001)	-0.006*** (0.002)	-0.005*** (0.002)	-0.008*** (0.001)
8	0.003 (0.002)	0.002 (0.002)	0.004 (0.004)	0.005 (0.006)	-0.008*** (0.001)	-0.007*** (0.002)	-0.005*** (0.002)	-0.009*** (0.002)
9	0.003 (0.002)	0.000 (0.002)	0.008 (0.005)	0.009 (0.006)	-0.009*** (0.001)	-0.009*** (0.002)	-0.005*** (0.002)	-0.010*** (0.002)
10	0.001 (0.003)	-0.003 (0.003)	0.009 (0.006)	0.009 (0.006)	-0.009*** (0.001)	-0.010*** (0.002)	-0.006*** (0.002)	-0.009*** (0.002)

Notes: Clustered and robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Regarding natives with post-compulsory education (Column 7), the negative effect of an increase in the unemployment rate is similar to that of the low-skilled in the early years in the labour market. However, in this case, the magnitude of the negative impact remains constant over time.

Therefore, our results suggest that less-educated immigrants as well as natives of all educational levels are negatively affected in terms of employment probability by a deterioration of the labour market conditions. Taking together these and the previous results relative to employment, the evidence suggests that the adjustment to the recession for high-educated immigrants may have taken place largely via earnings rather than employment. In next section, we will discuss these results in depth.<sup>24</sup>

<sup>24</sup> By age group, we observe in Annex 8 of Supplementary Material 2 that younger immigrant workers (aged 16-22) are negatively affected in the first 3 years of experience in terms of employment probability. Young natives, instead, are negatively affected in the short and long term regardless their age. In Annex 9 of Supplementary Material 2 the evidence shows a negative effect in the short and long term for those immigrants from Africa. Likewise, a negative

### 3.5.4. The long-term impact of a recession on annual earnings

Let us now focus on the impact of the Great Recession on annual earnings (Table 10). In general, both immigrants and natives are negatively affected in terms of earnings in the short- and long-term, especially in the case of natives, regardless their educational attainment.

Focusing first on immigrants as a whole, results show that if the unemployment rate rises by 1% earnings fall by 0.8% when cohorts accumulate 1 year of experience (Column 1). This adverse impact increases and persists for 8 years, when the reduction in earnings is 1%. Therefore, if the unemployment rate increased by 1% each year, in 8 years the earnings of young immigrants would decrease by 8.7%. This negative impact on immigrants' earnings is mainly driven by the effect faced by high-educated workers. In particular, annual earnings fall by 1.8 pp in the first year of potential experience given an increase in the unemployment rate of 1 pp (Column 4). This earnings penalty persists the next 7 years, with the magnitude increasing slightly. According to these results, if the unemployment rate increases by 8 pp each year, high-educated workers would accumulate a drop in income of around 112.8% in 7 years.

The annual earnings of less qualified immigrants, instead, decrease to a lesser extent. In fact, they are reduced by 0.8% at the beginning of their professional career given an increase of the unemployment rate by 1% (Column 2). This adverse impact lasts for 7 years, reaching a drop in earnings of around 1.1% after 4 years. However, we do not find a significant effect on earnings of immigrants with post-compulsory education (Column 3).

As mentioned above, natives are more negatively affected in terms of wages than immigrants. A 1% increase in the unemployment rate implies a decrease in wages of 1.3% in the first year of experience of young natives (Column 5). This negative impact becomes an earnings scar as it increases and persists in the long-term, reaching a 3.3% drop in the earnings of those who have 10 years of experience. By educational levels, the negative impact in the short and long term is more damaging for highly educated natives. More specifically, the earnings of native youths decrease by 2.3% in the first year of experience in the face of an increase in the unemployment rate of 1% (Column 8). This adverse effect increases over time, reaching a 4.3% drop in 10 years. Therefore, if the unemployment rate were to increase by 1% each year, the most qualified natives would accumulate a drop in their earnings by 30% in 10 years.

Finally, in the case of less-educated natives, the effect of a negative shock is similar, although the magnitude is lower. In particular, a rise by 1 pp in the unemployment rate translates into a loss in earnings of 1.1 pp in the first year within the labour market (Column 6). If the growth of

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effect is observed in the first two years of experience for those born in South America, but it is significant at the 10 percent level.

unemployment rate is 8% and remains constant for the following years, cohorts' earnings would be reduced by around 19.2 pp nine years later. Similar results are found for natives with post-compulsory education, although the initial negative effect is smaller (Column 7).

**Table 10: Impact of a 1-pp increase in unemployment rate on annual earnings**

	Immigrants				Natives			
	All Immigrants	Compulsory education	Post-compulsory education	University education	All Natives	Compulsory education	Post-compulsory education	University education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	-0.008* (0.004)	-0.004 (0.005)	-0.009 (0.007)	-0.018** (0.008)	-0.013*** (0.003)	-0.011*** (0.004)	-0.007* (0.004)	-0.023*** (0.006)
2	-0.010*** (0.004)	-0.008* (0.004)	-0.010 (0.006)	-0.020** (0.008)	-0.017*** (0.003)	-0.017*** (0.004)	-0.010*** (0.003)	-0.024*** (0.006)
3	-0.011*** (0.004)	-0.010** (0.004)	-0.009 (0.006)	-0.018** (0.008)	-0.019*** (0.003)	-0.018*** (0.004)	-0.013*** (0.004)	-0.026*** (0.006)
4	-0.013*** (0.004)	-0.011*** (0.004)	-0.011* (0.006)	-0.020** (0.008)	-0.021*** (0.003)	-0.019*** (0.004)	-0.016*** (0.004)	-0.027*** (0.006)
5	-0.011*** (0.004)	-0.008** (0.004)	-0.008 (0.006)	-0.019* (0.010)	-0.021*** (0.003)	-0.016*** (0.004)	-0.018*** (0.004)	-0.028*** (0.006)
6	-0.012*** (0.004)	-0.009** (0.004)	-0.010 (0.006)	-0.022** (0.011)	-0.023*** (0.003)	-0.020*** (0.003)	-0.020*** (0.004)	-0.028*** (0.006)
7	-0.012** (0.005)	-0.007* (0.005)	-0.011* (0.006)	-0.024* (0.013)	-0.023*** (0.004)	-0.019*** (0.004)	-0.020*** (0.005)	-0.030*** (0.007)
8	-0.010** (0.005)	-0.005 (0.003)	-0.010 (0.007)	-0.020 (0.014)	-0.025*** (0.004)	-0.020*** (0.003)	-0.021*** (0.005)	-0.034*** (0.007)
9	-0.005 (0.005)	-0.007* (0.004)	-0.009 (0.007)	-0.010 (0.013)	-0.028*** (0.005)	-0.019*** (0.003)	-0.024*** (0.005)	-0.037*** (0.008)
10	0.003 (0.006)	0.001 (0.006)	-0.011 (0.010)	-0.001 (0.016)	-0.033*** (0.005)	-0.024*** (0.004)	-0.024*** (0.006)	-0.043*** (0.009)
Constant	9.181*** (0.061)	9.170*** (0.070)	9.251*** (0.118)	9.631*** (0.200)	9.001*** (0.046)	8.928*** (0.056)	8.805*** (0.056)	9.332*** (0.076)
Observations	915	903	878	821	918	908	918	916
R-squared	0.852	0.790	0.653	0.369	0.954	0.836	0.901	0.888

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

To sum up, results indicate that, compared to immigrants, natives are more negatively affected by a worsening in labour market conditions in terms of earnings. This negative effect is larger for high-educated natives. In the case of immigrants, we find that the earnings penalty is driven mainly by those with university education.<sup>25</sup>

<sup>25</sup> In Annex 8 of Supplementary Material 2 we find that younger native workers (aged 16-22) are negatively affected in the short and long term in terms of annual income. All young immigrants, regardless their age, are negatively affected during 7 years in terms of annual income. Additionally, our results in Annex 9 of Supplementary Material 2 suggest that those immigrants from European countries not belonging to the EU15 are negatively affected in the short and long term in terms of annual income. By gender, we observe a negative effect on the earnings of less educated male immigrants but find no effect in the case of immigrant women. For male natives, we find a negative effect in the short- and long-term on earnings regardless of their educational level, but female natives are not affected in the short term (see Annex 10 of Supplementary Material 2).

### 3.6. Discussion of the results

Our evidence shows two sets of results. First, we observe a negative effect on the number of new entrants when the crisis starts, suggesting that many workers were blocked from entering the labour market. This effect is particularly large for low educated immigrants. Second, in this context of entry barriers to the labour market during the crisis, we find an adverse impact in terms of employment and earnings for those who are able to start their professional career, especially in the case of natives. The less pronounced effects found for more educated immigrants may be due to the greater self-selection of those who manage to enter the labour market, probably because they have more skills and education.

The effects of the Great Recession, however, are not experienced equally by all workers and there are significant differences between native and immigrant population.

In terms of employment, less-educated immigrants are more negatively affected by the crisis in the medium- and long-term than low-educated natives, and the opposite holds in the short run. As argued above, immigrants with lower educational level experience more frequent job losses due, among other factors, to their higher sensitivity to the business cycle. Immigrants can be more exposed to job loss, either because they work in firms, industries and occupations that are prone to closure and downsizing, or because they are more likely than their native co-workers to be selected for layoff during downsizing processes, for example, because they hold marginal jobs or have short tenure (Bratsberg et al., 2018). Likewise, job displacement may have particularly severe consequences for immigrants, as they typically possess less general human capital directly applicable in the host-country labour market and have inferior majority language skills, social capital and networks when compared to native workers (Dustmann et al. 2016). This lack of general skills forms a barrier in the search for new employment (Bratsberg et al., 2018).

On the other hand, according to the buffer theory (Castles, 2011; Bernardi and Garrido, 2008), the exit of immigrants from the labour market when there is an economic crisis frees up jobs for native population. This suggests that there may be a job displacement of immigrants from their jobs in favour of natives. Hence, the negative impact in terms of employment is greater for natives in short run and for immigrants in the medium- and long-term. Additionally, less-skilled workers may also be displaced from their jobs by high-skilled workers who move down the skill ladder during a recession, as pointed out Devereux (2004) and Papademetriou and Terrazas (2009).

The adjustment to the recession has also taken place via earnings for less-educated workers, particularly in the case of natives. We suspect that less-educated immigrants are not especially affected in terms of income because their earnings are already low and close to the legal minimum earnings (Cocks and Ghirelli, 2016; Gaini et al., 2012). Likewise, the rigid system of collective

bargaining in Spain also plays a key factor for the delay in earnings adjustment during the recession. As Bentolila et al. (2012) point out, adjustment to adverse economic shocks is likely to take place mostly through dismissals rather than through wage restraint or working time reduction.

While this explanation may also apply to low-skilled natives, we observe a higher and more persistent negative effect on their earnings. A possible explanation for this may be the displacement of low-educated native workers from their jobs by high-educated natives. There is evidence that shows displaced workers experience long-lasting reductions in earnings (Couch and Placzek, 2010).

Unlike those with lower education, who are at the bottom of the job ladder, cohorts with tertiary education have an alternative to unemployment. They can move down the job ladder, accepting lower-qualified jobs (Devereux, 2004). These jobs are typically characterized by offering temporary contracts as well as few opportunities of promotion. Thus, workers may be prompted to take jobs requiring lower skills and qualifications, losing firm or industry specific human capital, suggesting a ‘trade-off’ between unemployment and over-qualification (Khattab and Fox, 2016). This job-downgrading translates into an earnings penalty for the most qualified cohorts. Therefore, although high-educated workers have relatively better employment prospects, successfully finding employment requires relatively larger loss of earnings.

Our evidence for high-educated workers is also largely consistent with the theory of labour market segmentation (Doeringer and Piore, 1971), in which the labour market is characterised by two different sectors. In a context with high unemployment rates, job vacancies in the primary sector are limited. This causes young workers with tertiary education not to find a suitable job for their skills and, instead of being unemployed, decide to accept lower quality jobs, concentrated in the secondary sector. This has a negative impact on the earnings of young people whose high education is not compensated in income terms once they enter the labour market as well as in employment terms. The problem that derives from this is that many of these workers are unable to move to the primary sector when the economy recovers. As a result, this group is trapped in this sector, spending much of their professional career in it, with turnover between temporary and precarious jobs (Fernández -Kranz and Rodríguez-Planas, 2018). These sticky floors affecting the most qualified youth translate into earnings and employment penalties in the long run.

In sum, our results indicate that the impacts of the crisis in terms of earnings and employment have been negative for both natives and immigrants, but the explanations for why these effects arise on the two groups are different.

### 3.7. Conclusions

In this chapter, we analyze the long-term effects of entering the labour market under tough economic conditions on young immigrant earnings and employment outcomes. Using a fictitious cohort approach, we analyze the Spanish case, where the effect of the Great Recession has been particularly significant among the youngest cohorts, facing unemployment rates above 40% and 50%.

Our findings suggest that the Great Recession has initially blocked the entrance to the labour market, reducing the number of new young participants, especially among immigrants. Then, the first direct impact of the recession is in terms of cohort's size.

Second, we find an adverse impact in terms of employment and wages on those able to start their professional career. Besides, this effect varies in intensity and persistence for immigrants and natives (*Hypothesis 4*). In general, we observe that natives are more negatively affected in the short and long term in terms of wages and employment than immigrants, possibly because the entry of the latter is more blocked and those who enter are more self-selected.

In addition, our results show that the higher the educational level, the greater the negative impact of the crisis in terms of employment and wages (*Hypothesis 5*). The persistent negative impact of a crisis on employment for less-educated immigrants is likely to be driven by their higher sensitivity to the business cycle, which is translated in job losses, and by the job displacement they suffer from natives. Low educated immigrants are not particularly affected by the Great Recession in terms of income because their earnings are possibly already low and close to the legal minimum wage.

The earnings penalty on high-skilled immigrants seems to be driven by job downgrading and the segmented labour market. Under tough economic conditions, job vacancies at the primary sector are limited and high-educated immigrants may end up accepting lower-qualified jobs and filling the jobs usually held by less-educated workers. The sticky floors in the secondary sector and the limited promotion chances there cause that the adjustment to the recession is via income.

Previous reasons may also offer a plausible explanation for the persistent negative effects on earnings and employment of less and more skilled natives.

One of the limitations of this analysis is that the CSWH does not have information regarding the year in which the immigrants arrived in Spain. Therefore, it is not possible to examine the type of immigrants who are in the labour market in our sample, that is, if they are recently arrived immigrants and have developed their studies in their country of origin or if, on the other hand,

they are the children of immigrants already settled in Spain for years and have grown up with the Spanish educational system.

The effect of a crisis on immigrants' and natives' outcomes has been widely discussed in the literature, but little is known about the impact on young workers and new entrants into the labour market. Also, there is little evidence about the persistence of the negative effects and the differences between immigrants and natives. Hence, this third chapter contributes to the more recent literature on the impact of adverse economic conditions in the long run on labour outcomes of young entrants, which represents a vulnerable group inside the labour market.

As our results reflect, the crisis has affected young people with high education in the short and long term more severely, probably due to the lack of qualified vacancies in Spain. This creates an overqualification problem for these highly qualified workers in the labour market. This phenomenon has multiple consequences, since from the point of view of educational policy a permanent situation of overqualification involves subsidizing an activity that does not provide society with the expected performance.





## CAPÍTULO 4: IS THE MILLENNIAL GENERATION LEFT BEHIND? INTER-COHORT LABOUR INCOME INEQUALITY IN A CONTEXT OF ECONOMIC SHOCK

### 4.1. Introduction

The literature on economic inequality is growing as a result of increasing interest in measuring and understanding the level, causes and development of income inequality. This extensive research emerging in recent years focuses on the evolution of income inequality over time globally, such as Hammar and Waldenström, (2020), and in specific countries, such as Blundell and Etheridge, (2010), Fuchs-Schundeln et al. (2010), Domeij and Floden (2010), evidencing its potential effect on growth, social stability, and welfare.

During the last decade, several studies have examined the relationship between inequality and business cycles (Barlevy and Tsiddon, 2006), mainly as a consequence of the recent global recession and with the aim of understanding the probable distributional implications that it generated. The evidence found in the literature is mixed. Concretely, some authors find that income inequality follows a countercyclical pattern, that is, an increase of income inequality during an economic downturn and a decrease during an economic expansion (Hoynes et al. 2012; Guvenen et al. 2014; Hoover, 2009; Heathcote et al., 2010; Heathcote et al., 2020; Camacho and Palmieri, 2019). Other authors, instead, suggest the opposite. This is the case of Morin (2019) and Karonen and Niemelä (2020), who find that income inequality is procyclical.

Therefore, the evidence shows that changes in income inequality are associated with the business cycle. However, the evolution of income inequality at the aggregate level cannot reveal the complexities of income dynamics in terms of inequalities between cohorts. To do so, a life course perspective is required. Life course is defined as life trajectories in which income development varies by cohort (Elder, 1998; Ryder, 1965). The birth year places people in specific birth cohorts and, therefore, according to particular social changes. The impact of an event like an economic shock depends on when it affects in the life stage of the cohort (Elder, 1998). As Karonen and Niemelä (2020) state “this perspective emphasizes that certain cohorts could experience an accumulating effect due to an economic shock”.

In terms of income inequality, it raises questions like: Are younger generations better off than older ones? Are young and old generations becoming more unequal? What is the role played by a macroeconomic shock in shaping income inequality across cohorts over the life course? Thus, a cohort-based analysis over the life cycle may help us to better understand the drivers of inter-cohort inequality and the ways in which labour markets have changed during the last years. In

consequence, it allows us to separately identify age, time, and generational (cohort) effects. In other words, it isolates the effect of cohort membership on income from the effect of general economic growth, which mostly increases incomes on a period-to-period basis and from the effect of age, which typically lets incomes peak around the midpoint of a working career.

The evidence using this perspective shows that there are significant generational differences in economic measures such as income, wealth and consumption (Chauvel and Schöder, 2015; Karonen and Niemelä, 2020; Berloffia and Villa, 2010; Lim and Zeng, 2016). Likewise, empirical evidence supports the concern that younger generations are less well off than members of earlier generations in terms of lower earnings and less wealth (Gale et al., 2020; Kurz et al., 2018).

In this context, the aim of this fourth chapter is to provide new evidence relative to how inter-cohort income inequality develops in Spain during the period 2005-2019, distinguishing three components: cohort, age and period effects. The period analysed, includes several phases of the economic cycle. Between 2005 and 2007, Spain enjoyed a phase of economic growth, followed by the Great Recession that started in 2008. Subsequently, from 2014 onwards a phase of economic expansion begins. Therefore, this study offers new evidence on the impact of the Great Recession on inter-generational income inequality.

The evolution of income inequality in Spain has been characterized by being strongly countercyclical (Simón, 2009; Pijoan-Mas and Sánchez-Marcos, 2010; Izquierdo and Lacuesta, 2012). Income inequality declined substantially during the 1997-2007 expansion, and then rose again strongly during the Great Recession (Bonhomme and Hospido, 2017; Anghel et al., 2018). Additionally, it has been found that, particularly at the bottom of the distribution, earnings and income fell considerably during recessions and increased during economic booms (Izquierdo and Lacuesta, 2012; Carrasco et al., 2015; Anghel et al., 2018). However, the cohort dimension is not considered in any of these studies and its inclusion opens up a new perspective on the evolution of income inequality.

At a descriptive level, there is evidence that compares the working conditions experienced by the youngest cohorts in Spain with those of previous generations before and after the 2008 crisis (Hernández de Cos, 2019; Puente and Regil, 2020; Cebrián and Moreno, 2016). In general terms, it is shown that, before the crisis, each new generation reached an annual income on average higher than that of the previous generation as the workers accumulated work experience. However, this changes with the onset of the recession. Specifically, it is observed that the annual income of the young generations has decreased compared to previous generations.

In this chapter, we follow the most recent methodologies designed to analyse inter-cohort income dynamics and carry out our analysis from two approaches. First, we examine *relative* earnings which will reveal whether there are inequalities between generations in terms of earnings.

Conditional on the possible existence of inter-cohort inequality, secondly, we measure how *absolute* earnings have developed over time. Thus, we will be able to discover for which cohorts the earnings development has stopped or slowed down. This perspective, hence, shows whether the economic crisis particularly affected the absolute income dynamics of some cohorts, but not that of other cohorts.

We contribute to the literature in several aspects. First, we provide new evidence relative to how inter-cohort income inequality develops in relative and absolute terms in a context of economic crisis, considering at the same time the three dimensions of cohort, period and age.

Second, this study uses administrative data, which contains information on working conditions as well as socioeconomic characteristics of individual workers. One of the advantages of this dataset is that it allows us to follow the labour market trajectories of each individual and, thus, of cohorts over time. Hence, unlike most of the previous literature, which relies on longitudinal single-cohort or cross-sectional designs and therefore cannot distinguish cohort effects, we have longitudinal data from multiple cohorts. More specifically, we focus on cohorts born between 1950 and 1994, who are working during 2005-2019. Hence, we provide new evidence relative to income inequality between three generations, such as the baby-boom generation (born between the late 40s and early 60s), the generation X (born between the mid-60s and the late 70s) and the Millennial generation (born between the early 80's and 90's). Thus, we will be able to answer the question whether younger generations are better off than older ones.

Finally, we include in our analysis a gender perspective. Previous literature on inter-cohort inequality only examines men. Therefore, this approach will allow us to identify possible gender differences in the dynamics of income inequality between cohorts.

The remainder of the chapter is organized as follows. In next section, we review the related literature. Section 4.3. outlines our empirical strategy for estimating the impact of the Great Recession on income inter-cohort inequality. Section 4.4. describes the data and sample. Section 4.5. presents the estimations results and discussion. Section 4.6. concludes, summarizing our main results.

## 4.2. Literature Review

Despite the extensive literature on how income inequality, across countries and globally, has developed over time, little is known about the role of cohort membership because it is often excluded from the analysis. Hence, the relationship between income dynamics and cohorts is not enough discussed.

It is becoming increasingly clear that cohorts play a potential role in producing social change because social contexts and historical circumstances vary from cohort to cohort (Ryder, 1965). In general terms, a cohort is defined as the aggregate of individuals who experienced the same event in the same time interval (Mannheim, 1928). To date, birth is considered as the defining event in almost all cohort research. Each cohort has a different composition from the circumstances of its unique history. As Ryder (1965) notes “if change does occur, it differentiates cohorts from one another, and the comparison of their careers becomes a way to study change”. Likewise, the consequences of change may persist in the subsequent behavior of these individuals and thus of their cohorts. In line with this, Schuman and Scott (1989) find that events occurring during adolescence and young adulthood leave a deep-rooted mark, which in turns leads to cohort differences in beliefs about the importance of national and world events, and thus a cohort effect.

From an economic viewpoint, these discrepancies between cohorts could be considered inequalities because some cohorts may have a more or less favourable entry into the labour market due to the specific economic situation they face. Thus, an economic expansion or downturn may play a key role in how a cohort is able to establish itself during changing market situations. In line with this, Malmendier and Nagel (2011) analyse whether economic shocks affect individual financial risk decisions, as often suggested for the generation that experienced the Great Depression. They find that cohorts that have become adults during economic booms are more likely to profit from that favourable market situation. Cohorts who are “scarred” by an economic downturn, instead, may be more risk-averse and have a more disadvantaged economic trajectory from a life course perspective. This evidence leads to the idea that there are “lucky and less lucky generations”, in which the year of birth of the cohorts is of great importance in social dynamics (Chauvel, 2013).

Research focusing on inter-cohort income inequality points out that the “baby boomer” generation has benefitted most from its birth cohort compared with other generations in terms of income (Chauvel and Schröder, 2014). Concretely, these authors study possible inter-cohort inequalities in terms of income in different countries using a cohort analysis to assess which welfare regimes are more conducive to such inequalities. To do so, they focus on cohorts born between 1935 and 1975 and the period 1985-2005. They find income differences between generations, being the baby boomer generation the luckiest. Such inequalities between generations are much stronger in conservative European welfare states, compared to social democratic and liberal welfare states. The authors suggest that this is due to conservative welfare states exposing some cohorts to high youth unemployment and making lifetime earnings dependent on a favourable entry into the labour market.

Similar evidence is found by Chauvel and Schröder (2015). They examine how belonging to a certain birth cohort influences disposable incomes in France, Germany and US and whether these countries advantage some birth cohorts in terms of income while disadvantaging others. In particular, the authors focus on birth cohorts 1920-1975 and the period 1985-2005. They find that cohorts born between 1940 and 1950 have disposable incomes well above what one would expect if all cohorts had equally participated in long-run increases in disposable incomes. Regarding France, the authors show more pronounced cohort differences compared to Germany and US. They argue that older generations have monopolized lucrative positions and social transfers, to the detriment of generations born after 1950. The authors conclude that the insider–outsider dynamic that marks the Mediterranean welfare regime seems like a good candidate to explain these cohort differences. In the same way, Freedman (2017) analyses the variation in income generational inequalities across 8 different countries during the period 1985-2005. The evidence shows again that cohorts born after 1970 have experienced fewer earning opportunities, relative to cohorts born between 1950 and 1970.

However, these studies only observe differences between cohorts without emphasizing how the economic context that these cohorts experience affects intergenerational inequality. Some authors point out that inter-cohort income inequalities are greatly affected by macroeconomic shocks (Mayer, 2005). More specifically, cohorts entering the job market during times of austerity and economic downturn are in a more disadvantaged position, compared to cohorts entering during an economic growth, with regard to attaining similar career options. For instance, Berloff and Villa (2010) explore the evolution of Italian household income over the period 1989-2004 and find that young generations face economic difficulties. In particular, while those born in the 1930s and 1940s gain about 8 percent over the preceding cohorts, the younger ones record an average loss of about 5 percent, which is a result of the economic situation, its adverse effects on younger workers and different socio-political reforms.

In the research of Karonen and Niemelä (2020), the development of income distribution across periodic economic fluctuations in relation to cohorts and age groups is examined. Concretely, they analyse the Finnish case covering the period of 1966–2015. They find that the main effects on relative income are basically driven by period and cohort effects. This result suggests a link between the effects of economic shocks and cohort placement on labour market entry. Moreover, absolute income analysis suggests that an economic shock produce a stagnation in income development, which affects the younger cohorts more intensely.

### 4.3. Empirical Strategy

The aim of this chapter is to provide new evidence relative to how inter-cohort income inequality develops in Spain during the period 2005-2019. We use two specific age-period-cohort models, which are especially designed to examine inter-cohort income trajectories through the effects of age, period and cohort from two perspectives: the relative and absolute approach.

In general terms, age-period-cohort models (henceforth APC) try to explain outcomes distinguishing the effect of three different influences: the individual's age, linked to the life cycle ( $\alpha_a$ ), birth cohort membership ( $\gamma_c$ ), and period of measurement ( $\pi_p$ ). Thus, the equation of APC models can be written as follows:

$$y^{apc} = \mu + \alpha_a + \pi_p + \gamma_c \quad (APC) \quad (1)$$

However, all APC models are affected by an "identification problem" (Glenn, 1976), in which each component is a combination of the other two, that is, they are collinear. This arises from the equation age=period-cohort. In this way, if a variable linearly depends on age, period and cohort, then an infinite number of decompositions between these effects fit the data, there is no a unique solution and no statistical model can overcome this intrinsic indetermination.<sup>26</sup>

The literature has attempted to provide a solution to this problem, imposing restrictions on the APC model (Yang and Land, 2013; Yang et al., 2008). Nevertheless, these approaches have limitations and clear disadvantages, as some authors point out (Pampel and Hunter, 2012, Freedman, 2017).

In view of the limitations of these models, we follow the strategy proposed by Chauvel (2012). Firstly, we examine *relative* earnings which will reveal whether there are inequalities between generations in terms of earnings. Indeed, this analysis offers an answer to the research question on relative earnings in three different ways: which cohort group has the most privileged position compared to other cohorts, how age variations reveal the general effects of life course on earnings, and whether an economic shock as experienced from 2008, negatively affected earnings.

To do so, we use an APC-detrended (APCD) model, which was proposed by Chauvel (2012). This method differentiates between "linear trends" and fluctuations. More specifically, this approach displays how the effects of age, period and cohort on earnings fluctuate around a linear trend, which is equal to zero. In other words, this model is a "bump" detector that shows how earnings deviate from the general income trend through different cohorts, ages and years.

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<sup>26</sup> See Annex 1 of Supplementary Material 3 for more detail.

The APCD model imposes two sets of constraints: the vectors of age, period and cohort parameters have a zero-sum and a zero-slope. Moreover, the first and the last cohorts of the estimations of the models are excluded (the oldest age group of the first period and the youngest of the last), in order to improve the confidence intervals of the parameters. This produces a unique estimate of detrended age-period-cohort effects and leads to solve the traditional identification problem of the APC model. Thus, the APCD model can be expressed as follows:

$$y^{apc} = \alpha_a + \pi_p + \gamma_c + \alpha_0 \text{rescale}(a) + \gamma_0 \text{rescale}(c) + \beta_0 + \sum_j \beta_j X_j + \varepsilon_i$$

$$\left\{ \begin{array}{l} \sum(\alpha_a) = 0; \sum(\pi_p) = 0; \sum(\gamma_c) = 0 \\ \text{Slope}_p(\alpha_a) = 0; \text{Slope}_a(\pi_p) = 0; \text{Slope}_c(\gamma_c) = 0 \\ \min(c) < c < \max(c) \\ c = p - a \end{array} \right. \quad (2)$$

$y^{apc}$  refers to the dependent variable that pertains to individual  $i$  of age  $a$  in period  $p$ , and thus belonging to the birth cohort  $c=p-a$ .

$\beta_0$  denotes the constant,  $X_j$  is a set of covariates introduced in the model,  $\beta_j$  are the coefficients of control variables and  $\varepsilon_i$  refers to the error term. Further,  $\text{rescale}(a)$  and  $\text{rescale}(c)$  are linear functions that transform the initial values of  $a$  and  $c$  into a range between  $-1$  and  $+1$ .

Finally,  $\alpha_a$ ,  $\pi_p$  and  $\gamma_c$  are, respectively, the detrended age, period and cohort effects. The  $\pi_p$  vector fits the categorical period changes and absorb the period-specific changes in measurements of the dependent variable. The  $\alpha_a$  effects represent the non-linear age changes. For our purpose,  $\gamma_c$  effects (also named “detrended cohort effects” DCE) are the most important estimates of this model since they will detect cohort effects.

In the APCD model, if no detrended cohort effect coefficient  $\gamma_c$  is significantly different from zero, all cohorts behave according to their age and period characteristics, with no cohort-specific fluctuation. In this case, the simple age and period AP model is sufficient representation of data. However, if at least one  $\gamma_c$  coefficient is significantly different from zero, some cohorts are above or below the linear trend. Consequently, the AP model is insufficient, as some cohorts receive more or less than what one would expect, given long-run income trends.

Therefore, the APCD model shows whether a certain cohort has a more fortunate position in terms of income than other birth cohorts. However, even if later-born cohorts are below the long-run trend of income increases, they might still have higher earnings in absolute terms (compared with former cohorts), depending on the evolution of the overall rate of income growth (Chauvel and Schröder, 2015). For instance, if overall incomes grow by 4 percent points and a cohort, for example, the 1980 cohort, has an income that grew by only 2 percent points from the previous cohort (the 1979 cohort), then the 1980 cohort is below the trend, but it is still better-off than the

preceding one. Conversely, when a negative cohort effect is stronger than a positive linear trend, the absolute earnings of a cohort decrease.

These absolute declines and progressions of income cannot be measured with the APCD model. In other words, the APCD model cannot identify linear trends because they are equal to zero. Thus, secondly, we use a recent APC trended model, called the APCT-lag method (Chauvel et al., 2017; Bar-Haim et al., 2019), which shows how *absolute* earnings have developed over time. This model uses the “linear age effect” with the aim of identifying cohort trends. This implies a robust identification of the cohorts’ dynamics. In this way, this model constrains the age linear trend  $\alpha$  to equate to the average within-cohort age effect across the cohorts in the observation window. Consider this average shift  $\alpha$ :

$$\alpha = \frac{\Sigma(y_{a+1,p+1,c} - y_{apc})}{(p-1)(a-1)} \quad (3)$$

Once  $\alpha$  is known and the linear trend of period is constrained to zero, the cohort coefficients  $\gamma_c$  will absorb the long-term time transformations, that is, the general linear trend of social change, and make relative changes in income visible. Thus, the full model <sup>27</sup> is denoted as:

$$\left\{ \begin{array}{l} y^{apc} = \alpha_a + \pi_p + \gamma_c + \beta_0 + \sum_j \beta_j x_j + \varepsilon_i \\ \left\{ \begin{array}{l} \Sigma(\alpha_a) = 0; \Sigma(\pi_p) = 0 \\ Slope(\pi_p) = 0 \\ Slope(\alpha_a) = \alpha = \frac{\Sigma(y_{a+1,p+1,c} - y_{apc})}{(p-1)(a-1)} \\ \min(c) < c < \max(c) \\ c = p - a \end{array} \right. \end{array} \right. \quad (4)$$

## 4.4. Data

### 4.4.1. Sample

The data structure for the estimation of the models must take the form of a Lexis table, i.e. an age by period table of data with a constant pace in age and in period (e.g. five-year age groups measured each five years).<sup>28</sup> Thus, our key variables are age, period and birth cohort. As our dataset allows us it, we measure each age, period and cohort by 1-year interval.

<sup>27</sup> Note that the constraint on age linear trend requires that we have at least three consecutive cohorts, as reflected Equation 4. However, for the first and the last cohort, we have an incomplete set of age groups. Since the estimation is based on linear prediction of the average age effect, the results might be biased due to extrapolation of the age effect for these cohorts. Therefore, as robustness checks, we estimate for a narrower age span and cohort span (see Annexes 9, 10, 11 and 12 of Supplementary Material 3).

<sup>28</sup> Annex 2 of Supplementary Material 3 shows trends in earnings by period and age in our whole sample. Each cell shows the specific average logarithm of monthly earnings for one age in a particular time period. The table also allows us to follow the progression of cohorts’ down the diagonal. The progression of earnings varies depending on the birth



Our sample covers the 2005-2019 waves of the CSWH. We select as our population of reference those individuals who have been affiliated to Social Security during the whole month of October for the relevant year i.e. from 2005 to 2019 (in line with the Wage Structure Survey, provided by the Spanish National Institute of Statistics). So, we consider those individuals who are working in any of the months of October in the period 2005-2019. We focus on the private sector and on individuals who work full-time.<sup>29</sup> We exclude workers younger than age 25 years and older than age 55. In both cases, the number of observations is low. Because many respondents younger than age 25 may still be in school or finishing their tertiary education, their earnings may not accurately reflect their future income potential. Therefore, we do not include these individuals in order to reduce confounding effects due to incomplete educational attainment. Similarly, we do not consider those with more than 40 years of experience giving the limited number of observations.

Hence, we focus on the cohorts of males and females born between 1950 and 1994 and analyze the inter-cohort inequality in terms of income in the period 2005-2019. Our final sample consists of 4,411,255 observations.

Our dependent variable is the logarithm of monthly earnings.<sup>30</sup> The CSWH provides information on the contribution bases that are used as a proxy for wages.<sup>31</sup> We select the contribution base relative to the month of October. This variable is deflated using the 2016 CPI.

A set of covariates is included in the controlled model. These variables are classified into two blocks: variables related to the individual and variables related to the job. Regarding individual characteristics, we include gender, educational attainment, country of birth, nationality, region of residence and potential labour market experience. The gender is a dummy variable that takes value 1 if male and 0 otherwise. For educational attainment, we include dummy variables for having post-compulsory education, vocational training and university education. The reference group is compulsory education. The country of birth and nationality are also dummy variables that take value 1 if worker born in Spain and has the Spanish nationality, respectively, and 0 otherwise. In the case of the region of worker' residence, we include 17 dummy variables, one for each region. Andalusia is our reference region of residence category. Potential experience is computed as the difference between the last year in which workers are observed and the year in

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cohort. However, this progression of cohorts incorporates both age and period effects. Our modeling strategy allows us to move beyond the analytical limitation of this table to analyze age, period, and cohort effects net of the other two factors.

<sup>29</sup> Data on part-time work is insufficient to calculate hourly wages.

<sup>30</sup> Once the definition of our dependent variable has been clarified, we will use the terms earnings and income interchangeably in the analysis.

<sup>31</sup> The contribution bases are bottom and top coded (Annex 13 of Supplementary Material 3 shows the minimum and maximum limits of the contribution bases by year).

which they entered the labour market. Hence, our period of interest covers up to 40 years of (potential) working experience.

On the other hand, variables related to the job are having a temporary contract, economic activity, contribution group and firm size. We create a dummy variable that takes value 1 if the worker has a temporary contract, 0 if he has a permanent contract. Furthermore, we include 11 dummy variables, one for each economic activity. Industry is our reference economic activity category. We do not have information relative to occupation. As a proxy, we use the contribution group, which is a 6-code variable. We include dummy variables for non-manual and medium-skilled work, non-manual and low-skilled work, manual and high-skilled work, manual and medium-skilled work, and manual and low-skilled work. The reference group is non-manual and high-skilled work. Finally, firm size is divided in six different intervals: less than 10 workers, between 10-19 workers, between 20-49 workers, between 50-249 workers, between 250-499 workers, and more than 500 workers. We create a dummy variable for each of these intervals. Our reference firm size category is less than 10 workers.

#### 4.4.2. Descriptive Statistics

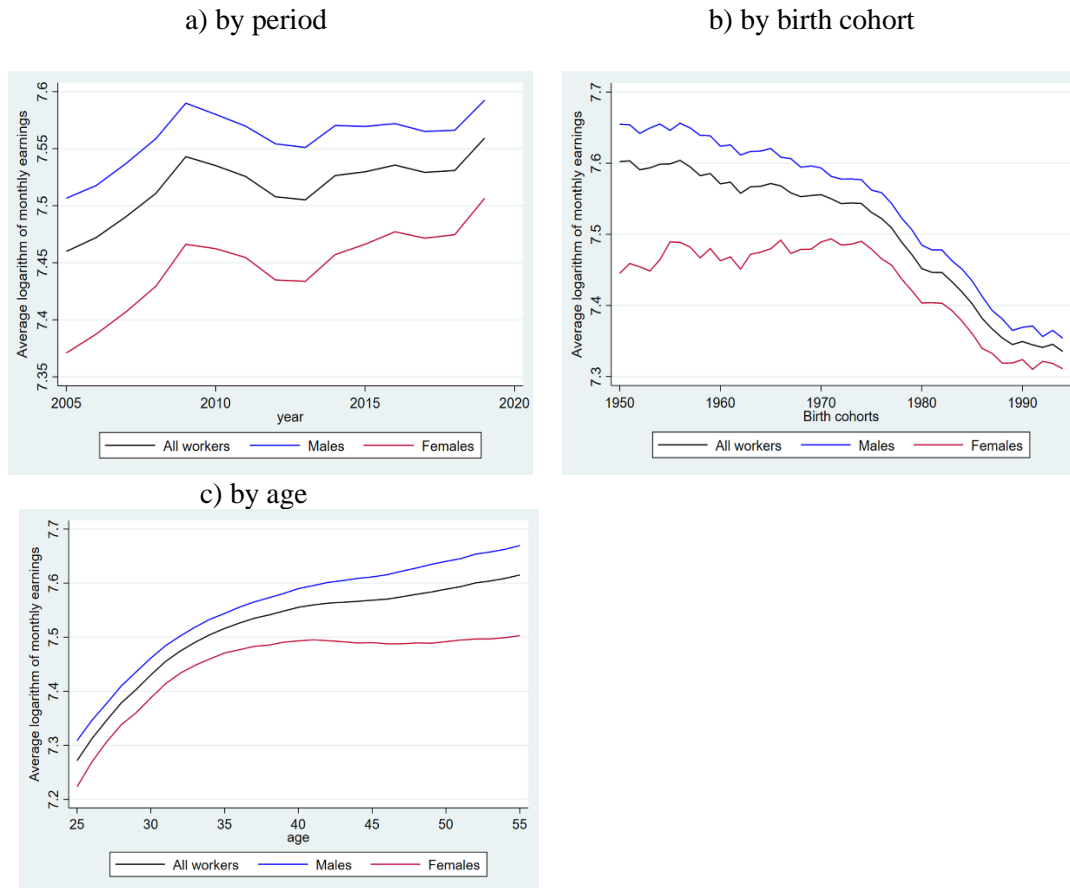
Figure 3 illustrates the average logarithm of monthly earnings by age-period-cohort profile, distinguishing by gender. Over the time period, the average income for all workers tend to increase until 2009, when they fall due to the economic crisis. Earnings are reduced until 2013. Then, earnings rise again, although the evidence shows a stagnation of income between 2017 and 2019. By gender, we observe that males receive higher income than females. Additionally, the evolution of earnings throughout the period for both sexes follows the same pattern as for the whole sample. However, the evidence seems to indicate that the gender wage gap has been slightly narrowing over time.

The profile of earnings across different age groups for the whole sample shows that the average earnings increase considerably in the first years in the labour market. At age 40, the evidence suggests that earnings' growth is not exponential and tends to stagnate. Regarding gender, as commented previously, we observe that males receive higher earnings than females. In both cases, the figure shows that the stage where earnings growth is strongest is focused on the youngest ages of workers. However, from the age of 40, while men's earnings continue to increase, although to a lesser extent, women's earnings stagnate.

Finally, the cohort profiles show a clear downward trend in earnings level, especially from the 1973 cohort. Furthermore, the cohort profiles show different trends by gender. For women, we find an aggregate trend in which females born from 1955 to 1970 share almost the same level of

earnings. For men, instead, the earnings of those born in the same period tend to decline. In both cases, the income of the cohorts born after 1973 collapses, as expected, since their transition to the job market is not yet complete.

**Figure 3: Age-Period-Cohort profile**



Notes: This figure plots the average monthly earnings by age, period and birth cohort. *Source: own elaboration from the CSWH.*

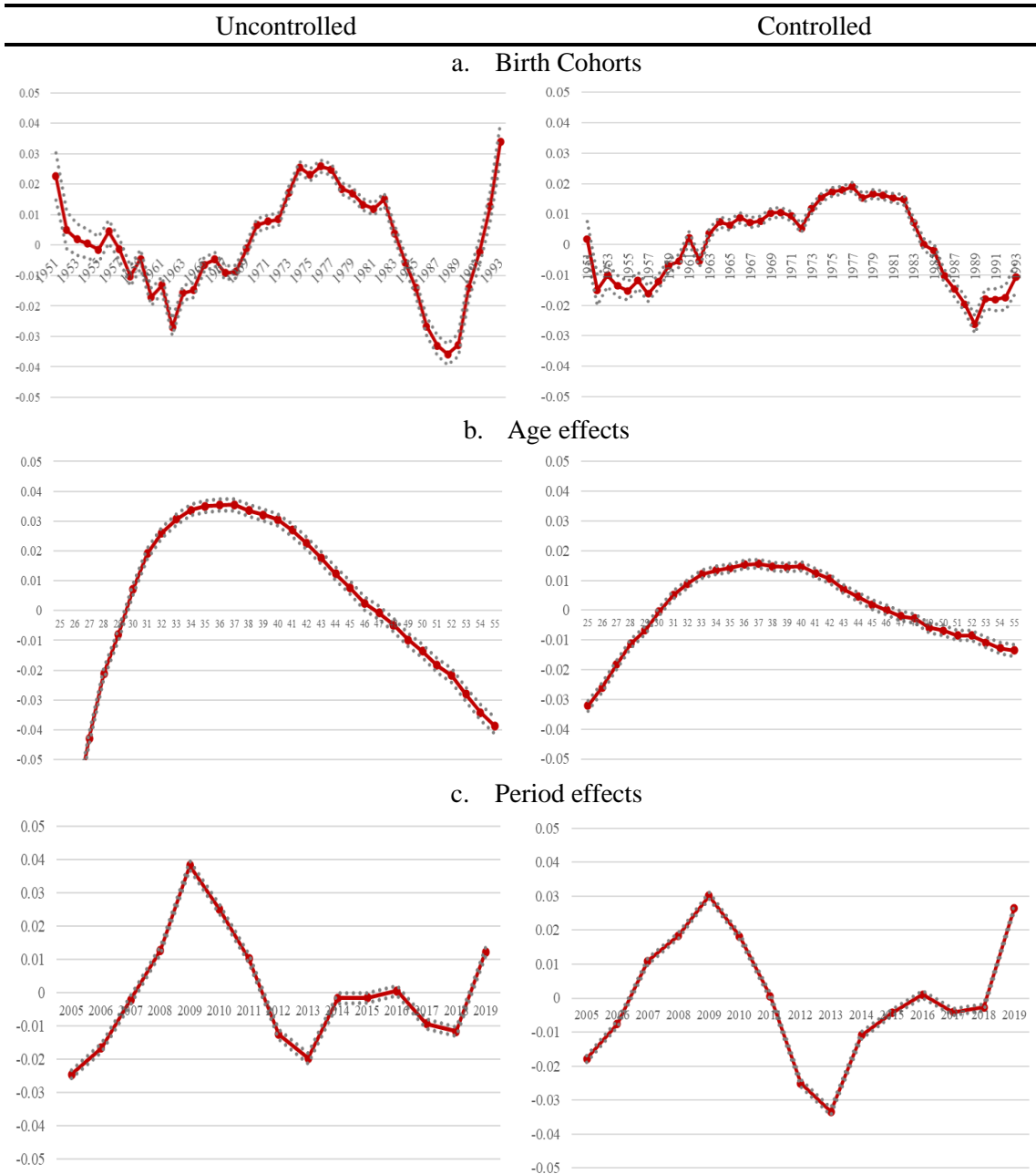
## 4.5. Results

### 4.5.1. Age-Period-Cohort “Detrended” model: *relative earnings*

We begin the analysis with the results of the APCD model that show whether there is inequality between generations. As seen in Section 4.3., the APCD model displays relative changes in the dependent variable in relation to the linear trend -which is equal to zero- revealing which age category, period, or cohort has the most advantages compared to other groups. In our case, this allows us to answer which birth cohort has the most privileged position in terms of earnings, how age changes reveal the general effects of the life course on earnings, and whether certain shocks negatively affected earnings.

To illustrate the results of the regression, Figure 4 shows the coefficients of the detrended effects of age-period-cohort on the earnings<sup>32</sup> of all workers with and without the control variables (Annex 3 of Supplementary Material 3 shows the coefficient estimates and their significance). Overall, we observe differences in average income between birth cohorts, age groups, and years.

**Figure 4: ‘Detrended’ Age-Period-Cohort effects on earnings without and with controls**



Note: Results of APCD Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCD coefficient and horizontal axis shows each APC component. Dotted lines represent 95 percent confidence intervals.

<sup>32</sup> We also estimate the APCD model using annual earnings as dependent variable and we find similar results (see Annexes 5 and 6 of Supplementary Material 3).

First, we focus on the cohort coefficients  $\gamma_c$ , since, as mentioned before, they are the most relevant coefficients in this analysis. Cohort effects show the relative effect of belonging to a given birth cohort on earnings. For instance, in the uncontrolled model the coefficient for the 1951 cohort is equal to 0.0226. Therefore, belonging to the 1951 birth cohort implies that their average earnings are 2.26 percentage points above the long-term earnings trend. The explanation is the reverse in the case that the coefficient obtained is negative. This is the case of the 1958 cohort, in which their average earnings are 1.02 percentage points below the long-term earnings trend simply because they were born that year.

Our results show statistically significant differences between generations. More specifically, before including the covariates, we note that cohorts born in the 1960s and late 1980s suffer the most in terms of income. Their average earnings are below the long-term income trend. Evidence also shows that individuals born in the late 1980s have been more negatively affected in terms of earnings than those born in the 1960s. In particular, being born in the late 1980s returns an average income approximately more than 3 percentage points below the long-term earnings trend. However, the results suggest that cohorts born in the 1970s and early 1980s, even those born in the early 1990s, are more favoured by their year of birth in terms of earnings. In other words, their average earnings are above the long-term earnings trend. Thus, belonging to the cohorts of the mid-1970s represents an average gain of more than 2 percentage points above the long-term earnings trend.

Once we control the model for covariates, the pattern is similar, although there are some differences. First, we find a smaller range of fluctuations above and below the long-term earnings trend. Second, we observe changes in which cohorts are affected positively and negatively in terms of earnings for their year of birth. We now find that cohorts born in the 1950s and early 1960s are adversely affected, that is, their average earnings are below the long-term income trend. However, younger individuals, that is, those born in the late 1980s and now also those born in the 1990s, continue to be more negatively affected. Specifically, belonging to one of these recent cohorts implies that average earnings are approximately 2 percentage points below the long-term trend.

Additionally, we observe that the number of cohorts with a privileged position in terms of earnings increases. The results show that the average incomes of the cohorts born in the 1960s, 1970s and early 1980s are above the income trend. Comparing these cohorts, we see those individuals born in the 1970s have a greater advantage than those born in the 1960s. While the average earnings of the former are approximately 2 percentage points above the long-term trend, those of the latter are about 1 percentage point higher.

Therefore, our results suggest that the baby-boomer generation (born between 1951-1965) as well as the Millennial generation (born between 1982-1993) are more affected by their year of birth in terms of earnings than generation X (1966-1981). An explanation for such results may be the economic conditions that the cohorts face in their transition to the labour market. Specifically, the first two generations begin their professional career in a context where the Spanish economy is experiencing a major economic crisis, which leads them to be in a more disadvantaged position in terms of earnings. While the baby-boomer generation faces the crisis of the 70s and early 80s, a crisis that affected the world and arrived late in Spain, the Millennial generation faces the financial and economic crisis of 2008 at their earliest point of transition to the labour market, in which the high rates of unemployment, especially in precarious and unstable jobs in the construction and service industries, affected them intensely. Hence, younger generations experience a deeper relative decline in income compared to those born during the baby boom. This is an important factor in income development, as we will examine in the next section.

However, the beginning of the labour market career of the generation X ranges from the late 80s to the beginning of the 2000s. Thus, this generation begins its professional career in a context of recovery and, later, strong economic expansion, despite the early 1990s, when the economy slows down. As our results show, this generation enjoys the most fortunate position. This generation is also experiencing an important educational expansion that, together with favourable economic conditions, offers greater job opportunities. All of this may have contributed to the positive evolution of income. In the next section, we will dig deeper into earnings growth.

Consequently, our results are related to the effects of an economic shock, supporting the idea that cohorts entering the labour market during an economic recession are in a more disadvantaged position than cohorts entering the labour market during an economic expansion (Karonen and Niemelä, 2020).

Although similar results have been found in the literature for Millennials, such as Berloff and Villa (2010), Chauvel and Schröder (2015), Karonen and Niemelä (2020), this does not occur in the case of baby-boomers. These authors find that the baby boomer generation is in a more privileged position in terms of earnings compared to other cohorts. The reason why the baby-boom generation in the Spanish case is more negatively affected by their year of birth could be that the crisis they experienced in their transition to the labour market begins later in Spain than in the rest of Europe. In this way, the crisis is more severe during this period in Spain compared to other European labour markets. During the late 1970s, while the Spanish economy suffers a considerable increase in the unemployment rate, the reduction in employment hardly occurs in other European labour markets.

Regarding age effects, they show an inverted U-shaped convex life course, where income in mid-life ages is above the long-term income trend. The younger and older age groups, in contrast, are the most unfortunate in terms of income levels. The age coefficients show an increase in earnings once the younger cohorts enter the labour market. Furthermore, the results show a stagnation phase between the ages of 35 and 40, followed by a slowdown in earnings growth relative to the linear trend. In the controlled model, we observe that the age effects become smaller, although they keep the same shape. Specifically, the youngest age group is below the linear trend, but the income level increases steadily between the ages of 25 and 34. From this point on, the income adheres to the linear trend and, subsequently, begins to decrease and is below the trend. Thus, it appears that 31–45-year-olds are to some extent in a more beneficial position than other age groups.

Finally, the results of the period effects show the relative effect of economic fluctuations on earnings. Overall, the relative estimates underscore a clear effect linked to the Great Recession on earnings. Initially, we observe that the average earnings are above the long-term income trend due to the phase of economic expansion that is being experienced in that period. This changes as a result of the origin of the economic crisis at the end of 2008. In line with our results, earnings are below the trend for several years, with 2013 being a turning point, although earnings keep below the long-term trend, except in 2019. The results obtained in the controlled model remain the same in general. The only thing to highlight is the most harmful effect of 2013.

In line with Karonen and Niemelä (2020), it is possible to compare these period coefficients with the historical development of income inequality in the analysed country. Based on this, our findings on the period effects are in line with the evidence obtained by some authors on the evolution of income inequality in Spain. The evolution of inequality in Spain has been characterized by being strongly countercyclical (Bonhomme and Hospido, 2017; Anghel et al., 2018). Income inequality decreased substantially during the economic expansion, which, in turn, is shown as a rapid increase in the period coefficients in the APCD model. When the economic crisis began, however, income inequality increased. Hence, the decrease in the coefficients relative to the period.

In sum, the results obtained by analysing relative income (APCD model) indicate that there are inequalities between generations. Likewise, the evidence shows that belonging to a certain age group or working in the labour market in certain periods leads to inequalities compared to other age groups and periods, respectively. However, linear trends are not taken into account in this analysis, as we explained in section 4.3. By not including them, the effect of economic growth is not attributed to successive cohorts. Thus, we do not know whether young cohorts have or have

not higher earnings in absolute terms than the predecessor cohorts, despite the fact that they are in a less favourable position in terms of relative income.

Therefore, the linear trend of income growth is included in the following section, in order to understand how income evolves from some cohorts to successive cohorts in absolute terms. Thus, we will find out if the development of earnings has stopped or slowed down for some cohorts and, in this way, show whether the economic crisis particularly affects the dynamics of absolute income of some cohorts, but not that of other cohorts.

#### 4.5.2. Age-Period-Cohort “Trended” model: *absolute earnings*

In this second part of the analysis, we discuss the results obtained when estimating the APCT-Lag model, which we described in detail in Section 4.3. This model includes the linear trends and will reveal how income develops in absolute terms across birth cohort, age, and period. The linear trend of increasing income, which we have controlled in the APCD model, is now captured using the regression line. In order to illustrate the results obtained, Figure 5 shows the age-period-cohort effects for all workers before and after including the control variables (Annex 4 of Supplementary Material 3 shows the estimates of the coefficients and their significance).<sup>33</sup>

Regarding the cohort effects  $\gamma_c$ , the results show statistically significant differences by cohort in the evolution of income compared to the general increase in income (the trend). In other words, the evidence suggests that there are some differences between cohort earnings growth and the trend of overall earnings growth.

First, we focus on the uncontrolled model. In Figure 5, we observe a stagnation in the income of those workers born between the 1950s and early 1960s. However, we must highlight a substantial increase in the earnings of workers whose year of birth is between the 1960s and early 1980s, compared to the trend of general income growth. From cohorts born in the 1960s to those born in the early 1980s, earnings increase by approximately 18.8%. Much of the growth is seen among the birth cohorts of the 1960s and 1970s. For those born in the mid-70s, earnings continue to grow, but at a lower rate. Specifically, they increase at a rate similar to the general trend in income. However, for cohorts born in the 1980s, earnings decrease. The results also suggest that income growth picks up again for those born in the early 1990s.

Once we control the model with covariates, we observe in Figure 5 that earnings growth for cohorts born in the 1950s correlates almost perfectly with overall earnings increases. Earnings

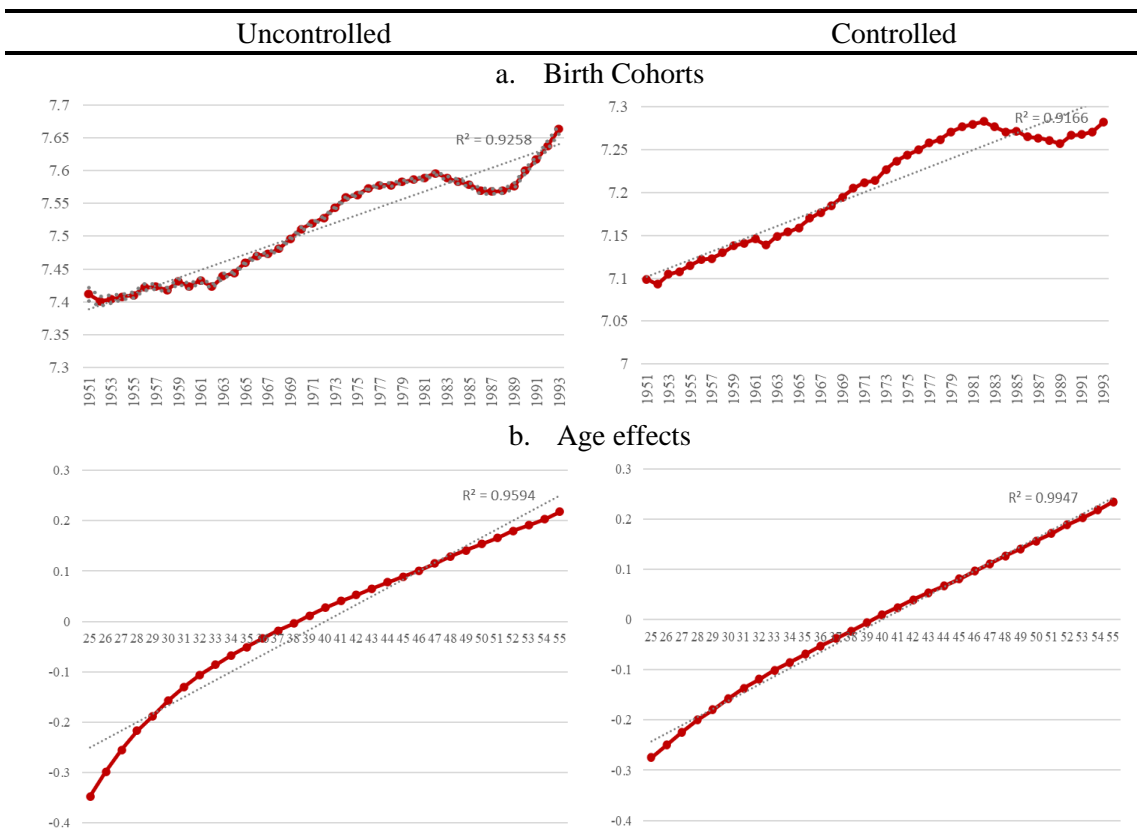
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<sup>33</sup> We also estimate the APCT-Lag model using annual earnings as dependent variable and we find similar results (see Annexes 7 and 8 of Supplementary Material 3).



grow at a similar rate to the trend, although slightly below it. Specifically, income grows at an average rate of 0.6% from a cohort born during these years to the next cohort. Looking at the growth slope of the cohorts born from the early 1960s to the early 1980s, it becomes clear that, for these cohorts, earnings increase at a roughly constant rate above the growth of overall earnings. More specifically, income grows at an average rate of 0.8% from one cohort born during these years to the next cohort. On the other hand, for the cohorts born after the 80s, the evolution of income falls, as can be seen in the figure. Income of cohorts born in the 1980s declines by approximately 2% with an average drop of 0.4% from one cohort to another. Likewise, the earnings of cohorts born in the 1990s appear to be growing, although they are below overall earnings growth.

**Figure 5: Results of APCT-Lag model without and with controls**



Note: Results of APCT-Lag Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCT-Lag coefficient and horizontal axis shows each APC component. As the period coefficients of the APCT-Lag model are the same as those obtained in the APCD model, we do not show them in the figure.

In sum, based on these results (APCT-Lag model) and those obtained in the previous analysis (APCD model), we observe that cohorts belonging to the baby-boom generation, despite being in a less favourable position in terms of income relative to other cohorts, are achieving higher earnings in absolute terms than their predecessor cohorts within the baby-boom generation. As we saw before, the evolution of their income is increasing and statistically significant. In the case

of cohorts born between the 70s and early 80s (generation X), in addition to having a more fortunate position in terms of relative earnings compared to other cohorts, they experience greater growth in their absolute earnings compared to overall income growth. Thus, cohorts born in the late 1970s have a higher living standard than those born in the early 1970s.

Conversely, our results point to a statistically significant decrease in the absolute earnings of the younger generation, that is, Millennials. Thus, the absolute living standard of these cohorts decreases. Therefore, the younger generation not only has a less favourable position in terms of relative income compared to other cohorts, but they also have a lower income in absolute terms than the predecessor cohorts. Consequently, the evidence shows that the economic crisis particularly affected the absolute income dynamics of this generation, but not that of other generations.

From a generational perspective, there is descriptive evidence that points to the economic crisis that began in 2008 in Spain as a turning point in the progress of workers' earnings conditions, which have been worsening over time in successive cohorts (Hernández de Cos, 2019; Puente and Regil, 2020). Thus, it is shown that, before the Great Recession, each new generation earned, on average, higher annual labour income than that of the previous one and experienced a continuous increase in hourly wages through the accumulation of work experience. Due to the economic recession, the progression in the improvement of the income of the young cohorts in comparison with the previous ones was slowed down. This led to the youngest workers being concentrated to a greater extent in the lower deciles of the wage distribution, those that correspond to the lowest incomes, and their proportion decreased in the higher wage levels.

Additionally, the evidence provided by Hernández de Cos (2019) and Puente and Regil (2020) indicates that the main causes of the slowness in the earnings recovery of young people are, on the one hand, the incidence of unemployment, especially at the beginning of the working career, and, on the other one hand, long-term unemployment with the associated loss of human capital, which would have generated a greater mismatch in the capacities of young unemployed people in the face of the labour market, especially those with a lower educational level. But also, the high rate of temporary employment presented by the current younger cohorts, which entail a loss or more difficult accumulation of experience and qualifications.

All of this illustrates that the impact of the financial and economic crisis of 2008-2013 is more adverse on the earnings of young people who are taking longer to recover. This context helps to explain the relatively high proportion of workers under 30 at risk of poverty.

Thus, our results are in line with the idea that younger generations are less favoured than members of previous generations in terms of lower income and less wealth (Gale et al., 2020; Kurz et al., 2018; Rahman and Tomlinson, 2018). As Puente and Regil (2020) point out, the annual labour

income of younger generations is reduced compared to that of previous generations, but this decrease seems to have a cyclical component.

Nevertheless, some authors such as Karonen and Niemelä (2020) and Chauvel and Schröder (2015) find that the level of absolute income has increased steadily from generation to generation, and no income inequalities between cohorts in absolute terms have been found. In the analysis by Chauvel and Schröder (2015), it is necessary to specify that the authors find an increase in the absolute income of the oldest to the youngest birth cohorts when they examine the American and German case, but not in the French case. In the latter, the evidence is similar to that found in our analysis. There is a stagnation in the absolute income progress of the younger cohorts.

Regarding age effects, the most notable differences are found at the extremes of the slope. In particular, the evidence for the uncontrolled model shows significant earnings growth in the youngest phase of the cohorts, when they transition to the labour market, that is, when the workers are between 25-30 years old. In the following years of the life cycle, earnings continue to grow in line with the trend. However, the results also show that earnings grow, but at a slower rate after 48 years.

Once we introduce the control variables, the effects of age practically overlap the trend, showing a constant increase in income throughout the life cycle. The deviations that we observe in the uncontrolled model are explained by the addition of control variables when age effects form an almost perfect line with the linear trend. These results, together with those obtained in the previous analysis, suggest that the effect of the variables included in the regression such as education, economic activity, or company size reduce the differences in all age groups. Thus, the evolution of income between age groups shows a linear trajectory in an absolute sense.

Finally, the estimated coefficients of the APCT-Lag model display the same period effects as in the APCD model. Thus, it does not provide new information on the effects of the period, so the results are not shown in the figure (to see the corresponding coefficients, see Annex 4 of Supplementary Material 3).

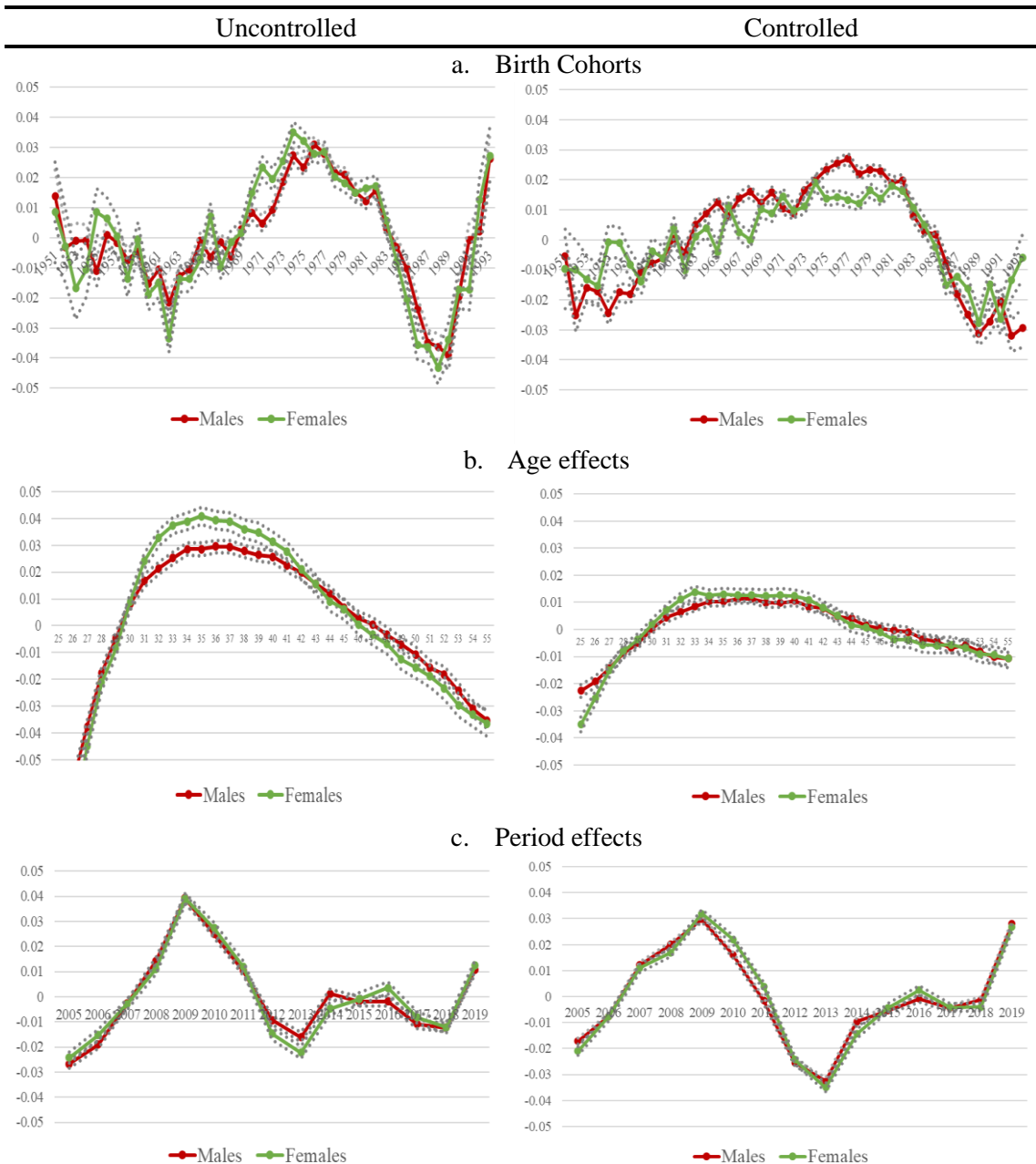
In sum, this second approach reveals that the Millennial generation is the most disadvantaged in terms of absolute earnings. Thus, the economic crisis of 2008 affects these cohorts more intensely compared to other cohorts, since, as we have seen, the evolution of their absolute earnings decrease.

#### 4.5.3. Gender perspective

Using a gender perspective, we also examine possible differences between male cohorts and female cohorts in terms of relative and absolute income.

In relation to relative income, the results of cohort effects on the income of men and women before and after including the control variables are consistent with what is obtained for the overall sample (see Figure 6 and Annex 3 of Supplementary Material 3).<sup>34</sup>

**Figure 6: ‘Detrended’ Age-Period-Cohort effects on earnings by gender without and with controls**



Note: Results of APCD Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCD coefficient and horizontal axis shows each APC component. Dotted lines represent 95 percent confidence intervals.

<sup>34</sup> We also estimate the APCD model using annual earnings as dependent variable and we find similar results (see Annexes 5 and 6 of Supplementary Material 3).

The generation born in the 1970s and early 1980s experiences a period of high economic growth in their transition to the labour market, as well as an expansion of educational opportunities, especially for women.<sup>35</sup> Based on data published by the World Bank, while the percentage of men with secondary school enrolment rose from 50% in 1971 to 73% in 1981 and to 86% in 1999, in the case of women, this percentage rose from 42% in 1971 to 74% in 1981 and to 89% in 1999.

In the case of women of working age, the economic situation they are experiencing leads them to join the employed group with greater intensity or to look for work, although their unemployment rate remains high. Thus, the percentage of active women with respect to the total labour force rose from 27.8% in 1980 to 43% in 2008 and to 46% in 2019, based on data available from the World Bank. All this contributes to the positive evolution of income. Hence, women born in the late 70s and early 80s are more benefited in terms of earnings than those born in the late 60s. Similar results are found for men.

For both genders, the results also show that the most disadvantaged cohorts are the younger generations. Despite being below the long-term income trend, female cohorts are closer to the trend than males.

The age effects follow a similar pattern for both sexes. The only thing to note is that age effects are greater for women between 31 and 42 years than for men of those ages. Once we include controls in the model, however, we do not find a significant difference between men and women. Regarding the period coefficients, we do not find significant differences between men and women.

In relation to absolute earnings, for both genders there are differences between the earnings growth of the cohorts and the trend of the overall earnings growth of each gender, especially once we control the model for covariates (see Figure 7 and Annex 4 of Supplementary Material 3).

<sup>36</sup>This implies that for some cohorts, income growth is higher or lower than overall income growth. Focusing on the controlled model, we observe that the earnings growth of the male and female cohorts in the 1950s and early 1960s is similar to the overall increase in earnings.

On the other hand, we find that the earnings of workers born between the 1960s and the late 1970s increase at a constant rate above the growth of overall earnings, especially for women. Thus, the earnings of women increased approximately 16.6% during that period, compared to those of men, which increased 13.2%. For the cohorts born after the 1980s, on the other hand, the evolution of income stagnates in the case of women and becomes practically flat. In the case of men, earnings

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<sup>35</sup> Mainly promoted by the General Education Law of 1970, covering the entire national educational system, that is, the different educational levels.

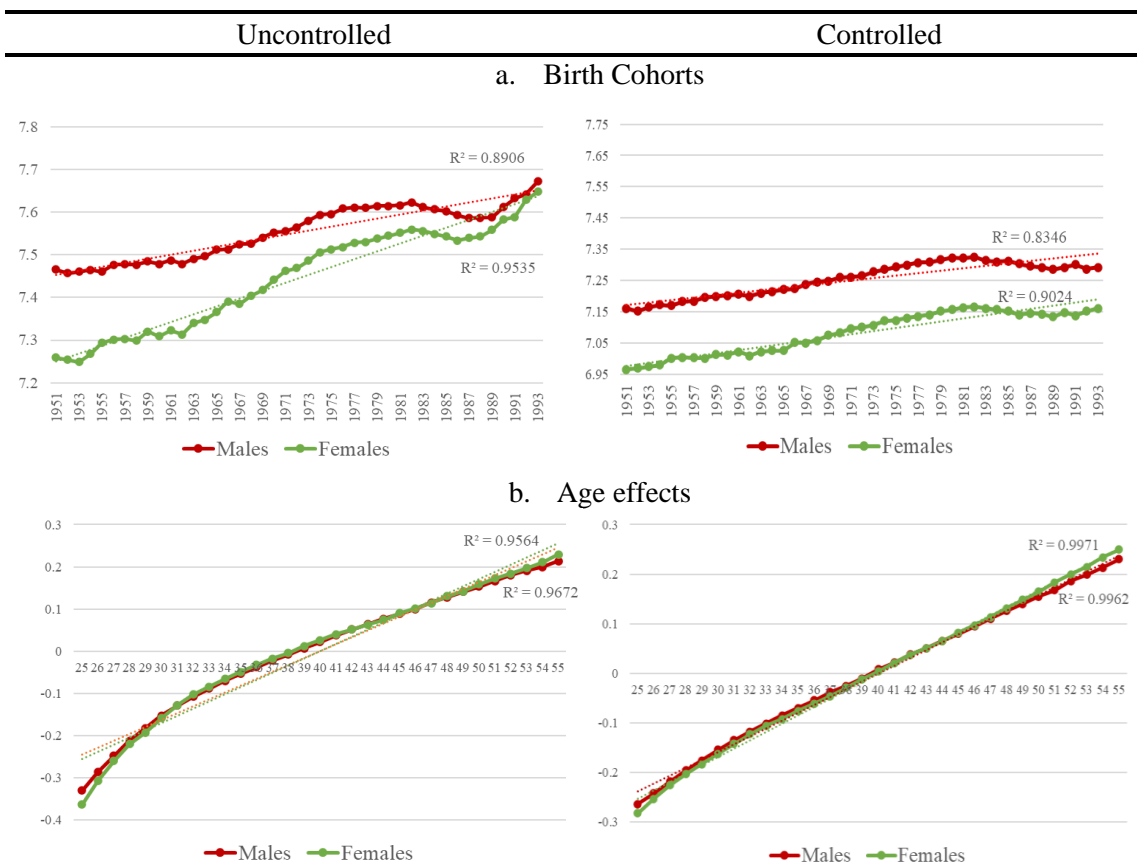
<sup>36</sup> We also estimate the APCT-Lag model using annual earnings as dependent variable and we find similar results (see Annexes 7 and 8 of Supplementary Material 3).

decrease slightly. If we compare the income growth of men with that of women, we find that the gap in terms of earnings tends to decrease slightly by birth cohort.

Regarding age effects, the results do not differ by gender. When we control for covariates, the effects of age for both men and women almost overlap the trend, showing a steady increase in income throughout the life cycle. Finally, as the period effects do not provide new information, the results are not shown in the figure.

In sum, the evidence indicates that there are inequalities within female cohorts, on the one hand, and within male cohorts, on the other. Furthermore, the results confirm the idea that the younger cohorts, whether men or women, have lower absolute earnings than the predecessor cohorts. This result suggests that the economic crisis particularly affects the absolute income dynamics of this generation, but not that of other generations, regardless of gender. Another result should be highlighted as well. If we compare the evolution of the absolute income of men with that of women, we find that the earnings of men are higher than that of women, although the gap tends to decrease from generation to generation.

**Figure 7: Results of APCT-Lag model without and with controls by gender**



Note: Results of APCT-Lag Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCT-Lag coefficient and horizontal axis shows each APC component. As the period coefficients of the APCT-Lag model are the same as those obtained in the APCD model, we do not show them in the figure.

## 4.6. Conclusions

In this article, we present evidence on the possible existence of income inequality between different generations from two approaches: relative and absolute income. We also take into account possible gender differences. Moreover, we focus on cohort dimension, which is often excluded from most analyses. Together with a life course perspective, we can separately identify age, time and cohort effects. This opens up a new perspective on the income inequality topic.

We focus on the period between 2005 and 2019, when the Spanish economy experiences different phases of business cycle. Specifically, the economic expansion during 2000-2007 is followed by a period of tough economic conditions since 2008. From 2014 onwards, an economic recovery seems to begin. Therefore, this analysis provides new evidence on how the Great Recession affects inter-cohort income inequality and to the growth of the absolute earnings from generation to generation.

From the relative perspective, our results indicate that there are inequalities between generations (*Hypothesis 6*). In particular, we find that the baby-boom generation (born between 1951-1965) and the Millennial generation (born between 1982-1993) are more disadvantaged by their year of birth in terms of earnings than the generation X (1966-1981). These results in relative terms are consistent with the idea that the economic conditions faced by the cohorts in their transition to the labour market are a key factor in determining whether they are in a more or less favoured position. Thus, the generation X enters the labour market in a context of recovery and strong economic expansion, along with a development of educational opportunities. Hence, they have a more fortunate position. The baby-boom and Millennial generation, instead, start their professional career under adverse economic conditions, which leads them to be in a more disadvantaged position in terms of earnings, especially for the latter. Distinguishing by gender, the evidence also indicates that there are inequalities between female cohorts, on the one hand, and male cohorts, on the other.

From the absolute perspective, we observe again differences between generations (*Hypothesis 7*). Particularly, the evidence indicates that the Millennial generation is the most disadvantaged in terms of absolute income. Therefore, the younger generation not only has a less favourable position in terms of relative income compared to other cohorts, but they also have lower absolute earnings than the predecessor cohorts. Thus, our findings show that the economic crisis particularly affected the absolute income dynamics of this generation, but not that of other generations. By gender, our results confirm the idea that the younger cohorts, whether males or females, have lower absolute earnings than the predecessor cohorts. Furthermore, if we compare the evolution of the absolute income of males versus that of females, we find that the earnings of

males are higher than that of females (*Hypothesis 8*), despite the fact that this gap has been narrowing from generation to generation.

One of the limitations of this analysis may be the use of labour income from the contribution bases as our study variable because they are bottom and top coded. Consequently, the true wage received by a worker may be higher than the maximum contribution base. We find that the percentage of total observations affected by the lower and upper limits in our sample is 1.2% and 9.2%, respectively, of the total sample. It should also be noted that the cohorts affected by the lower limit are the youngest, while those most affected by the upper limit are those belonging to Generation X. These results, therefore, indicate that the evidence found in this chapter may be downward biased. In other words, it is possible that the true value of labour income inequality between generations is being underestimated. If the contribution bases did not have those limits above and below, perhaps it would be observed that the inequality between generations would be even greater. Thus, as future research, this topic of income inequality between generations will be addressed, using annual work income, which is not bottom and top coded.

Additionally, we do not include public sector in the study. As the main objective in this chapter is to observe a possible labour income inequality between young people and other different generations, we do not include the public sector in the analysis for two important reasons. First, the percentage of young people under 30 years of age who are working in the public sector is low in Spain. Thus, according to LFS data, the average percentage of workers aged 16-24 and working in the public sector between 2006-2020 is 2.3%. Second, the MCVL only includes a part of the workers in the public sector. Additionally, the inclusion of these workers could lead to a greater effect of inter-cohort income inequality, to the extent that the generations with the highest proportion of public sector workers are those corresponding to generation X. Therefore, this chapter focuses on the analysis of labour income inequality between cohorts in the private sector.

Our evidence presents a clear but troubling picture of the economic position of the Millennial generation in their transition to the labour market. The financial and economic crisis that began in 2008 put a significant brake on the expectations of prosperity especially for young people, while at the same time entailing significant costs and risks of a social and collective nature. Therefore, it should receive more attention from policy makers. Concretely, it seems clear the need to implement economic, educational and labour policies capable of facilitating that young people in Spain have access to jobs that allow them to acquire and accumulate professional experience, reinforcing their employability and strengthening their work paths.

This is not only important because the economic crisis has particularly affected this generation, placing them in a more unfavourable position in terms of earnings and reducing their living standard compared to other generations, but this may have long-term consequences which may



widen existing economic disparities and limit the development of the human capital of this generation, which in turn has negative implications for future economic growth. This is what has been found in Chapter 2. In this sense, a significant penalty in terms of wages for young workers entering the labour market during the economic crisis, which persists several years since their entry, has been found. Therefore, it is necessary to reinforce all policies aimed at young cohorts, avoiding that, due to the accumulated effect of the crisis, a reality of low earnings can become chronic, which affects them more differentially, with negative individual and social consequences.

This situation may be aggravated in the context of the new crisis caused by COVID-19. The significance of the consequences that the already verified drop in employment and the increase in unemployment among young people may have, within a panorama of strong general deterioration in the labour market, will depend on the depth and duration of this new crisis. The prospects created by the impact of the COVID-19 pandemic are again very worrying for the younger group. The intense and rapid deterioration of their position in the labour market, and its effects in the medium and long term, increase the risk of aggravating a situation of social precariousness. The current generations of the young population, and particularly the older ones, have lived between two devastating crises practically successive that weighed down their expectations and their real options to achieve a full transition to independent adult life.



## CAPÍTULO 5: CONCLUSIONES DE LA INVESTIGACIÓN

En este último capítulo se desarrolla, por un lado, el alcance de los objetivos generales, así como de una serie de hipótesis a contrastar, las cuales se han enunciado al inicio de esta tesis doctoral. Por otro lado, este capítulo finaliza con una sección donde se exponen las conclusiones generales de la tesis doctoral.

### 5.1. Alcance de los objetivos generales

Al inicio de esta tesis doctoral se plantean tres objetivos generales que resultan clave en el estudio de cómo la crisis económica de 2008 ha afectado a la carrera profesional de los nuevos entrantes jóvenes al mercado de trabajo desde una perspectiva de cohortes.

En primer lugar, se ha buscado entender el impacto que ha tenido la Gran Recesión sobre las trayectorias salariales y de empleo de la población trabajadora más joven en su conjunto, que inicia su carrera profesional en dicho contexto económico en el mercado laboral español, poniendo el foco tanto en su magnitud como en su persistencia. Así, el análisis incluye una perspectiva a corto y largo plazo. Otro de los ejes argumentales del primer objetivo ha girado en torno al papel que juega el nivel educativo alcanzado por los jóvenes cuando inician su etapa profesional durante la Gran Recesión. Esto nos ha permitido examinar las diferentes consecuencias que tuvo la crisis en el corto y largo plazo sobre la situación laboral de los jóvenes en función de su nivel de formación.

A tal respecto, se comprueba que las cohortes de jóvenes que entran al mercado laboral durante una recesión se enfrentan a un impacto adverso en el corto plazo en términos de salarios y empleo, pero también en el largo plazo. Es decir, el aumento del desempleo y el empeoramiento de la calidad de los puestos de trabajo produce un impacto negativo en los salarios y el empleo de los jóvenes que se extiende a lo largo de su carrera profesional. En base a estos resultados, no se pueden rechazar las Hipótesis 1 y 2, que son las siguientes:

***Hipótesis 1.*** Los jóvenes que inician su carrera profesional en un contexto de recesión ven afectados negativamente sus salarios y perspectivas de empleo en el corto plazo.

***Hipótesis 2.*** Los efectos negativos de la Gran Recesión sobre los jóvenes en términos de empleo y salarios se prolongan en el largo plazo.

Por otro lado, la evidencia obtenida hace hincapié en el papel que tiene el nivel educativo a la hora de observar diferentes efectos de la crisis sobre las trayectorias salariales y de empleo de los jóvenes. Así, nuestros resultados muestran una penalización salarial persistente para los

trabajadores jóvenes altamente cualificados, pero ningún efecto significativo sobre los salarios de aquellos poco cualificados. En términos de empleo, encontramos un efecto negativo y persistente para los jóvenes con educación universitaria. Para aquellos con menor nivel educativo, encontramos que el efecto principal es a través del empleo. Este resultado es coherente con el hecho de que en España los trabajadores poco cualificados se han enfrentado a una barrera de entrada que impedía a una alta proporción de ellos acceder al mercado laboral.

En base a esta evidencia, no se puede rechazar la Hipótesis 3, que es la siguiente:

**Hipótesis 3.** La magnitud del impacto de la Gran Recesión sobre los salarios y el empleo de los jóvenes, así como su persistencia varía en función del nivel educativo que estos alcancen.

El segundo objetivo continúa abordando el impacto de la crisis sobre el colectivo juvenil que inicia su carrera profesional bajo este contexto, pero, en este caso, teniendo en cuenta el país de nacimiento de los jóvenes, es decir, diferenciando entre aquellos nacidos en España frente a quienes han nacido en otro país y acceden al mercado laboral español. El interés por la desagregación de los jóvenes en función del país de nacimiento surge del importante aumento de población inmigrante que llegó a España durante la expansión económica seguido del notable impacto que esta experimentó con el inicio de la crisis de 2008. De esta manera, se analizan posibles diferencias en el impacto a corto y largo plazo que la Gran Recesión ha tenido sobre las trayectorias salariales y de empleo de los jóvenes nativos e inmigrantes entrando al mercado laboral.

En términos generales, se demuestra que existe un impacto diferente de la crisis económica sobre los salarios y el empleo de nativos e inmigrantes. Además de un bloqueo en la entrada del mercado laboral que afecta más al colectivo inmigrante, los resultados muestran que los nativos se ven más afectados tanto a corto como a largo plazo en términos de salarios y empleo que los inmigrantes. Asimismo, el nivel de formación también marca la diferencia. Cuanto mayor es el nivel educativo, mayor es el impacto negativo de la crisis en términos de empleo y salarios. Estos efectos negativos se prolongan a lo largo de la carrera profesional de los jóvenes.

En base a estos resultados, no se pueden rechazar las Hipótesis 4 y 5, que son las siguientes:

**Hipótesis 4.** Tanto la magnitud como la persistencia del impacto de la Gran Recesión sobre los salarios y el empleo de los jóvenes varía en función del país de nacimiento.

**Hipótesis 5.** El nivel educativo de los jóvenes nativos e inmigrantes también juega un papel clave en la magnitud y persistencia del impacto de la Gran Recesión sobre los salarios y el empleo.

Finalmente, el tercer objetivo radica en el estudio sobre la desigualdad de renta entre diferentes generaciones que se encuentran dentro del mercado laboral español durante una recesión económica. Este análisis permite profundizar en la posición desfavorecida que presentan las cohortes más jóvenes en términos de renta en comparación con otras generaciones. Con el inicio de la recesión, la desigualdad y el riesgo de exclusión social aumentaron, afectando especialmente al colectivo juvenil. Así, una vez conocida la situación desfavorecida de los jóvenes en su entrada al mercado laboral y en los siguientes años de su carrera profesional, se amplía la perspectiva incorporando a otros colectivos con el fin de realizar un análisis comparativo.

A tal respecto, se confirma que existen desigualdades de renta entre generaciones. En concreto, se encuentra que mientras que la generación X (nacida entre 1966-1981) está más favorecida por su año de nacimiento en términos de renta, la generación del baby boom (nacida entre 1951-1965) y, especialmente, la generación Millennial (nacida entre 1982-1993) se encuentran en una posición más desfavorable en términos de renta por su año de nacimiento. Asimismo, la evidencia señala que la generación Millennial no sólo se ve afectada negativamente en términos de ingresos relativos, sino también en términos de ingresos absolutos. Por tanto, la generación más joven no solo tiene una posición menos favorable en términos de ingresos relativos en comparación con otras cohortes, sino que también tiene un nivel de vida absoluto más bajo que las cohortes predecesoras. De esta manera, la crisis económica afectó particularmente a la dinámica de ingresos absolutos de esta generación, pero no a la de otras generaciones.

En línea con esta evidencia, no se pueden rechazar las Hipótesis 6 y 7, que son las siguientes:

- **Hipótesis 6.** Existen desigualdades de renta en términos relativos entre diferentes generaciones.
- **Hipótesis 7.** Existen diferencias entre generaciones en cómo se han desarrollado los ingresos absolutos durante una crisis económica.

Adicionalmente, el tercer objetivo de la tesis doctoral incluye una perspectiva de género, con el fin de observar posibles diferencias de género en la desigualdad de ingresos entre generaciones en un contexto de crisis. Los resultados hallados muestran desigualdades de renta entre las cohortes femeninas, por un lado, y las cohortes masculinas, por el otro. Sin embargo, no existen diferencias entre hombres y mujeres sobre cuáles son las generaciones que están favorecidas y desfavorecidas en términos de renta. Desde una perspectiva de ingresos absolutos, los resultados confirman la idea de que las cohortes más jóvenes, ya sean hombres o mujeres, tienen un estándar de vida absoluto más bajo que las cohortes predecesoras. En este caso, sí se observan diferencias por género si comparamos la evolución del ingreso absoluto de los hombres frente al de las mujeres. En particular, se observa que el nivel de vida de los hombres es superior al de las mujeres, a pesar de que esta brecha se ha ido reduciendo de generación en generación.

Por tanto, se puede rechazar una parte de la Hipótesis 8 y aceptar la otra parte. La Hipótesis 8 es la siguiente:

- **Hipótesis 8.** Las desigualdades de renta en términos absolutos y relativos entre generaciones pueden ser diferentes entre mujeres y hombres.

En resumen, toda la evidencia hallada en la tesis doctoral plantea una panorámica general que permite una comprensión global de las principales consecuencias que ha tenido la crisis económica sobre la situación laboral de los jóvenes y, a su vez, determina el grado de consecución de los objetivos inicialmente planteados. Al mismo tiempo, las hipótesis de partida que han servido de hilo argumental de la tesis doctoral ofrecen resultados detallados que enriquecen el análisis y permiten un estudio particular sobre lo ocurrido con el colectivo juvenil a raíz de la crisis económica. A continuación, se exponen las conclusiones extraídas en la tesis doctoral.

## 5.2. Conclusiones de la investigación

La inserción laboral de los jóvenes es una etapa de transición a la vida adulta, en la que se desarrolla la maduración de los individuos, la formación con metas profesionales y la adopción de decisiones tendentes al asentamiento vital, es decir, la adquisición de la condición plena de individuos autónomos. Así pues, la participación laboral de los jóvenes resulta ser un factor clave en la garantía de su bienestar y de pertenencia al conjunto social, y al mismo tiempo representa un activo fundamental para la renovación generacional del capital humano y social del país.

Por tanto, la integración social de este grupo de población tiene su epicentro en el empleo, así como en las características de dicha participación en el mercado de trabajo. De cómo sean estas dependen en gran medida sus condiciones de vida y sus expectativas de desarrollo personal y familiar, las cuales tienen profundas consecuencias colectivas a medio y largo plazo. De una integración social satisfactoria de las personas jóvenes depende el bienestar de una amplia capa de la población, pero también la propia sostenibilidad social. Por este motivo, es necesario conocer en profundidad las características que presentan los trabajadores más jóvenes y su situación laboral en el periodo de transición de la etapa educativa al acceso al mundo profesional.

Tal y como apunta la evidencia encontrada en la tesis doctoral, las condiciones económicas que enfrentan las cohortes de trabajadores en su transición al mercado laboral son un factor clave para determinar su situación laboral no sólo en el corto plazo, sino también a lo largo de su carrera profesional. Así, las condiciones económicas adversas producidas por la crisis financiera y económica iniciada en 2008 tuvieron como primer impacto la destrucción de empleo, así como el bloqueo en la entrada al mercado laboral, afectando más intensamente al colectivo juvenil. Esto

supuso una importante reducción en el número de nuevos participantes jóvenes, especialmente entre los trabajadores inmigrantes.

Asimismo, los resultados obtenidos para aquellos jóvenes capaces de entrar al mercado laboral bajo un contexto de crisis económica muestran un efecto “cicatriz” en las carreras laborales de los jóvenes en términos de salarios y empleo, especialmente para las cohortes jóvenes nacidas en España. En otras palabras, se encuentran relevantes efectos negativos en el corto y largo plazo ante un incremento del desempleo. Sin embargo, el impacto de entrar al mercado laboral durante la crisis varía según el nivel educativo de los jóvenes.

Para el conjunto del colectivo juvenil, se observa una clara penalización salarial y de empleo para las personas altamente cualificadas, que persiste durante más de 10 años. Esta evidencia está en línea con la idea de que los trabajadores con alto nivel educativo, frente a quedar desempleados, acaban aceptando trabajos con peores condiciones laborales, es decir, con salarios más bajos y menos oportunidades de formación y promoción, y desplazando a aquellos con bajos niveles de educación. Esto acarrea una mayor dificultad a la hora de acceder en un futuro a un trabajo con salarios más altos y mejores condiciones laborales. De esta forma, las pérdidas salariales y de empleo persisten en el tiempo. En el caso de las cohortes menos educadas, en cambio, no se encuentran afectadas negativamente en términos salariales, pero sí en términos de empleo. Esta evidencia es consistente con la existencia de un salario mínimo legal, que puede actuar como un piso para los salarios de entrada y afecta principalmente a los trabajadores jóvenes poco calificados, y a la presencia de rigideces salariales a la baja, que conducen a un ajuste principalmente a través de despidos y no a través de recortes salariales.

Una vez diferenciamos entre cohortes jóvenes nativas e inmigrantes, se encuentran efectos de la crisis sobre las trayectorias salariales y de empleo distintos. En general, la evidencia muestra que los nativos se ven más afectados en el corto y largo plazo en términos de salarios y empleo que los inmigrantes, posiblemente porque la entrada de estos últimos está más bloqueada y los que entran están más autoseleccionados. Por niveles educativos, se encuentra que cuanto mayor es el nivel de educación, mayor es el impacto negativo de la crisis en términos de empleo y salarios. El impacto negativo de la crisis sobre los ingresos de inmigrantes y sobre los ingresos y empleo de nativos con alto nivel educativo parece estar promovida por el acceso a trabajos menos cualificados, los cuales normalmente ocupan los trabajadores con menor nivel educativo. Estos trabajos con peores condiciones laborales también se caracterizan por tener “suelos pegajosos” y limitadas posibilidades de promoción. Esto crea un problema de sobrecualificación para estos trabajadores altamente cualificados en el mercado laboral, que tiene graves consecuencias. En el caso de las cohortes menos cualificadas, cabe destacar el persistente impacto negativo de la crisis sobre el empleo de los inmigrantes, probablemente como consecuencia de su mayor sensibilidad

al ciclo económico, que se traduce en pérdidas de empleo, y al desplazamiento laboral que sufren por parte de los nativos. Por otro lado, los inmigrantes con bajo nivel educativo no se ven particularmente afectados por la Gran Recesión en términos de ingresos posiblemente porque sus ingresos ya sean bajos y cercanos al salario mínimo legal.

Desde una perspectiva generacional, se profundiza en la posición desfavorecida que presentan los jóvenes en el mercado de trabajo en términos de renta en comparación con otras generaciones en un contexto de recesión. En particular, los resultados muestran que la generación más joven no solo tiene una posición menos favorable en términos de ingresos relativos en comparación con otras generaciones, sino que también tiene un nivel de vida absoluto más bajo que las cohortes predecesoras. Por tanto, la evidencia señala que la crisis económica afecta particularmente a la dinámica de ingresos absolutos de esta generación, pero no la de otras generaciones. Esto puede originar consecuencias a largo plazo que pueden ampliar las disparidades económicas existentes y limitar el desarrollo del capital humano de esta generación, lo que a su vez tiene implicaciones negativas para el crecimiento económico futuro, tal y como se observa en el primer análisis comentado anteriormente.

En resumen, la evidencia hallada en esta tesis doctoral presenta una imagen clara pero preocupante de la posición económica de la generación Millennial en su etapa de inserción en el mercado laboral. La crisis financiera y económica iniciada en 2008 frenó de forma significativa las expectativas de prosperidad especialmente para los jóvenes, al tiempo que conllevó importantes efectos negativos a lo largo de sus trayectorias profesionales. Por este motivo, debería recibir más atención por parte de los responsables políticos. Concretamente, parece clara la necesidad de implementar políticas económicas, educativas y laborales capaces de facilitar que los jóvenes en España tengan acceso a puestos de trabajo que les permitan adquirir y acumular experiencia profesional, reforzando su empleabilidad y fortaleciendo sus trayectorias laborales.

De esta manera, se pone de manifiesto la importancia de llevar a cabo una política de empleo en sentido amplio, capaz de responder a los problemas y necesidades de la juventud en su acceso al mercado de trabajo, el ajuste con la demanda de trabajo existente, la mejora de la empleabilidad y la estabilidad laboral. En particular, las políticas activas de empleo dirigidas a la población joven ejercen un papel importante en el conjunto de la política de empleo a nivel global, que parte de identificar los problemas a los que se enfrentan los trabajadores menores de 30 años en el mercado de trabajo y articular medidas concretas para abordarlos.

A esto se añaden los problemas y las necesidades específicas de la población joven en su transición del mundo educativo al laboral y el acceso a un primer empleo, máxime en un contexto en el que son los jóvenes los que han sufrido las mayores consecuencias de la crisis económica, como también lo están siendo ahora en la crisis por la COVID-19. El empeoramiento del problema



estructural relativo al desempleo juvenil que supone la suma de los efectos de las dos últimas crisis, la población joven sigue enfrentándose a importantes incertidumbres y desafíos. Por tanto, es necesario reforzar todas las políticas dirigidas a las cohortes jóvenes, evitando que, debido al efecto acumulado de las dos crisis, se pueda volver crónica una realidad de bajos ingresos, que los afecta de forma más diferencial, con consecuencias negativas individuales y sociales.



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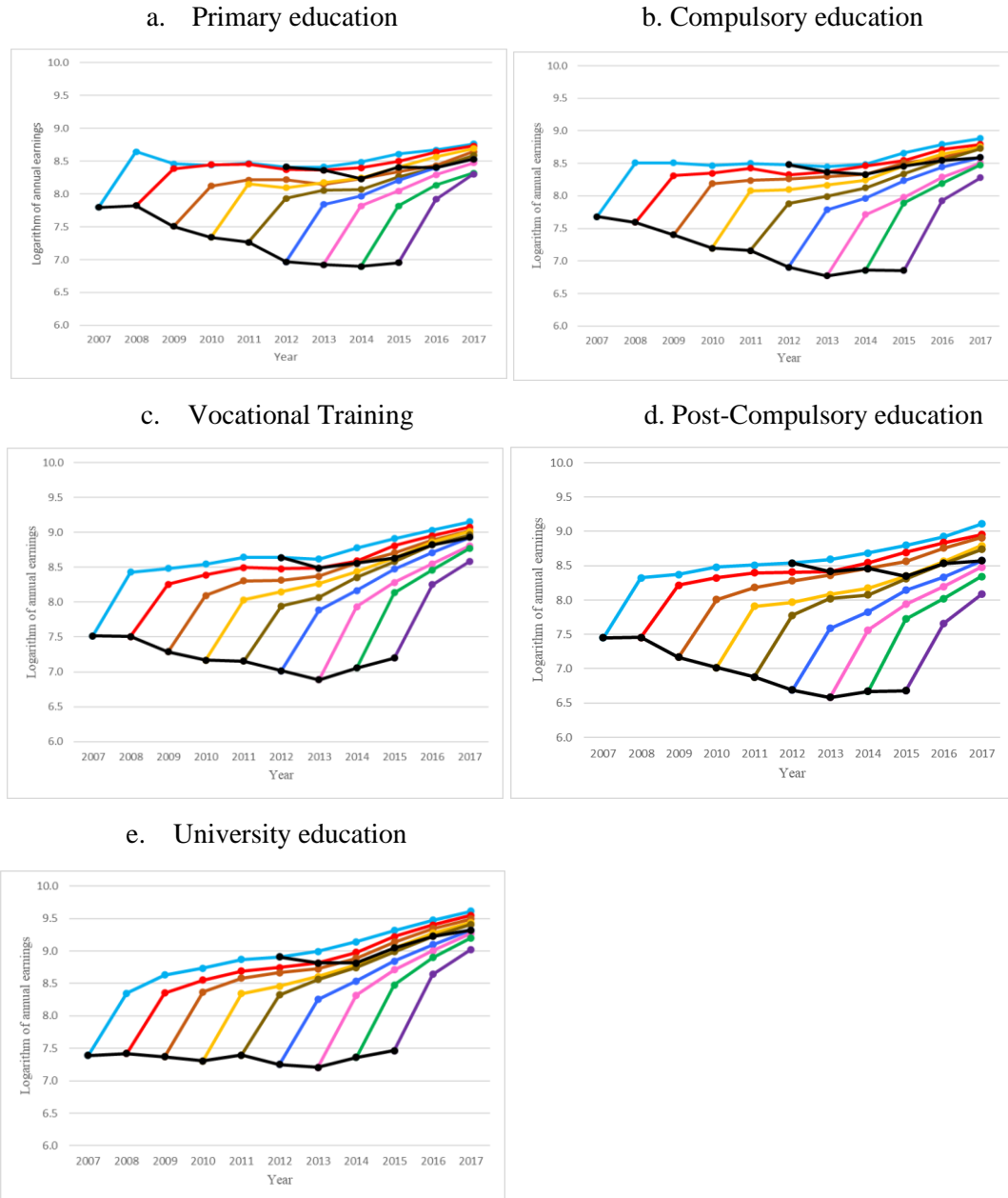
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# MATERIAL SUPLEMENTARIO 1

CAPÍTULO 2: LONG-TERM EFFECTS ON YOUTH CAREER  
OF ENTERING THE LABOUR MARKET DURING THE  
GREAT RECESSION

## ANNEX 1: Evolution of the annual earnings by educational level

Figure 8A: Evolution of the annual earnings of young cohorts, according to educational level



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

## ANNEX 2: The Wald test

We carry out the Wald test, which allows us to compare regression coefficients across different groups. However, we cannot perform the Wald test directly after the estimates because an important step in our methodology is, before estimating, to collapse our data by entry year into the labour market, province where the worker enters the labour market and calendar year. All this, broken down by 6 educational levels. In other words, we use different subsamples when estimating.

When we collapse, we are left with the desired subsample, but the original database is automatically removed from Stata's memory. In this way, we need to export the estimated coefficients of each of the subsamples on disk and then import them. To do this, we use the Stata “*estwrite*” and “*estread*” commands. “*Estwrite*” exports previously fitted and stored models by estimates stored to filename on disk and “*estread*” reimports the saved estimation sets from the filename.

As we estimate the regressions for each subsample, we add them to an existing file using the “*estwrite*” command with the “*append*” option. The sample size is taken into account with the “*id (varname)*” option, which specifies a unique identifier for the observations and causes the sample size to be stored with the estimates. However, the values of the ID variables have to coincide in all regressions included in the file. In our case, this condition is only fulfilled in the case of estimates relating to the monthly wages and the probability of employment, whose sample size is the same in the different regressions. As we mentioned in the second chapter, we use, on the one hand, data from files related to the contribution bases and, on the other hand, data from files related to fiscal data. Therefore, we use two different databases. From the first we obtain information about monthly wages and the probability of employment, and from the second we obtain information about annual wages and days worked. Hence, the number of observations may differ.

Thus, we can only examine whether the coefficients differ between groups in the case that the dependent variables are the monthly wage or the probability of employment. Next, we show the results obtained.

Once we import the file with the estimated regressions, to examine whether the coefficients differ between groups, we use a Wald chi-square test. For this we use the Stata's command “*suest*”. To do this, we separately estimate the model for each educational group, store the results, use “*suest*” to combine the results into a single model, and then test whether the coefficients differ between the groups. Specifically, the “*suest*” approach estimates the simultaneous (co) variance of the coefficients of the different groups, allowing comparison between coefficients, that is, it is possible to test whether the common coefficients are equal.

In the case that the dependent variable is the monthly wage, we compare the coefficients of the regressions of those workers with primary education, post-compulsory education and university since they are the only regressions with statistically significant coefficients. The result obtained in the coefficient equality test is as follows:

test [mod2_mean=mod5_mean=mod6_mean]: r_UR_exp0 r_UR_exp1 r_UR_exp2 r_UR_exp3 r_UR_exp4 r_UR_exp5 r_UR_exp6 r_UR_exp7 r_UR_exp8 r_UR_exp9 r_UR_exp10
chi2(22) = 32.85
Prob > chi2 = 0.0641

In line with the result obtained, we reject the null hypothesis of equality of the common coefficients between the three models analyzed: those workers with primary, post-compulsory and university education. Therefore, the coefficients are statistically different between the three models analyzed.

On the other hand, when the dependent variable is the probability of employment, we compare the coefficients of the regressions of those workers with vocational education and university since they are the only regressions with statistically significant coefficients. The result obtained in the coefficient equality test is as follows:

test [mod4_mean= mod6_mean]: r_UR_exp0 r_UR_exp1 r_UR_exp2 r_UR_exp3 r_UR_exp4 r_UR_exp5 r_UR_exp6 r_UR_exp7 r_UR_exp8 r_UR_exp9 r_UR_exp10
chi2(11) = 20.82
Prob > chi2 = 0.0353

Based on the result obtained, we reject the null hypothesis of equality of the common coefficients between the two models analyzed: those workers with vocational education and university education. Therefore, the coefficients are statistically different between the two models analyzed.

ANNEX 3: The effect of one pp in unemployment on annual income and days worked  
by age group

Table 11A: Effect of one pp rise in contemporaneous unemployment rate on annual income, by age group

	Age groups	
	16-25 (1)	26-30 (2)
0	-0.008** (0.003)	-0.020*** (0.005)
1	-0.005* (0.003)	-0.010** (0.005)
2	-0.009*** (0.003)	-0.011** (0.004)
3	-0.011*** (0.003)	-0.010** (0.004)
4	-0.014*** (0.003)	-0.009* (0.004)
5	-0.012*** (0.003)	-0.009** (0.004)
6	-0.013*** (0.003)	-0.009 (0.006)
7	-0.013*** (0.003)	-0.008 (0.007)
8	-0.015*** (0.003)	-0.003 (0.009)
9	-0.017*** (0.003)	-0.001 (0.009)
10	-0.021*** (0.004)	-0.007 (0.007)
Constant	8.070*** (0.035)	8.873*** (0.066)
Observations	1,071	1,071
R-squared	0.986	0.900

Robust standard errors in parentheses \*\*\*p<0.01, \*\*p<0.05, \*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 12A: Effect of one pp rise in contemporaneous unemployment rate on days worked, by age group

	Age groups	
	16-25 (1)	26-30 (2)
0	-2.005*** (0.493)	-1.033 (0.797)
1	-1.661*** (0.510)	0.574 (0.787)
2	-2.013*** (0.498)	0.014 (0.741)
3	-1.820*** (0.467)	0.410 (0.736)
4	-1.589*** (0.439)	0.530 (0.709)
5	-1.722*** (0.447)	0.708 (0.762)
6	-1.565*** (0.471)	0.608 (0.812)
7	-1.485*** (0.498)	0.795 (0.844)
8	-1.574*** (0.535)	1.314 (0.830)
9	-1.929*** (0.520)	1.345 (0.852)
10	-2.308*** (0.570)	1.710* (0.966)
Constant	125.081*** (5.932)	197.532*** (10.599)
Observations	1,071	1,071
R-squared	0.947	0.712

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.



ANNEX 4: The effect of one pp in unemployment on annual income and days worked  
by entry cohort and educational level

Table 13A: The effect of one pp in unemployment on annual income by entry cohort and educational level

	Compulsory education		V.T.		P.C. education		University education	
	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
0	-0.017*** (0.006)	0.019 (0.014)	-0.001 (0.007)	0.001 (0.007)	-0.028*** (0.01)	-0.008 (0.013)	-0.024*** (0.008)	-0.017*** (0.006)
1	-0.017*** (0.006)	0.016 (0.011)	-0.001 (0.005)	0.006 (0.007)	-0.019** (0.008)	-0.011 (0.016)	-0.017*** (0.006)	-0.014** (0.006)
2	-0.018*** (0.004)	0.010 (0.012)	-0.000 (0.005)	0.003 (0.007)	-0.015** (0.006)	-0.012 (0.014)	-0.016*** (0.005)	-0.016** (0.006)
3	-0.015*** (0.004)	0.013 (0.014)	-0.001 (0.004)	0.002 (0.006)	-0.016** (0.006)	-0.016 (0.013)	-0.017*** (0.005)	-0.017*** (0.006)
4	-0.013*** (0.004)	0.006 (0.013)	-0.001 (0.004)	-0.000 (0.007)	-0.017*** (0.006)	-0.017 (0.013)	-0.018*** (0.005)	-0.017** (0.006)
5	-0.009** (0.004)	0.018 (0.014)	-0.003 (0.004)	-0.000 (0.007)	-0.018*** (0.006)	-0.021 (0.014)	-0.018*** (0.004)	-0.018*** (0.007)
6	-0.010** (0.004)	0.017 (0.015)	-0.005 (0.004)	-0.003 (0.008)	-0.020*** (0.007)	-0.015 (0.014)	-0.019*** (0.005)	-0.020*** (0.007)
7	-0.008 (0.005)	0.026 (0.017)	-0.005 (0.004)	-0.002 (0.008)	-0.020** (0.008)	-0.023 (0.016)	-0.021*** (0.005)	-0.020*** (0.007)
8	-0.005 (0.006)		-0.003 (0.004)		-0.021** (0.008)		-0.024*** (0.005)	
9	-0.004 (0.006)		-0.004 (0.004)		-0.025*** (0.009)		-0.026*** (0.006)	
10	-0.017*** (0.005)		-0.002 (0.004)		-0.029** (0.012)		-0.030*** (0.007)	
Constant	8.299*** (0.064)	7.381*** (0.304)	8.137*** (0.072)	7.709*** (0.168)	8.266*** (0.095)	7.854*** (0.289)	8.395*** (0.075)	8.619*** (0.138)
Observ.	510	561	508	561	509	559	510	561
R-squared	0.936	0.933	0.945	0.939	0.876	0.904	0.974	0.971

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 14A: The effect of one pp in unemployment on days worked by entry cohort and educational level

	Compulsory education		V.T.		P.C. education		University education	
	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015	2007-2009	2010-2015
0	-2.939** (1.277)	-0.266 (1.016)	2.150* (1.087)	0.222 (0.751)	-2.172 (1.509)	-1.254 (0.967)	-4.023*** (1.241)	-2.448** (0.964)
1	-2.283* (1.141)	0.150 (0.949)	2.352** (0.915)	0.313 (0.727)	-1.671 (1.183)	-1.467 (0.992)	-2.696** (1.033)	-2.234** (0.997)
2	-2.449** (0.921)	-0.238 (1.015)	2.125** (0.87)	-0.028 (0.758)	-1.096 (0.999)	-2.041** (1.021)	-2.661*** (0.946)	-2.792*** (1.008)
3	-1.890** (0.825)	0.271 (1.076)	1.886** (0.807)	0.010 (0.757)	-0.722 (0.883)	-1.900* (1.069)	-2.443*** (0.853)	-2.494** (1.021)
4	-1.067 (0.792)	0.948 (1.138)	1.847** (0.789)	0.475 (0.812)	-0.614 (0.817)	-1.472 (1.081)	-2.687*** (0.787)	-2.113** (1.034)
5	-0.749 (0.747)	1.530 (1.189)	1.862** (0.793)	0.230 (0.887)	-0.635 (0.847)	-1.877* (1.109)	-2.658*** (0.76)	-2.243** (1.093)
6	-0.886 (0.719)	1.560 (1.267)	1.938*** (0.723)	0.252 (1.084)	-0.544 (0.886)	-1.391 (1.415)	-2.747*** (0.747)	-2.306* (1.174)
7	-0.771 (0.795)	1.918 (1.335)	1.918*** (0.71)	0.431 (1.193)	-0.465 (0.921)	-0.92 (1.441)	-2.942*** (0.756)	-0.936 (1.298)
8	-0.843 (0.868)		2.035** (0.803)		-0.082 (1.047)		-2.953*** (0.818)	
9	-1.047 (0.959)		2.364** (0.902)		-0.895 (1.17)		-3.090*** (0.923)	
10	-1.568 (1.209)		2.493** (0.971)		-1.174 (-1.218)		-2.846** (1.321)	
Constant	154.255*** (13.312)	117.818*** (22.312)	94.875*** (10.642)	82.223*** (16.972)	119.539*** (17.327)	122.573*** (22.052)	114.848*** (11.333)	147.160*** (20.833)
Observ.	510	561	509	561	509	561	510	561
R-squared	0.815	0.886	0.898	0.937	0.801	0.884	0.955	0.943

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

ANNEX 5: The effect of one pp in unemployment on annual income and days worked  
by gender and educational level

Table 15A: The effect of one pp in unemployment on annual income of males by educational level

	All males (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	-0.014*** (0.004)	-0.013* (0.007)	-0.006 (0.006)	-0.003 (0.007)	-0.010 (0.006)	-0.009 (0.009)	-0.023*** (0.006)
1	-0.010*** (0.004)	-0.005 (0.008)	-0.004 (0.006)	-0.002 (0.006)	-0.005 (0.006)	-0.005 (0.010)	-0.018*** (0.005)
2	-0.014*** (0.003)	-0.012* (0.007)	-0.008 (0.005)	-0.008 (0.006)	-0.005 (0.005)	-0.005 (0.009)	-0.017*** (0.005)
3	-0.013*** (0.003)	-0.011* (0.006)	-0.011* (0.006)	-0.006 (0.007)	-0.005 (0.005)	-0.009 (0.008)	-0.017*** (0.005)
4	-0.015*** (0.003)	-0.010 (0.006)	-0.013** (0.006)	-0.008 (0.006)	-0.006 (0.005)	-0.007 (0.008)	-0.018*** (0.004)
5	-0.012*** (0.003)	-0.008 (0.006)	-0.013** (0.005)	0.001 (0.006)	-0.006 (0.005)	-0.007 (0.008)	-0.018*** (0.004)
6	-0.013*** (0.004)	-0.012* (0.006)	-0.014*** (0.005)	0.003 (0.007)	-0.007 (0.005)	-0.005 (0.007)	-0.020*** (0.005)
7	-0.011*** (0.004)	-0.012* (0.007)	-0.011* (0.006)	0.008 (0.007)	-0.005 (0.005)	-0.007 (0.008)	-0.019*** (0.005)
8	-0.012*** (0.004)	-0.011* (0.006)	-0.009* (0.005)	0.012 (0.009)	-0.005 (0.006)	-0.006 (0.008)	-0.022*** (0.005)
9	-0.014*** (0.004)	-0.008 (0.006)	-0.014** (0.005)	0.012 (0.008)	-0.006 (0.006)	-0.018* (0.010)	-0.025*** (0.005)
10	-0.020*** (0.004)	-0.006 (0.007)	-0.014*** (0.005)	-0.006 (0.007)	-0.002 (0.006)	-0.022 (0.016)	-0.033*** (0.006)
Constant	8.384*** (0.044)	8.516*** (0.091)	8.489*** (0.074)	8.306*** (0.080)	8.257*** (0.068)	8.189*** (0.100)	8.564*** (0.070)
Observations	1,071	1,050	1,062	1,070	1,060	1,049	1,071
R-squared	0.973	0.853	0.794	0.879	0.888	0.834	0.925

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 16A: The effect of one pp in unemployment on annual income of females by educational level

	All males (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	-0.005 (0.003)	0.005 (0.007)	-0.008 (0.008)	-0.003 (0.005)	0.008 (0.005)	-0.003 (0.008)	-0.019*** (0.006)
1	0.000 (0.003)	0.013* (0.007)	0.000 (0.008)	-0.001 (0.005)	0.010** (0.005)	0.001 (0.008)	-0.013*** (0.005)
2	-0.003 (0.003)	0.011* (0.007)	-0.002 (0.007)	-0.007 (0.005)	0.007 (0.004)	-0.003 (0.007)	-0.015*** (0.005)
3	-0.006** (0.003)	0.011* (0.007)	-0.008 (0.006)	-0.005 (0.005)	0.003 (0.004)	-0.009 (0.007)	-0.017*** (0.005)
4	-0.008*** (0.003)	0.008 (0.007)	-0.009 (0.007)	-0.008 (0.005)	0.002 (0.004)	-0.015** (0.007)	-0.018*** (0.005)
5	-0.008** (0.003)	0.012* (0.006)	-0.002 (0.007)	-0.006 (0.005)	0.001 (0.004)	-0.015** (0.007)	-0.019*** (0.005)
6	-0.008** (0.003)	0.012** (0.006)	-0.006 (0.007)	-0.009** (0.005)	0.000 (0.004)	-0.015** (0.007)	-0.017*** (0.005)
7	-0.008** (0.004)	0.010 (0.007)	-0.002 (0.008)	-0.006 (0.005)	-0.001 (0.004)	-0.015* (0.008)	-0.018*** (0.006)
8	-0.009** (0.004)	0.011* (0.006)	-0.002 (0.008)	-0.007 (0.006)	0.002 (0.004)	-0.017** (0.008)	-0.020*** (0.006)
9	-0.011** (0.004)	0.017*** (0.006)	-0.001 (0.009)	-0.007 (0.006)	-0.000 (0.004)	-0.015 (0.009)	-0.023*** (0.007)
10	-0.014*** (0.004)	0.020** (0.008)	-0.001 (0.009)	-0.012 (0.008)	-0.002 (0.004)	-0.022** (0.011)	-0.025*** (0.007)
Constant	7.997*** (0.045)	7.900*** (0.065)	7.908*** (0.118)	7.914*** (0.054)	7.883*** (0.069)	7.846*** (0.081)	8.282*** (0.083)
Observations	1,071	993	1,023	1,050	1,066	1,053	1,071
R-squared	0.976	0.776	0.748	0.851	0.909	0.872	0.941

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 17A: The effect of one pp in unemployment on days worked of males by educational level

	All males (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	-1.965*** (0.684)	-2.600* (1.411)	-0.919 (1.348)	-2.267*** (0.728)	-0.589 (0.657)	-1.371 (0.935)	-3.523*** (0.873)
1	-1.478** (0.728)	-2.061 (1.445)	-0.217 (1.402)	-2.085*** (0.795)	-0.009 (0.708)	-1.644* (0.869)	-2.365*** (0.802)
2	-1.645** (0.690)	-1.830 (1.414)	0.035 (1.287)	-2.046*** (0.732)	-0.055 (0.662)	-1.908** (0.948)	-3.007*** (0.793)
3	-1.267* (0.658)	-1.310 (1.356)	0.612 (1.203)	-1.395** (0.704)	0.241 (0.692)	-1.964** (0.946)	-2.774*** (0.791)
4	-0.896 (0.611)	-0.582 (1.279)	0.683 (1.168)	-0.627 (0.677)	0.412 (0.711)	-1.020 (0.884)	-2.584*** (0.754)
5	-1.066* (0.640)	-0.924 (1.283)	-0.040 (1.302)	-0.270 (0.653)	0.357 (0.701)	-1.130 (0.940)	-2.573*** (0.750)
6	-0.751 (0.686)	-0.341 (1.370)	0.596 (1.433)	-0.140 (0.612)	0.578 (0.665)	-0.511 (1.048)	-2.107*** (0.730)
7	-0.548 (0.730)	-0.030 (1.545)	0.662 (1.451)	0.228 (0.704)	0.989 (0.678)	-0.588 (0.970)	-1.862*** (0.707)
8	-0.485 (0.722)	0.292 (1.629)	1.173 (1.383)	0.250 (0.717)	1.389* (0.769)	-0.185 (1.074)	-2.596*** (0.809)
9	-0.559 (0.722)	0.030 (1.543)	0.623 (1.474)	0.304 (0.827)	1.605* (0.964)	-0.504 (1.271)	-2.437** (0.977)
10	-0.520 (0.740)	0.691 (1.509)	0.481 (1.555)	0.159 (0.999)	2.245** (0.922)	-0.459 (1.728)	-2.894** (1.120)
Constant	151.512*** (9.383)	215.628*** (18.782)	173.984*** (20.979)	156.423*** (11.721)	114.651*** (8.394)	120.510*** (11.903)	126.879*** (8.869)
Observations	1,071	1,050	1,062	1,070	1,060	1,049	1,071
R-squared	0.904	0.677	0.583	0.824	0.867	0.750	0.894

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 18A: The effect of one pp in unemployment on days worked of females by educational level

	All males (1)	Less than primary education (2)	Primary education (3)	Compulsory secondary education (4)	Vocational training (5)	Post- compulsory education (6)	University education (7)
0	-1.525*** (0.456)	-1.413 (1.080)	-0.855 (1.069)	-2.163*** (0.798)	-0.104 (0.729)	-1.291 (0.826)	-3.702*** (0.701)
1	-1.011** (0.445)	-1.388 (0.982)	-0.112 (0.995)	-1.911** (0.804)	0.279 (0.653)	-0.906 (0.799)	-2.477*** (0.659)
2	-1.543*** (0.437)	-1.471 (0.975)	-0.560 (0.961)	-2.432*** (0.807)	-0.229 (0.653)	-1.441* (0.792)	-2.840*** (0.644)
3	-1.431*** (0.401)	-0.784 (0.928)	-0.382 (0.957)	-2.120*** (0.801)	-0.413 (0.614)	-0.956 (0.761)	-2.711*** (0.627)
4	-1.327*** (0.374)	-0.743 (0.874)	0.026 (0.941)	-1.503* (0.798)	0.114 (0.585)	-1.005 (0.750)	-2.803*** (0.636)
5	-1.249*** (0.378)	-0.614 (0.876)	0.138 (0.897)	-1.133 (0.820)	0.310 (0.614)	-1.140 (0.731)	-2.599*** (0.625)
6	-1.229*** (0.398)	-0.069 (0.905)	0.102 (0.914)	-1.280* (0.757)	0.447 (0.631)	-1.164 (0.768)	-2.581*** (0.626)
7	-1.104*** (0.421)	0.391 (0.920)	0.372 (0.911)	-0.933 (0.790)	0.556 (0.654)	-0.398 (0.727)	-2.653*** (0.692)
8	-0.926* (0.482)	0.218 (1.004)	1.638 (1.017)	-0.992 (0.895)	0.888 (0.742)	0.172 (0.811)	-2.468*** (0.812)
9	-1.388*** (0.513)	0.307 (0.985)	1.551 (1.121)	-1.605 (1.072)	0.980 (0.913)	-1.265 (1.043)	-3.027*** (0.780)
10	-2.021*** (0.543)	-0.358 (1.020)	0.462 (1.424)	-3.041** (1.253)	0.485 (1.204)	-2.329** (0.938)	-2.551** (1.142)
Constant	115.929*** (4.992)	147.228*** (12.185)	133.327*** (12.146)	137.913*** (10.275)	111.523*** (7.700)	114.185*** (10.756)	115.259*** (9.903)
Observations	1,071	993	1,023	1,050	1,066	1,053	1,071
R-squared	0.928	0.503	0.387	0.721	0.850	0.754	0.928

Robust standard errors in parentheses \*\*\*p<0.01,\*\*p<0.05,\*p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

# MATERIAL SUPLEMENTARIO 2

CAPÍTULO 3: LABOUR MARKET OUTCOMES OF  
IMMIGRANT-NATIVE ENTRANTS FACING A RECESSION

## ANNEX 1: Population born outside of Spain

Figure 9A: Percentage of the population born outside of Spain in 2005 and 2020, according to their age.



Source: Population Registers. INE.



## ANNEX 2: Number of immigrant workers by country of origin

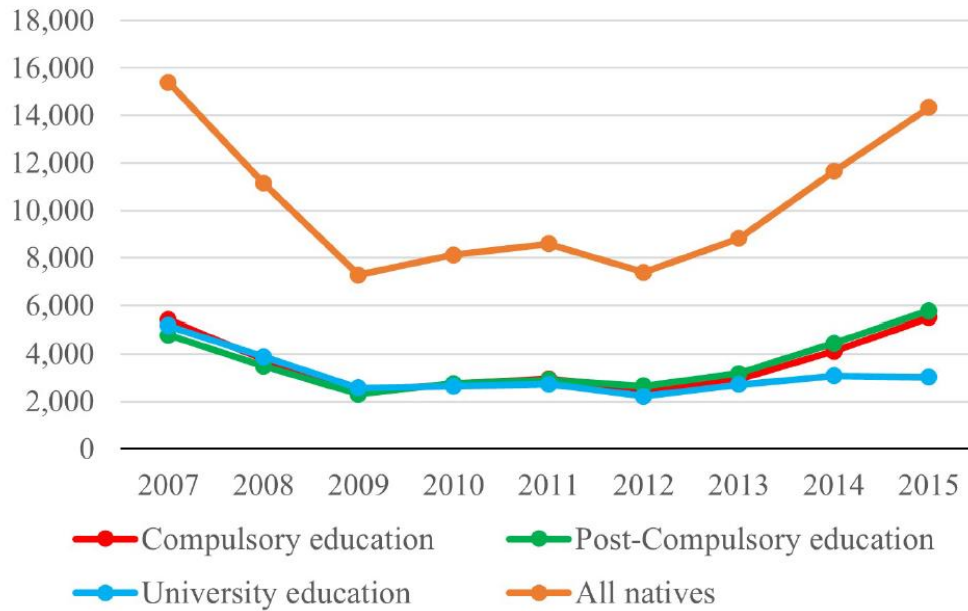
Table 19A: Number of immigrant workers by country of origin, according to their age and educational level

	All workers	AGE		EDUCATION		
		16-22	23-30	Compulsory education	Post-Compulsory education	University education
EU15	2,891	1,022	1,869	986	864	1,041
rEU	7,745	3,441	4,304	5,181	1,754	810
South America	11,141	5,774	5,367	5,891	3,495	1,755
North America	357	123	234	158	99	100
Asia	2,175	1,061	1,114	1,652	316	207
Africa	4,288	1,991	2,297	3,606	546	136
<b>TOTAL</b>	<b>28,597</b>	<b>13,412</b>	<b>15,185</b>	<b>17,474</b>	<b>7,074</b>	<b>4,049</b>

Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017). Note that *EU15* comprises the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. *rEU* refers to the rest of European countries. *North America* comprises America and Canada.

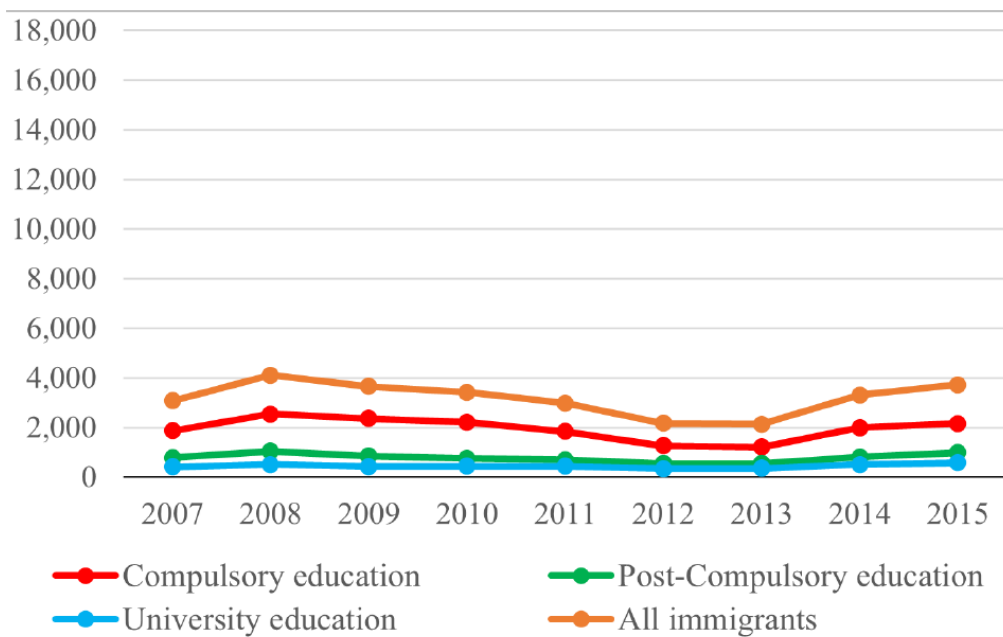
ANNEX 3: Number of new entrants into the labour market between 2007-2015

Figure 10A: Number of native entrants, by entry cohort and educational level



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2015).

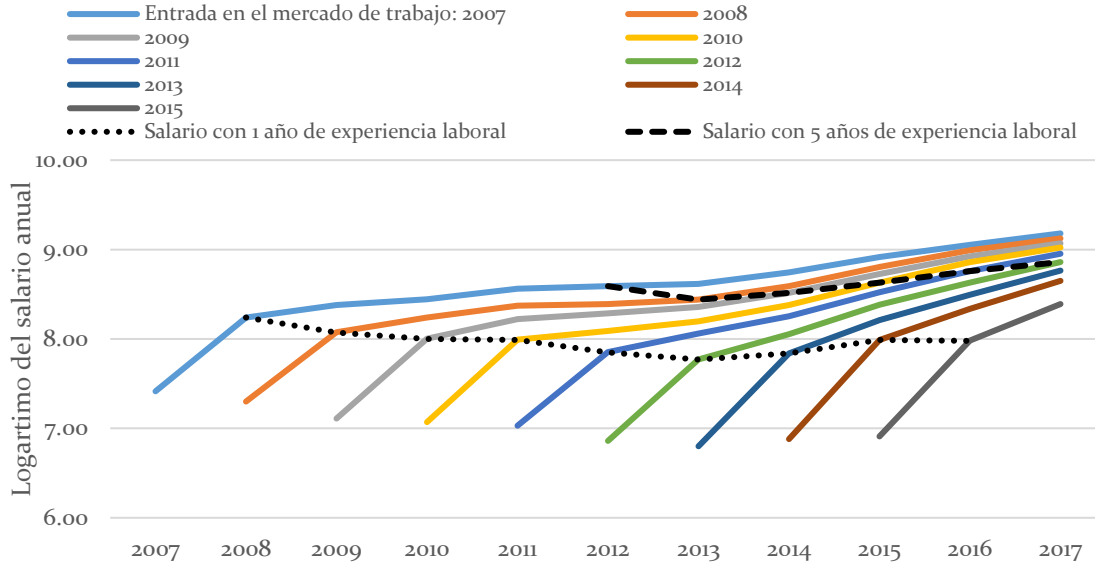
Figure 11A: Number of immigrant entrants, by entry cohort and educational level



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2015).

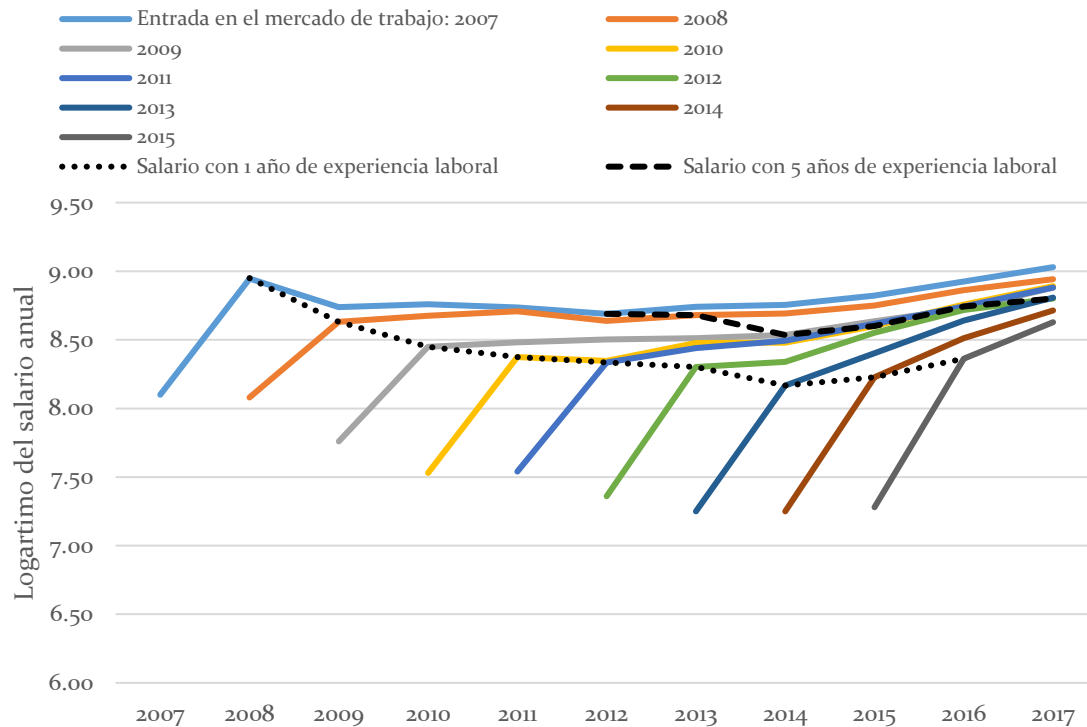
## ANNEX 4: Evolution of the annual earnings of natives and immigrants

Figure 12A: Evolution of the annual earnings of people born in Spain, according to their year of entry into the labour market



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

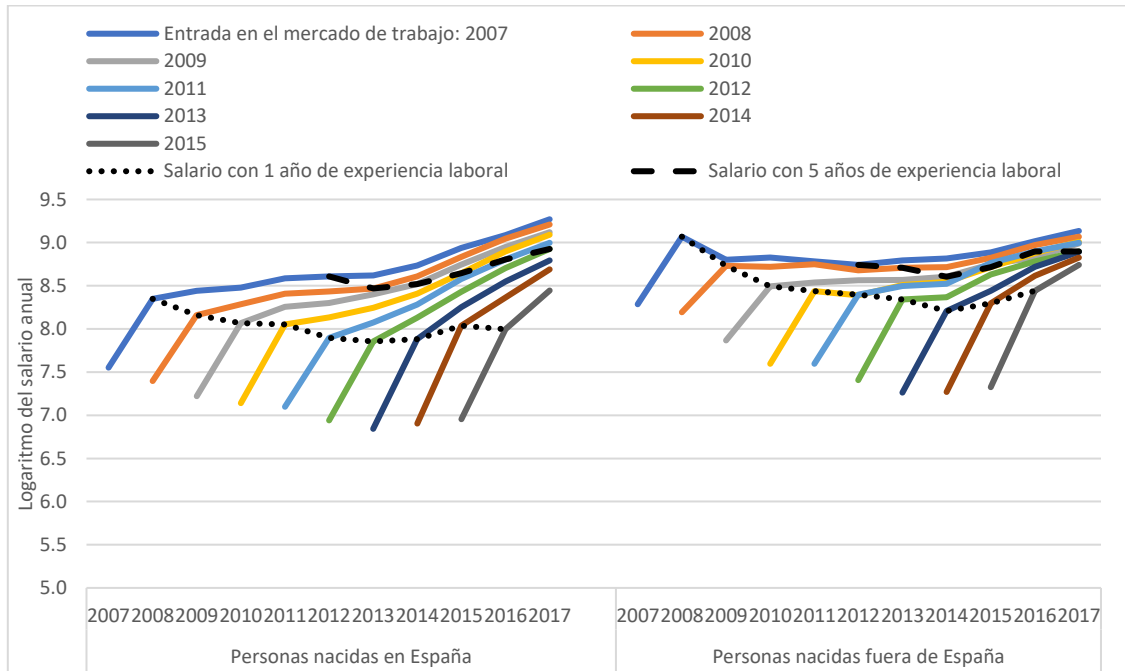
Figure 13A: Evolution of the annual earnings of people born outside of Spain, according to their year of entry into the labour market



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

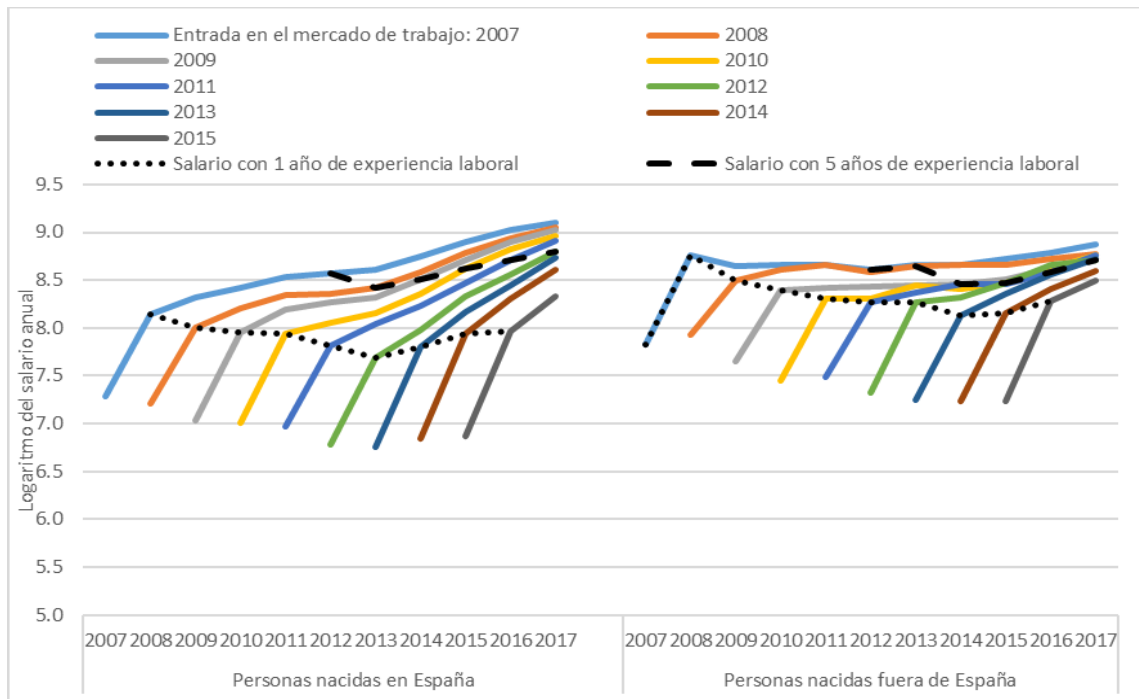
ANNEX 5: Evolution of the annual earnings of natives and immigrants by gender

Figure 14A: Evolution of the annual earnings of young males, according to their year of entry into the labour market and country of birth



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

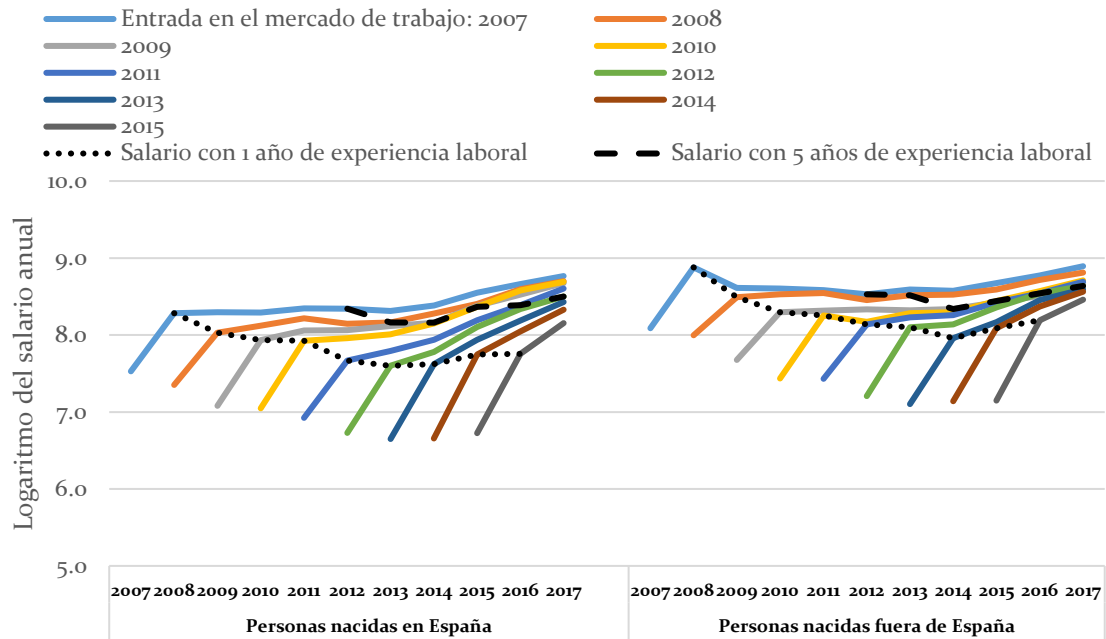
Figure 15A: Evolution of the annual earnings of young females, according to their year of entry into the labour market and country of birth



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

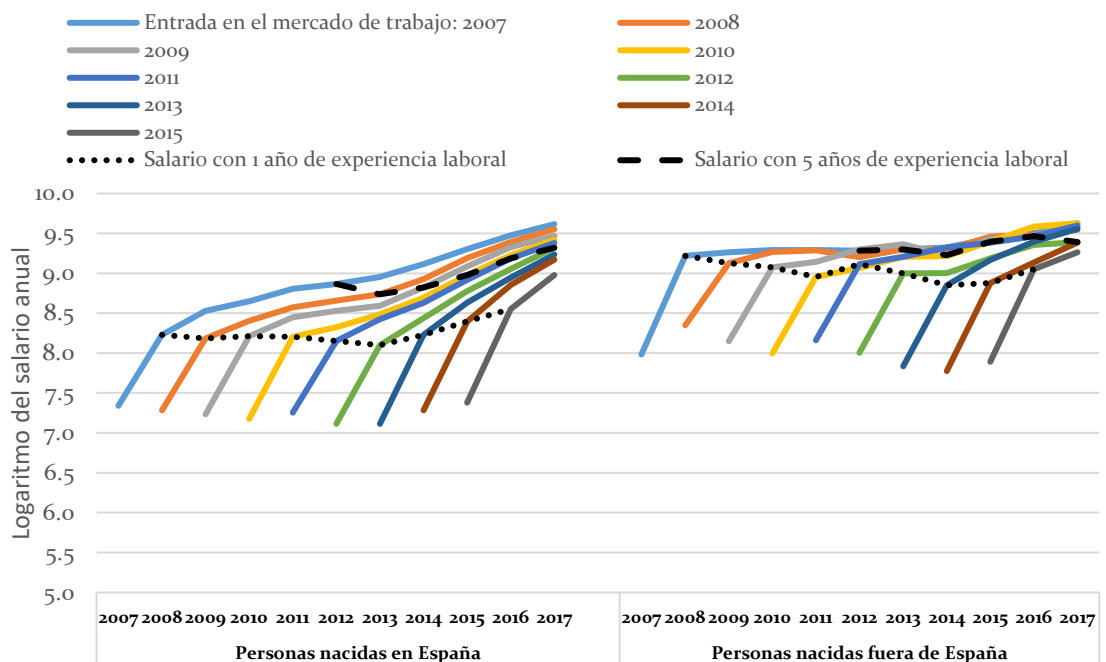
ANNEX 6: Evolution of the annual earnings of natives and immigrants by education

Figure 16A: Evolution of the annual earnings of people with low education, according to their year of entry into the labour market and their country of birth



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

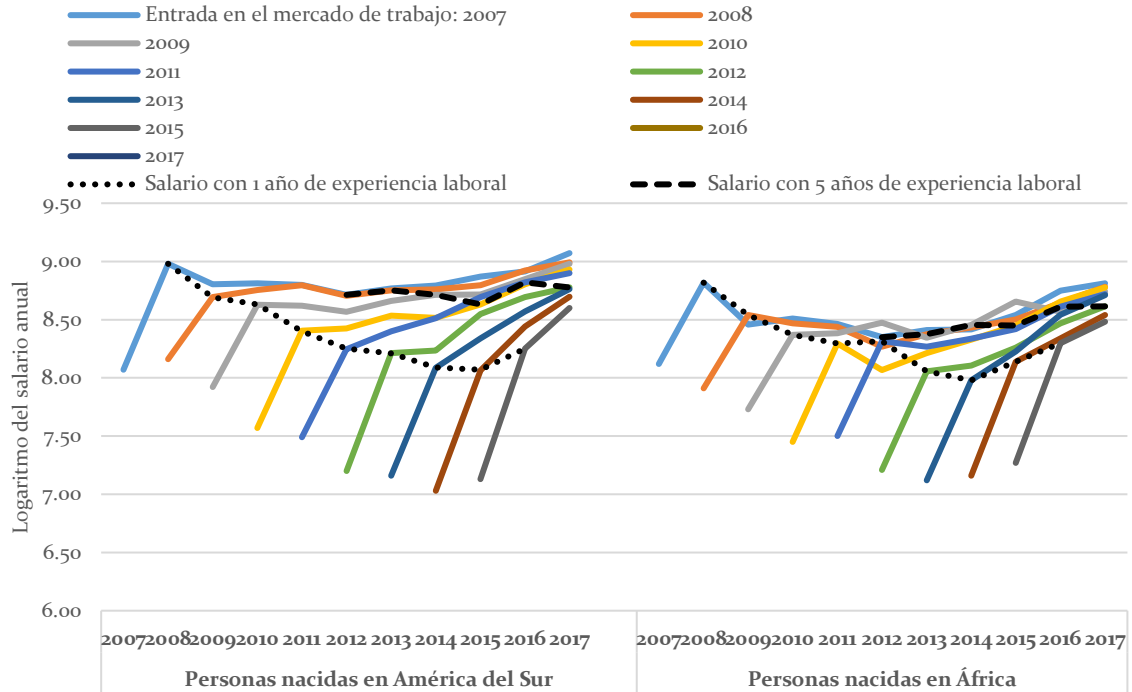
Figure 17A: Evolution of the annual earnings of people with university studies, according to their year of entry into the labour market and their country of birth



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

## ANNEX 7: Evolution of the annual earnings of specific immigrants

Figure 18A: Evolution of the annual salary of people born in South America and Africa, according to their year of entry into the labour market



Source: Own elaboration from the Continuous Sample of Working Histories (2007-2017).

ANNEX 8: The effect of one pp in unemployment on days worked, employment probability and annual income of immigrant and native workers by age group

Table 20A: The effect of one pp in unemployment on days worked of immigrant and native workers by age group

	Immigrants		Natives	
	16-22	23-30	16-22	23-30
	(1)	(2)	(3)	(4)
1	-1.721 (1.190)	-0.262 (1.197)	-2.626*** (0.629)	-0.312 (0.560)
2	-1.808 (1.173)	-1.243 (1.087)	-3.079*** (0.585)	-0.370 (0.546)
3	-1.840 (1.157)	-0.726 (1.010)	-3.065*** (0.538)	-0.521 (0.545)
4	-2.000* (1.113)	-1.207 (0.960)	-3.108*** (0.526)	-0.343 (0.548)
5	-2.798** (1.148)	-0.874 (1.085)	-3.551*** (0.560)	-0.231 (0.528)
6	-3.102** (1.236)	-1.587 (1.045)	-4.033*** (0.586)	0.215 (0.521)
7	-3.614*** (1.325)	-1.870 (1.306)	-4.315*** (0.582)	0.243 (0.510)
8	-2.685** (1.298)	-1.602 (1.272)	-4.675*** (0.627)	-0.040 (0.591)
9	-2.911** (1.253)	-1.174 (1.512)	-5.030*** (0.691)	0.501 (0.567)
10	-2.712* (1.423)	0.195 (1.678)	-5.299*** (0.614)	-0.340 (0.579)
Constant	309.160*** (17.188)	345.300*** (18.986)	219.104*** (8.360)	274.660*** (8.458)
Observations	881	909	918	911
R-squared	0.541	0.355	0.937	0.809

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 21A: The effect of one pp in unemployment on the employment probability of immigrant and native workers by age group

	Immigrants		Natives	
	16-22	23-30	16-22	23-30
	(1)	(2)	(3)	(4)
1	-0.005** (0.002)	-0.001 (0.002)	-0.005*** (0.001)	-0.005*** (0.001)
2	-0.005** (0.002)	-0.001 (0.002)	-0.006*** (0.001)	-0.006*** (0.001)
3	-0.004* (0.002)	-0.001 (0.002)	-0.006*** (0.001)	-0.005*** (0.001)
4	-0.002 (0.002)	0.001 (0.002)	-0.006*** (0.001)	-0.004*** (0.001)
5	-0.003 (0.002)	0.002 (0.002)	-0.007*** (0.001)	-0.003** (0.001)
6	-0.003 (0.002)	0.002 (0.002)	-0.006*** (0.001)	-0.004*** (0.001)
7	-0.001 (0.002)	0.003 (0.002)	-0.006*** (0.001)	-0.004** (0.001)
8	0.001 (0.003)	0.003 (0.002)	-0.007*** (0.001)	-0.003* (0.002)
9	-0.001 (0.003)	0.005* (0.003)	-0.008*** (0.001)	-0.004*** (0.002)
10	-0.005 (0.004)	0.005 (0.004)	-0.009*** (0.001)	-0.004** (0.002)
Observations	77,663	97,976	434,259	122,669

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.



Table 22A: The effect of one pp in unemployment on annual income of immigrant and native workers by age group

	Immigrants		Natives	
	16-22	23-30	16-22	23-30
	(1)	(2)	(3)	(4)
1	-0.005 (0.005)	-0.008 (0.005)	-0.014*** (0.004)	0.004 (0.003)
2	-0.007 (0.005)	-0.010** (0.004)	-0.020*** (0.004)	0.004 (0.003)
3	-0.011** (0.005)	-0.009** (0.004)	-0.022*** (0.004)	0.002 (0.003)
4	-0.011** (0.005)	-0.012*** (0.004)	-0.025*** (0.004)	0.001 (0.003)
5	-0.010** (0.005)	-0.010** (0.004)	-0.026*** (0.004)	0.001 (0.003)
6	-0.011** (0.005)	-0.010** (0.005)	-0.029*** (0.004)	0.002 (0.003)
7	-0.010** (0.005)	-0.011* (0.006)	-0.029*** (0.004)	0.002 (0.003)
8	-0.007 (0.005)	-0.008 (0.006)	-0.032*** (0.004)	0.001 (0.004)
9	-0.005 (0.005)	-0.004 (0.007)	-0.035*** (0.005)	0.000 (0.005)
10	0.003 (0.006)	0.004 (0.008)	-0.039*** (0.005)	-0.003 (0.005)
Constant	8.998*** (0.090)	9.262*** (0.074)	8.771*** (0.052)	9.448*** (0.054)
Observations	881	909	918	911
R-squared	0.767	0.784	0.952	0.932

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

ANNEX 9: The effect of one pp in unemployment on days worked, employment probability and annual income of immigrant workers by their country of birth

Table 23A: The effect of one pp in unemployment on days worked of immigrant workers by their country of birth

	Immigrants			
	UE15	rUE	South America	Africa
	(1)	(2)	(3)	(4)
1	-0.887 (1.698)	-3.544** (1.485)	0.839 (1.021)	-1.125 (2.214)
2	-1.169 (1.659)	-4.034*** (1.293)	0.357 (1.020)	-2.010 (2.083)
3	-0.761 (1.702)	-3.356*** (1.210)	0.526 (0.979)	-1.881 (2.034)
4	-0.455 (1.636)	-3.559*** (1.034)	0.378 (0.965)	-3.206 (2.013)
5	0.902 (1.717)	-4.155*** (1.198)	0.658 (1.060)	-3.469* (1.985)
6	0.453 (1.569)	-4.646*** (1.298)	-0.132 (1.047)	-4.518** (2.018)
7	-0.697 (1.774)	-5.168*** (1.361)	0.099 (1.123)	-5.032* (2.584)
8	1.209 (1.734)	-4.024** (1.556)	-0.783 (1.011)	-4.999** (2.334)
9	1.747 (2.042)	-3.624** (1.638)	-0.082 (1.062)	-5.596** (2.496)
10	1.441 (1.823)	-2.259 (2.108)	0.663 (1.884)	-3.890 (2.636)
Constant	266.324*** (31.868)	360.605*** (24.934)	307.319*** (15.620)	357.407*** (34.965)
Observations	758	848	897	839
R-squared	0.370	0.465	0.418	0.466

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects. Note that *EU15* comprises the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. *rEU* refers to the rest of European countries.

Table 24A: The effect of one pp in unemployment on the employment probability of immigrant workers by their country of birth

	Immigrants			
	UE15	rUE	South America	Africa
	(1)	(2)	(3)	(4)
1	0.003 (0.004)	-0.000 (0.003)	-0.004* (0.002)	-0.014*** (0.004)
2	0.004 (0.004)	-0.001 (0.003)	-0.004* (0.002)	-0.011*** (0.004)
3	0.004 (0.004)	-0.002 (0.003)	-0.003 (0.002)	-0.008** (0.004)
4	0.007* (0.004)	-0.000 (0.003)	-0.002 (0.002)	-0.006 (0.004)
5	0.006 (0.004)	-0.000 (0.003)	-0.002 (0.002)	-0.007** (0.003)
6	0.006 (0.004)	0.001 (0.003)	-0.002 (0.002)	-0.009*** (0.003)
7	0.006 (0.004)	0.001 (0.003)	-0.001 (0.003)	-0.009** (0.003)
8	0.006 (0.005)	0.002 (0.003)	0.002 (0.003)	-0.012*** (0.004)
9	0.008 (0.005)	-0.001 (0.004)	0.003 (0.004)	-0.013*** (0.005)
10	0.011** (0.005)	-0.005 (0.005)	0.001 (0.006)	-0.013*** (0.004)
Observations	16,736	50,386	67,045	26,854

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects. Note that *EU15* comprises the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. *rEU* refers to the rest of European countries.

Table 25A: The effect of one pp in unemployment on annual income of immigrant workers by their country of birth

	Immigrants			
	UE15	rUE	South America	Africa
	(1)	(2)	(3)	(4)
1	-0.015 (0.010)	-0.022*** (0.006)	-0.004 (0.005)	0.002 (0.008)
2	-0.016 (0.010)	-0.024*** (0.005)	-0.006 (0.005)	-0.003 (0.008)
3	-0.016 (0.010)	-0.022*** (0.005)	-0.006 (0.005)	-0.002 (0.008)
4	-0.011 (0.010)	-0.024*** (0.005)	-0.010* (0.006)	-0.006 (0.007)
5	-0.006 (0.010)	-0.022*** (0.005)	-0.008 (0.006)	-0.004 (0.007)
6	-0.005 (0.010)	-0.024*** (0.004)	-0.009 (0.007)	-0.004 (0.007)
7	-0.008 (0.010)	-0.021*** (0.005)	-0.008 (0.008)	-0.006 (0.008)
8	-0.003 (0.012)	-0.016*** (0.005)	-0.009 (0.007)	-0.002 (0.007)
9	-0.005 (0.012)	-0.020*** (0.005)	0.004 (0.008)	0.002 (0.007)
10	-0.002 (0.013)	-0.009 (0.010)	0.007 (0.012)	0.014 (0.010)
Constant	9.047*** (0.223)	9.565*** (0.094)	9.121*** (0.090)	9.021*** (0.112)
Observations	758	848	897	839
R-squared	0.620	0.818	0.599	0.605

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects. Note that *EU15* comprises the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. *rEU* refers to the rest of European countries.

ANNEX 10: The effect of one pp in unemployment on annual income and days worked of immigrant and native workers, by gender and educational level

Table 26A: The effect of one pp in unemployment on annual income of male immigrants and natives, by educational level

	Immigrants				Natives			
	All Immigrants	Compulsory education	Post-compulsory education	University education	All Natives	Compulsory education	Post-compulsory education	University education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	-0.008 (0.005)	-0.004 (0.005)	-0.012 (0.009)	-0.018 (0.014)	-0.020*** (0.005)	-0.016*** (0.005)	-0.017*** (0.006)	-0.028*** (0.008)
2	-0.011** (0.005)	-0.008* (0.004)	-0.010 (0.008)	-0.024 (0.014)	-0.025*** (0.004)	-0.023*** (0.005)	-0.020*** (0.005)	-0.028*** (0.008)
3	-0.011** (0.005)	-0.010** (0.004)	-0.006 (0.008)	-0.021 (0.014)	-0.026*** (0.004)	-0.024*** (0.004)	-0.021*** (0.005)	-0.029*** (0.007)
4	-0.013*** (0.005)	-0.011*** (0.004)	-0.008 (0.008)	-0.020 (0.014)	-0.026*** (0.004)	-0.022*** (0.005)	-0.022*** (0.005)	-0.031*** (0.007)
5	-0.012** (0.005)	-0.008** (0.004)	-0.009 (0.008)	-0.018 (0.015)	-0.026*** (0.004)	-0.019*** (0.004)	-0.024*** (0.005)	-0.032*** (0.007)
6	-0.014*** (0.005)	-0.009** (0.004)	-0.011 (0.008)	-0.028 (0.017)	-0.028*** (0.004)	-0.022*** (0.004)	-0.025*** (0.006)	-0.033*** (0.007)
7	-0.015** (0.006)	-0.007* (0.004)	-0.011 (0.008)	-0.037* (0.021)	-0.027*** (0.004)	-0.022*** (0.004)	-0.023*** (0.006)	-0.032*** (0.008)
8	-0.007 (0.005)	-0.005 (0.003)	-0.005 (0.009)	-0.025 (0.021)	-0.031*** (0.005)	-0.024*** (0.005)	-0.025*** (0.006)	-0.039*** (0.008)
9	-0.004 (0.005)	-0.007* (0.004)	-0.007 (0.009)	-0.020 (0.022)	-0.033*** (0.005)	-0.024*** (0.004)	-0.028*** (0.007)	-0.042*** (0.009)
10	-0.000 (0.007)	0.001 (0.006)	-0.012 (0.013)	-0.012 (0.031)	-0.039*** (0.006)	-0.030*** (0.005)	-0.026*** (0.008)	-0.050*** (0.011)
Constant	9.328*** (0.076)	9.170*** (0.070)	9.464*** (0.152)	9.789*** (0.276)	9.183*** (0.057)	9.115*** (0.065)	9.032*** (0.086)	9.510*** (0.096)
Observations	903	903	842	709	916	892	886	897
R-squared	0.783	0.790	0.509	0.469	0.906	0.820	0.816	0.816

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 27A: The effect of one pp in unemployment on days worked of male immigrants and natives, by educational level

	Immigrants				Natives			
	All Immigrants (1)	Compulsory education (2)	Post-compulsory education (3)	University education (4)	All Natives (5)	Compulsory education (6)	Post-compulsory education (7)	University education (8)
1	-0.622 (1.382)	-1.692 (1.340)	0.240 (1.330)	0.215 (1.682)	-3.533*** (0.738)	-2.976*** (0.947)	-3.622*** (0.761)	-3.475*** (1.178)
2	-1.068 (1.272)	-2.311* (1.204)	0.475 (1.345)	-0.286 (1.758)	-3.796*** (0.694)	-3.087*** (0.926)	-3.866*** (0.752)	-3.657*** (1.108)
3	-0.829 (1.189)	-2.105* (1.150)	1.069 (1.272)	-0.101 (1.733)	-3.615*** (0.643)	-2.618*** (0.902)	-3.980*** (0.748)	-3.713*** (1.089)
4	-1.279 (1.156)	-2.467** (1.044)	0.989 (1.306)	-0.563 (1.839)	-3.168*** (0.628)	-1.786** (0.882)	-3.564*** (0.706)	-3.828*** (1.067)
5	-1.911 (1.273)	-2.598** (1.144)	0.389 (1.471)	-0.504 (1.794)	-3.520*** (0.652)	-2.035** (0.905)	-4.176*** (0.772)	-3.727*** (1.078)
6	-2.488* (1.331)	-3.269*** (1.183)	-0.825 (1.295)	-1.399 (1.867)	-3.629*** (0.680)	-2.378*** (0.859)	-4.163*** (0.841)	-3.504*** (1.133)
7	-3.156** (1.589)	-3.822*** (1.411)	-1.085 (1.313)	-0.392 (1.839)	-3.755*** (0.698)	-2.514*** (0.912)	-4.085*** (0.833)	-3.448*** (1.120)
8	-2.130 (1.346)	-3.212** (1.263)	-0.730 (1.337)	0.876 (2.328)	-4.377*** (0.708)	-3.016*** (0.918)	-4.307*** (0.771)	-4.624*** (1.194)
9	-2.744* (1.439)	-3.679*** (1.357)	-1.099 (1.306)	2.101 (2.597)	-4.548*** (0.789)	-2.995*** (1.007)	-4.779*** (0.820)	-4.483*** (1.405)
10	-2.042 (1.542)	-2.282 (1.429)	0.653 (3.332)	2.634 (2.873)	-4.992*** (0.830)	-3.569*** (0.987)	-4.071*** (1.000)	-5.721*** (1.520)
Constant	339.641*** (21.202)	355.939*** (18.455)	309.662*** (22.084)	286.294*** (32.088)	254.985*** (9.637)	269.990*** (14.990)	240.150*** (12.317)	243.054*** (15.062)
Observations	903	903	842	709	916	892	886	897
R-squared	0.448	0.540	0.314	0.252	0.882	0.764	0.812	0.797

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 28A: The effect of one pp in unemployment on annual income of female immigrants and natives, by educational level

	Immigrants				Natives			
	All Immigrants (1)	Compulsory education (2)	Post-compulsory education (3)	University education (4)	All Natives (5)	Compulsory education (6)	Post-compulsory education (7)	University education (8)
1	-0.006 (0.005)	-0.006 (0.006)	-0.009 (0.008)	-0.014 (0.011)	-0.006 (0.004)	-0.005 (0.005)	0.001 (0.005)	-0.019*** (0.006)
2	-0.008* (0.005)	-0.009 (0.006)	-0.011 (0.008)	-0.013 (0.010)	-0.009** (0.004)	-0.009* (0.005)	-0.002 (0.005)	-0.020*** (0.006)
3	-0.010** (0.005)	-0.009 (0.006)	-0.015* (0.008)	-0.011 (0.010)	-0.012*** (0.004)	-0.009* (0.005)	-0.007 (0.005)	-0.022*** (0.006)
4	-0.012** (0.005)	-0.011* (0.006)	-0.016* (0.008)	-0.012 (0.010)	-0.015*** (0.004)	-0.014*** (0.005)	-0.011** (0.005)	-0.024*** (0.006)
5	-0.008* (0.004)	-0.005 (0.006)	-0.008 (0.008)	-0.013 (0.013)	-0.016*** (0.004)	-0.014*** (0.005)	-0.014*** (0.005)	-0.026*** (0.006)
6	-0.006 (0.005)	-0.007 (0.005)	-0.011 (0.008)	-0.006 (0.012)	-0.018*** (0.004)	-0.016*** (0.005)	-0.015*** (0.005)	-0.026*** (0.007)
7	-0.006 (0.006)	-0.005 (0.006)	-0.012 (0.008)	-0.003 (0.012)	-0.019*** (0.005)	-0.016*** (0.005)	-0.017*** (0.005)	-0.028*** (0.007)
8	-0.012* (0.006)	-0.009 (0.006)	-0.014 (0.011)	-0.010 (0.017)	-0.020*** (0.005)	-0.014*** (0.005)	-0.016*** (0.005)	-0.030*** (0.008)
9	-0.004 (0.008)	-0.008 (0.006)	-0.012 (0.012)	0.010 (0.017)	-0.023*** (0.006)	-0.013*** (0.005)	-0.019*** (0.006)	-0.034*** (0.009)
10	0.012 (0.008)	-0.003 (0.010)	-0.009 (0.013)	0.034 (0.023)	-0.026*** (0.006)	-0.017*** (0.006)	-0.022*** (0.006)	-0.037*** (0.009)
Constant	8.880*** (0.082)	8.936*** (0.098)	8.959*** (0.137)	9.138*** (0.330)	8.814*** (0.068)	8.625*** (0.073)	8.600*** (0.074)	9.198*** (0.100)
Observations	907	866	818	762	918	871	906	912
R-squared	0.726	0.585	0.546	0.453	0.921	0.759	0.847	0.844

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.

Table 29A: The effect of one pp in unemployment on days worked of female immigrants and natives, by educational level

	Immigrants				Natives			
	All Immigrants (1)	Compulsory education (2)	Post-compulsory education (3)	University education (4)	All Natives (5)	Compulsory education (6)	Post-compulsory education (7)	University education (8)
1	-0.994 (1.035)	-2.185 (1.384)	0.060 (1.565)	-0.040 (1.594)	-1.982*** (0.559)	-1.827** (0.795)	-1.101 (0.745)	-3.473*** (0.835)
2	-1.735* (0.972)	-2.956** (1.339)	-0.689 (1.525)	-0.456 (1.587)	-2.409*** (0.528)	-2.319*** (0.766)	-1.586** (0.705)	-3.586*** (0.801)
3	-1.480 (0.974)	-2.604** (1.317)	-0.556 (1.495)	-0.384 (1.654)	-2.557*** (0.522)	-2.017** (0.773)	-1.919*** (0.728)	-3.748*** (0.801)
4	-1.777* (0.908)	-2.885** (1.188)	-0.873 (1.567)	-0.783 (1.733)	-2.848*** (0.507)	-2.488*** (0.722)	-2.090*** (0.704)	-4.000*** (0.802)
5	-1.269 (0.950)	-2.283* (1.280)	0.319 (1.545)	-1.080 (1.725)	-3.077*** (0.510)	-2.169*** (0.733)	-2.445*** (0.676)	-4.439*** (0.794)
6	-1.698* (0.960)	-3.276*** (1.224)	0.619 (1.624)	-1.106 (1.630)	-3.572*** (0.541)	-2.901*** (0.688)	-2.997*** (0.779)	-4.451*** (0.889)
7	-1.748* (0.988)	-3.090** (1.366)	-0.179 (1.535)	-0.260 (1.810)	-3.890*** (0.536)	-3.141*** (0.689)	-2.977*** (0.737)	-4.867*** (0.846)
8	-1.826* (1.028)	-3.183** (1.408)	0.278 (1.883)	-1.652 (2.007)	-4.028*** (0.657)	-2.848*** (0.781)	-3.371*** (0.774)	-4.971*** (0.997)
9	-0.212 (1.145)	-2.386 (1.666)	2.038 (2.093)	2.009 (1.867)	-4.289*** (0.732)	-2.639*** (0.805)	-3.728*** (0.886)	-5.354*** (1.110)
10	0.825 (1.406)	0.008 (1.927)	1.064 (2.628)	1.432 (3.473)	-4.778*** (0.662)	-3.496*** (0.980)	-4.630*** (0.892)	-4.946*** (0.984)
Constant	311.431*** (16.459)	343.158*** (19.893)	285.173*** (27.533)	276.691*** (32.292)	218.996*** (7.996)	231.391*** (11.556)	215.180*** (10.528)	223.164*** (12.745)
Observations	907	866	818	762	918	871	906	912
R-squared	0.479	0.416	0.299	0.325	0.915	0.668	0.837	0.874

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All estimates include entry cohort, region, experience and calendar year fixed effects.



# MATERIAL SUPLEMENTARIO 3

CAPÍTULO 4: IS THE MILLENNIAL GENERATION LEFT  
BEHIND? INTER-COHORT LABOUR INCOME  
INEQUALITY IN A CONTEXT OF ECONOMIC SHOCK

## ANNEX 1: The identification problem of APC models

Table 30A: An example of identification problem of APC models

Age\period	2000	2005	2010	2015
25	5	6	7	8
30	10	11	12	13
35	15	16	17	18
40	20	21	22	23
45	25	26	27	28
50	30	31	32	33
55	35	36	37	38

Notes: Example of Chauvel and Schröder (2015).

The problem of APC models lies in the collinearity of the components, that is, each component is a combination of the other two. Suppose Table 15A shows the fictitious average earnings of individuals of different ages at different periods. Thus, the identification problem is that the same linear trend of income change can either be understood as:

- 1) a combination of an age effect (earnings increase by 5 euro per 5-year age group) plus a period effect (earnings increase by 1 euro per 5-year period).
- 2) and an age effect (again, earnings increase by 5 euro per 5-year age group) plus a cohort effect (each cohort earns 1 euro more than the preceding one).

If a variable linearly depends on age, period, and cohort, then an infinite number of decompositions between these effects fit the data and, therefore, no statistical model can overcome this intrinsic indetermination.

## ANNEX 2: The average earnings by age-period-cohort

Table 31A: Average logarithm of monthly earnings by age and period categories

age/period	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
25	7.23	7.25	7.29	7.31	7.32	7.30	7.27	7.22	7.19	7.19	7.20	7.23	7.26	7.29	7.33
26	7.27	7.29	7.32	7.35	7.36	7.34	7.32	7.27	7.23	7.25	7.24	7.28	7.30	7.32	7.39
27	7.30	7.33	7.35	7.39	7.40	7.38	7.36	7.31	7.27	7.29	7.27	7.31	7.33	7.35	7.41
28	7.34	7.36	7.39	7.41	7.43	7.41	7.39	7.35	7.32	7.32	7.32	7.34	7.35	7.38	7.43
29	7.37	7.38	7.41	7.43	7.45	7.44	7.42	7.38	7.35	7.36	7.35	7.36	7.37	7.39	7.45
30	7.39	7.41	7.44	7.45	7.48	7.45	7.44	7.41	7.39	7.40	7.40	7.40	7.40	7.42	7.45
31	7.42	7.43	7.45	7.47	7.50	7.48	7.46	7.43	7.43	7.44	7.43	7.44	7.43	7.44	7.47
32	7.42	7.45	7.47	7.49	7.51	7.50	7.48	7.45	7.44	7.46	7.46	7.46	7.46	7.46	7.49
33	7.43	7.45	7.48	7.50	7.53	7.52	7.49	7.48	7.46	7.48	7.49	7.48	7.47	7.47	7.50
34	7.45	7.46	7.49	7.51	7.54	7.53	7.51	7.49	7.48	7.49	7.50	7.50	7.49	7.49	7.51
35	7.45	7.47	7.48	7.51	7.55	7.54	7.53	7.51	7.49	7.52	7.51	7.51	7.51	7.50	7.53
36	7.46	7.47	7.49	7.51	7.55	7.55	7.53	7.52	7.52	7.52	7.53	7.53	7.51	7.52	7.54
37	7.46	7.48	7.50	7.51	7.56	7.55	7.54	7.52	7.52	7.54	7.54	7.54	7.53	7.52	7.55
38	7.47	7.47	7.49	7.52	7.55	7.55	7.54	7.53	7.53	7.55	7.56	7.55	7.53	7.53	7.55
39	7.47	7.48	7.50	7.52	7.56	7.55	7.54	7.53	7.54	7.56	7.56	7.57	7.55	7.54	7.57
40	7.48	7.49	7.50	7.52	7.56	7.56	7.54	7.53	7.54	7.57	7.57	7.57	7.56	7.55	7.57
41	7.48	7.49	7.51	7.51	7.55	7.55	7.55	7.54	7.54	7.56	7.57	7.58	7.57	7.57	7.58
42	7.48	7.49	7.51	7.52	7.55	7.55	7.54	7.54	7.54	7.56	7.58	7.59	7.57	7.57	7.59
43	7.47	7.49	7.50	7.52	7.56	7.55	7.54	7.53	7.54	7.57	7.57	7.58	7.58	7.57	7.60
44	7.48	7.48	7.50	7.52	7.56	7.56	7.54	7.53	7.54	7.57	7.58	7.57	7.57	7.58	7.60
45	7.49	7.50	7.49	7.52	7.56	7.56	7.56	7.54	7.54	7.56	7.58	7.58	7.57	7.57	7.61
46	7.51	7.50	7.51	7.51	7.56	7.56	7.56	7.54	7.54	7.56	7.57	7.58	7.58	7.57	7.60
47	7.51	7.51	7.51	7.53	7.55	7.56	7.55	7.55	7.56	7.57	7.57	7.58	7.57	7.57	7.59
48	7.53	7.52	7.53	7.53	7.57	7.55	7.56	7.54	7.55	7.58	7.58	7.58	7.57	7.57	7.60
49	7.53	7.53	7.53	7.55	7.57	7.57	7.54	7.54	7.55	7.58	7.59	7.58	7.57	7.57	7.60
50	7.54	7.54	7.54	7.55	7.59	7.57	7.57	7.53	7.56	7.58	7.59	7.59	7.57	7.56	7.59
51	7.53	7.54	7.55	7.56	7.59	7.59	7.57	7.56	7.54	7.58	7.58	7.59	7.58	7.57	7.59
52	7.54	7.55	7.55	7.57	7.60	7.58	7.59	7.55	7.56	7.57	7.59	7.59	7.58	7.58	7.59
53	7.54	7.54	7.55	7.57	7.61	7.60	7.58	7.57	7.56	7.58	7.58	7.59	7.57	7.57	7.60
54	7.55	7.55	7.55	7.57	7.61	7.61	7.60	7.57	7.58	7.59	7.59	7.58	7.57	7.57	7.60
55	7.55	7.56	7.56	7.57	7.61	7.61	7.60	7.58	7.58	7.62	7.60	7.60	7.57	7.58	7.60

Notes: Birth cohorts are shown along the diagonal. Source: own elaboration from the CSWH.

## ANNEX 3: Detrended age-period-cohort effects on monthly earnings

Table 32A: Detrended age-period-cohort effects on monthly earnings

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Uncontrolled			Controlled		
	All workers	Males	Females	All workers	Males	Females
coh_1951	0.0226*** (0.00399)	0.0138*** (0.00436)	0.00843 (0.00853)	0.00173 (0.00302)	-0.00539* (0.00318)	-0.00977 (0.00676)
coh_1952	0.00490 (0.00316)	-0.00329 (0.00357)	-0.00286 (0.00624)	-0.0150*** (0.00248)	-0.0252*** (0.00277)	-0.00999** (0.00494)
coh_1953	0.00185 (0.00264)	-0.00106 (0.00295)	-0.0168*** (0.00524)	-0.0100*** (0.00198)	-0.0159*** (0.00215)	-0.0131*** (0.00404)
coh_1954	0.000457 (0.00239)	-0.00102 (0.00269)	-0.0106** (0.00468)	-0.0136*** (0.00179)	-0.0172*** (0.00197)	-0.0154*** (0.00351)
coh_1955	-0.00146 (0.00211)	-0.0111*** (0.00244)	0.00844** (0.00395)	-0.0152*** (0.00158)	-0.0244*** (0.00183)	-0.000744 (0.00285)
coh_1956	0.00448** (0.00191)	0.000940 (0.00219)	0.00629* (0.00360)	-0.0118*** (0.00137)	-0.0175*** (0.00155)	-0.000962 (0.00252)
coh_1957	-0.00144 (0.00176)	-0.00166 (0.00203)	0.000293 (0.00324)	-0.0162*** (0.00130)	-0.0181*** (0.00147)	-0.00833*** (0.00238)
coh_1958	-0.0102*** (0.00165)	-0.00744*** (0.00194)	-0.0136*** (0.00295)	-0.0121*** (0.00121)	-0.0105*** (0.00140)	-0.0139*** (0.00213)
coh_1959	-0.00461*** (0.00157)	-0.00450** (0.00182)	-0.000571 (0.00287)	-0.00687*** (0.00115)	-0.00791*** (0.00129)	-0.00372* (0.00212)
coh_1960	-0.0170*** (0.00147)	-0.0153*** (0.00173)	-0.0189*** (0.00266)	-0.00542*** (0.00108)	-0.00606*** (0.00124)	-0.00606*** (0.00196)
coh_1961	-0.0132*** (0.00140)	-0.0107*** (0.00164)	-0.0150*** (0.00250)	0.00228** (0.00101)	0.000414 (0.00119)	0.00390** (0.00176)
coh_1962	-0.0270*** (0.00134)	-0.0216*** (0.00159)	-0.0334*** (0.00236)	-0.00537*** (0.000978)	-0.00426*** (0.00115)	-0.0100*** (0.00168)
coh_1963	-0.0158*** (0.00127)	-0.0128*** (0.00151)	-0.0137*** (0.00223)	0.00366*** (0.000913)	0.00506*** (0.00107)	0.00120 (0.00159)
coh_1964	-0.0148*** (0.00118)	-0.0106*** (0.00140)	-0.0138*** (0.00207)	0.00744*** (0.000845)	0.00882*** (0.000980)	0.00392*** (0.00149)
coh_1965	-0.00645*** (0.00118)	-0.00112 (0.00140)	-0.00729*** (0.00208)	0.00647*** (0.000848)	0.0125*** (0.000980)	-0.00401*** (0.00148)
coh_1966	-0.00470*** (0.00116)	-0.00647*** (0.00138)	0.00710*** (0.00206)	0.00888*** (0.000831)	0.00792*** (0.000970)	0.0114*** (0.00145)
coh_1967	-0.00916*** (0.00114)	-0.00148 (0.00137)	-0.00982*** (0.00198)	0.00722*** (0.000829)	0.0139*** (0.000986)	0.00252* (0.00138)
coh_1968	-0.00874*** (0.00114)	-0.00623*** (0.00136)	-0.00149 (0.00199)	0.00779*** (0.000824)	0.0161*** (0.000974)	3.32e-06 (0.00140)
coh_1969	-0.00117 (0.00112)	0.00283** (0.00134)	0.00167 (0.00195)	0.0103*** (0.000808)	0.0123*** (0.000956)	0.0103*** (0.00138)
coh_1970	0.00661*** (0.00109)	0.00826*** (0.00131)	0.0149*** (0.00191)	0.0106*** (0.000795)	0.0158*** (0.000938)	0.00879*** (0.00136)
coh_1971	0.00776*** (0.00107)	0.00466*** (0.00129)	0.0233*** (0.00186)	0.00939*** (0.000779)	0.0105*** (0.000926)	0.0145*** (0.00132)
coh_1972	0.00847*** (0.00106)	0.00924*** (0.00129)	0.0193*** (0.00183)	0.00532*** (0.000768)	0.00873*** (0.000922)	0.00975*** (0.00128)
coh_1973	0.0172*** (0.00104)	0.0184*** (0.00126)	0.0253*** (0.00178)	0.0118*** (0.000750)	0.0166*** (0.000899)	0.0111*** (0.00125)
coh_1974	0.0255***	0.0272***	0.0350***	0.0156***	0.0198***	0.0191***

Table 32A: continued

	(0.00101)	(0.00124)	(0.00170)	(0.000726)	(0.000886)	(0.00118)
coh_1975	0.0231***	0.0232***	0.0320***	0.0174***	0.0234***	0.0137***
	(0.000990)	(0.00121)	(0.00168)	(0.000721)	(0.000875)	(0.00118)
coh_1976	0.0259***	0.0309***	0.0277***	0.0179***	0.0255***	0.0143***
	(0.000973)	(0.00121)	(0.00162)	(0.000712)	(0.000870)	(0.00114)
coh_1977	0.0248***	0.0279***	0.0285***	0.0190***	0.0270***	0.0133***
	(0.000959)	(0.00118)	(0.00160)	(0.000714)	(0.000878)	(0.00113)
coh_1978	0.0185***	0.0216***	0.0201***	0.0153***	0.0219***	0.0121***
	(0.000952)	(0.00119)	(0.00157)	(0.000705)	(0.000877)	(0.00110)
coh_1979	0.0170***	0.0208***	0.0180***	0.0166***	0.0234***	0.0165***
	(0.000972)	(0.00122)	(0.00158)	(0.000729)	(0.000919)	(0.00112)
coh_1980	0.0133***	0.0150***	0.0148***	0.0163***	0.0229***	0.0138***
	(0.000956)	(0.00119)	(0.00156)	(0.000728)	(0.000910)	(0.00114)
coh_1981	0.0119***	0.0121***	0.0164***	0.0153***	0.0190***	0.0180***
	(0.00103)	(0.00131)	(0.00163)	(0.000777)	(0.000992)	(0.00119)
coh_1982	0.0151***	0.0157***	0.0171***	0.0149***	0.0197***	0.0163***
	(0.00108)	(0.00137)	(0.00173)	(0.000812)	(0.00104)	(0.00123)
coh_1983	0.00391***	0.00312**	0.00564***	0.00721***	0.00795***	0.0107***
	(0.00118)	(0.00150)	(0.00190)	(0.000897)	(0.00115)	(0.00137)
coh_1984	-0.00582***	-0.00309*	-0.00799***	-5.94e-05	0.00264**	0.00497***
	(0.00128)	(0.00164)	(0.00202)	(0.000976)	(0.00126)	(0.00147)
coh_1985	-0.0141***	-0.0105***	-0.0206***	-0.00200*	0.00179	-0.00241
	(0.00139)	(0.00179)	(0.00219)	(0.00106)	(0.00137)	(0.00160)
coh_1986	-0.0266***	-0.0236***	-0.0356***	-0.0103***	-0.00788***	-0.0151***
	(0.00153)	(0.00194)	(0.00245)	(0.00116)	(0.00149)	(0.00176)
coh_1987	-0.0330***	-0.0348***	-0.0363***	-0.0146***	-0.0181***	-0.0121***
	(0.00164)	(0.00209)	(0.00262)	(0.00125)	(0.00164)	(0.00188)
coh_1988	-0.0358***	-0.0362***	-0.0432***	-0.0196***	-0.0249***	-0.0163***
	(0.00177)	(0.00225)	(0.00283)	(0.00135)	(0.00176)	(0.00202)
coh_1989	-0.0327***	-0.0389***	-0.0340***	-0.0262***	-0.0313***	-0.0278***
	(0.00191)	(0.00243)	(0.00305)	(0.00146)	(0.00192)	(0.00218)
coh_1990	-0.0140***	-0.0197***	-0.0172***	-0.0179***	-0.0272***	-0.0147***
	(0.00206)	(0.00266)	(0.00324)	(0.00159)	(0.00211)	(0.00237)
coh_1991	-0.00231	-0.000703	-0.0172***	-0.0181***	-0.0204***	-0.0264***
	(0.00226)	(0.00291)	(0.00355)	(0.00179)	(0.00234)	(0.00269)
coh_1992	0.0128***	0.00210	0.0125***	-0.0174***	-0.0320***	-0.0133***
	(0.00251)	(0.00324)	(0.00395)	(0.00205)	(0.00269)	(0.00310)
coh_1993	0.0339***	0.0262***	0.0270***	-0.0107***	-0.0292***	-0.00589
	(0.00305)	(0.00387)	(0.00489)	(0.00253)	(0.00332)	(0.00383)
age_25	-0.0985***	-0.0842***	-0.114***	-0.0321***	-0.0226***	-0.0350***
	(0.00110)	(0.00139)	(0.00175)	(0.000914)	(0.00119)	(0.00136)
age_26	-0.0676***	-0.0582***	-0.0751***	-0.0259***	-0.0193***	-0.0253***
	(0.00103)	(0.00130)	(0.00164)	(0.000837)	(0.00108)	(0.00125)
age_27	-0.0428***	-0.0375***	-0.0449***	-0.0183***	-0.0143***	-0.0151***
	(0.000989)	(0.00125)	(0.00157)	(0.000789)	(0.00102)	(0.00118)
age_28	-0.0211***	-0.0176***	-0.0211***	-0.0113***	-0.00858***	-0.00784***
	(0.000964)	(0.00122)	(0.00153)	(0.000751)	(0.000968)	(0.00112)
age_29	-0.00803***	-0.00471***	-0.00856***	-0.00672***	-0.00493***	-0.00364***
	(0.000956)	(0.00121)	(0.00152)	(0.000735)	(0.000944)	(0.00111)
age_30	0.00724***	0.00807***	0.00892***	-0.000437	0.000290	0.00197*
	(0.000945)	(0.00120)	(0.00151)	(0.000721)	(0.000917)	(0.00110)
age_31	0.0191***	0.0167***	0.0240***	0.00513***	0.00452***	0.00713***
	(0.000941)	(0.00119)	(0.00152)	(0.000710)	(0.000896)	(0.00109)
age_32	0.0261***	0.0214***	0.0328***	0.00900***	0.00646***	0.0111***

Table 32A: continued

	(0.000941)	(0.00118)	(0.00154)	(0.000701)	(0.000876)	(0.00109)
age_33	0.0307***	0.0252***	0.0373***	0.0121***	0.00851***	0.0138***
	(0.000947)	(0.00118)	(0.00156)	(0.000698)	(0.000867)	(0.00110)
age_34	0.0337***	0.0285***	0.0388***	0.0134***	0.0104***	0.0125***
	(0.000957)	(0.00119)	(0.00159)	(0.000700)	(0.000863)	(0.00111)
age_35	0.0350***	0.0285***	0.0409***	0.0143***	0.0103***	0.0130***
	(0.000970)	(0.00119)	(0.00163)	(0.000707)	(0.000863)	(0.00114)
age_36	0.0354***	0.0295***	0.0393***	0.0154***	0.0114***	0.0127***
	(0.000979)	(0.00119)	(0.00167)	(0.000709)	(0.000858)	(0.00116)
age_37	0.0355***	0.0295***	0.0388***	0.0157***	0.0114***	0.0126***
	(0.000989)	(0.00120)	(0.00170)	(0.000715)	(0.000858)	(0.00118)
age_38	0.0335***	0.0278***	0.0360***	0.0147***	0.00994***	0.0124***
	(0.00100)	(0.00122)	(0.00174)	(0.000727)	(0.000871)	(0.00121)
age_39	0.0321***	0.0263***	0.0347***	0.0145***	0.00976***	0.0127***
	(0.00101)	(0.00122)	(0.00176)	(0.000727)	(0.000869)	(0.00121)
age_40	0.0305***	0.0257***	0.0313***	0.0148***	0.0105***	0.0124***
	(0.00102)	(0.00123)	(0.00178)	(0.000732)	(0.000871)	(0.00123)
age_41	0.0270***	0.0225***	0.0277***	0.0125***	0.00842***	0.0110***
	(0.00104)	(0.00125)	(0.00180)	(0.000740)	(0.000878)	(0.00125)
age_42	0.0225***	0.0197***	0.0209***	0.0106***	0.00782***	0.00810***
	(0.00105)	(0.00126)	(0.00183)	(0.000751)	(0.000886)	(0.00127)
age_43	0.0176***	0.0156***	0.0155***	0.00709***	0.00492***	0.00509***
	(0.00106)	(0.00128)	(0.00185)	(0.000759)	(0.000898)	(0.00128)
age_44	0.0124***	0.0120***	0.00901***	0.00454***	0.00402***	0.00161
	(0.00108)	(0.00130)	(0.00188)	(0.000775)	(0.000915)	(0.00131)
age_45	0.00764***	0.00680***	0.00615***	0.00190**	0.00148	0.000655
	(0.00110)	(0.00132)	(0.00190)	(0.000787)	(0.000932)	(0.00133)
age_46	0.00247**	0.00274**	0.000474	0.000107	0.000492	-0.00110
	(0.00111)	(0.00133)	(0.00192)	(0.000794)	(0.000936)	(0.00135)
age_47	-0.000819	0.000489	-0.00340*	-0.00195**	-0.000369	-0.00371***
	(0.00112)	(0.00135)	(0.00195)	(0.000806)	(0.000946)	(0.00137)
age_48	-0.00490***	-0.00331**	-0.00682***	-0.00273***	-0.000930	-0.00385***
	(0.00114)	(0.00136)	(0.00197)	(0.000813)	(0.000954)	(0.00139)
age_49	-0.00982***	-0.00695***	-0.0125***	-0.00580***	-0.00362***	-0.00559***
	(0.00116)	(0.00139)	(0.00200)	(0.000831)	(0.000979)	(0.00141)
age_50	-0.0136***	-0.0106***	-0.0155***	-0.00679***	-0.00453***	-0.00584***
	(0.00118)	(0.00141)	(0.00203)	(0.000838)	(0.000992)	(0.00141)
age_51	-0.0183***	-0.0156***	-0.0188***	-0.00842***	-0.00675***	-0.00563***
	(0.00120)	(0.00144)	(0.00209)	(0.000856)	(0.00101)	(0.00144)
age_52	-0.0218***	-0.0181***	-0.0232***	-0.00842***	-0.00580***	-0.00684***
	(0.00122)	(0.00145)	(0.00213)	(0.000870)	(0.00102)	(0.00149)
age_53	-0.0281***	-0.0242***	-0.0296***	-0.0108***	-0.00805***	-0.00905***
	(0.00126)	(0.00149)	(0.00221)	(0.000896)	(0.00105)	(0.00155)
age_54	-0.0342***	-0.0309***	-0.0331***	-0.0127***	-0.0101***	-0.00943***
	(0.00130)	(0.00155)	(0.00229)	(0.000935)	(0.00110)	(0.00162)
age_55	-0.0388***	-0.0352***	-0.0364***	-0.0135***	-0.0107***	-0.0107***
	(0.00141)	(0.00167)	(0.00246)	(0.00100)	(0.00118)	(0.00172)
per_2005	-0.0245***	-0.0268***	-0.0243***	-0.0179***	-0.0172***	-0.0210***
	(0.000641)	(0.000763)	(0.00113)	(0.000495)	(0.000577)	(0.000857)
per_2006	-0.0165***	-0.0190***	-0.0153***	-0.00760***	-0.00758***	-0.00760***
	(0.000634)	(0.000758)	(0.00111)	(0.000479)	(0.000563)	(0.000817)
per_2007	-0.00215***	-0.00274***	-0.00291***	0.0110***	0.0121***	0.0110***
	(0.000633)	(0.000759)	(0.00110)	(0.000510)	(0.000604)	(0.000855)
per_2008	0.0128***	0.0143***	0.0112***	0.0184***	0.0200***	0.0169***

Table 32A: continued

	(0.000642)	(0.000773)	(0.00110)	(0.000476)	(0.000565)	(0.000789)
per_2009	0.0383***	0.0393***	0.0390***	0.0302***	0.0297***	0.0320***
	(0.000677)	(0.000823)	(0.00114)	(0.000493)	(0.000594)	(0.000802)
per_2010	0.0250***	0.0250***	0.0273***	0.0182***	0.0161***	0.0219***
	(0.000692)	(0.000847)	(0.00116)	(0.000503)	(0.000610)	(0.000812)
per_2011	0.0102***	0.0104***	0.0120***	0.000569	-0.00160***	0.00394***
	(0.000707)	(0.000871)	(0.00118)	(0.000510)	(0.000622)	(0.000818)
per_2012	-0.0124***	-0.00929***	-0.0146***	-0.0250***	-0.0255***	-0.0244***
	(0.000735)	(0.000911)	(0.00121)	(0.000530)	(0.000654)	(0.000838)
per_2013	-0.0196***	-0.0161***	-0.0223***	-0.0334***	-0.0326***	-0.0350***
	(0.000781)	(0.000973)	(0.00127)	(0.000559)	(0.000694)	(0.000880)
per_2014	-0.00160**	0.00117	-0.00470***	-0.0109***	-0.00966***	-0.0144***
	(0.000776)	(0.000964)	(0.00128)	(0.000553)	(0.000681)	(0.000883)
per_2015	-0.00146*	-0.00186**	-0.000939	-0.00432***	-0.00539***	-0.00445***
	(0.000757)	(0.000940)	(0.00125)	(0.000535)	(0.000660)	(0.000854)
per_2016	0.000648	-0.00181**	0.00355***	0.00108**	-0.000876	0.00254***
	(0.000733)	(0.000910)	(0.00121)	(0.000519)	(0.000640)	(0.000829)
per_2017	-0.00930***	-0.0110***	-0.00824***	-0.00415***	-0.00442***	-0.00417***
	(0.000708)	(0.000873)	(0.00118)	(0.000504)	(0.000616)	(0.000816)
per_2018	-0.0116***	-0.0123***	-0.0122***	-0.00266***	-0.00119**	-0.00407***
	(0.000680)	(0.000839)	(0.00114)	(0.000489)	(0.000598)	(0.000792)
per_2019	0.0122***	0.0107***	0.0125***	0.0266***	0.0280***	0.0267***
	(0.000654)	(0.000809)	(0.00109)	(0.000466)	(0.000573)	(0.000749)
rescacoh	0.0670***	0.0367***	0.159***	-0.0628***	-0.0690***	-0.0617***
	(0.00142)	(0.00170)	(0.00252)	(0.00110)	(0.00131)	(0.00192)
rescaage	0.176***	0.175***	0.179***	0.00664***	0.00993***	0.0332***
	(0.000735)	(0.000892)	(0.00126)	(0.000766)	(0.000968)	(0.00120)
spanish_n				-0.0128***	0.00634***	-0.0144***
				(0.000864)	(0.00109)	(0.00138)
abroad				-0.0233***	-0.0279***	-0.0252***
				(0.000733)	(0.000941)	(0.00111)
v.t.				0.0935***	0.0926***	0.0962***
				(0.000379)	(0.000457)	(0.000624)
p.comp_educ				0.0797***	0.0740***	0.0950***
				(0.000536)	(0.000682)	(0.000823)
university_ed				0.149***	0.140***	0.175***
				(0.000540)	(0.000723)	(0.000800)
Aragón				0.0353***	0.0591***	0.0176***
				(0.000886)	(0.00106)	(0.00144)
Asturias				0.0184***	0.0572***	-0.0365***
				(0.00104)	(0.00123)	(0.00165)
I._Balears				0.0672***	0.0683***	0.0932***
				(0.000904)	(0.00115)	(0.00140)
I._Canarias				-0.0633***	-0.0731***	-0.0317***
				(0.000771)	(0.000975)	(0.00120)
Cantabria				0.0256***	0.0427***	0.00526**
				(0.00133)	(0.00163)	(0.00208)
C.-LaMancha				-0.00661***	-0.00307***	-0.00156
				(0.000788)	(0.000923)	(0.00139)
CastillayLeón				8.42e-05	0.00999***	-0.00380***
				(0.000705)	(0.000850)	(0.00117)
Cataluña				0.0857***	0.107***	0.0809***
				(0.000524)	(0.000626)	(0.000883)
Extremadura				-0.0815***	-0.0929***	-0.0573***

Table 32A: continued

	(0.00116)	(0.00137)	(0.00201)
Galicia	-0.0563***	-0.0376***	-0.0559***
	(0.000689)	(0.000830)	(0.00112)
C. Madrid	0.0324***	0.0399***	0.0357***
	(0.000534)	(0.000656)	(0.000878)
Murcia	-0.0225***	-0.0183***	-0.0229***
	(0.000943)	(0.00109)	(0.00166)
Navarra	0.142***	0.164***	0.119***
	(0.00111)	(0.00132)	(0.00183)
P. Vasco	0.174***	0.182***	0.169***
	(0.000709)	(0.000850)	(0.00119)
La Rioja	0.0473***	0.0620***	0.0525***
	(0.00157)	(0.00188)	(0.00257)
C. Valenciana	-0.00901***	-0.00340***	-0.000909
	(0.000594)	(0.000718)	(0.000985)
CeutaMelilla	0.0930***	0.0748***	0.127***
	(0.00324)	(0.00395)	(0.00549)
temporary	-0.0909***	-0.107***	-0.0689***
	(0.000368)	(0.000460)	(0.000591)
exp	0.00542***	0.00462***	0.00358***
	(3.60e-05)	(4.77e-05)	(5.32e-05)
agriculture	-0.138***	-0.154***	-0.117***
	(0.00178)	(0.00189)	(0.00450)
construction	-0.00579***	-0.0211***	-0.0242***
	(0.000508)	(0.000545)	(0.00154)
trade	-0.159***	-0.128***	-0.151***
	(0.000474)	(0.000558)	(0.000830)
tourism	-0.177***	-0.185***	-0.0671***
	(0.000590)	(0.000795)	(0.000955)
transport	-0.0596***	-0.0737***	-0.0281***
	(0.000652)	(0.000707)	(0.00150)
health	-0.202***	-0.171***	-0.141***
	(0.000626)	(0.00112)	(0.000877)
education	-0.274***	-0.258***	-0.213***
	(0.000976)	(0.00166)	(0.00128)
financial	0.134***	0.105***	0.212***
	(0.000699)	(0.000858)	(0.00116)
s_company	-0.157***	-0.155***	-0.111***
	(0.000525)	(0.000662)	(0.000877)
o_services	-0.142***	-0.112***	-0.132***
	(0.000674)	(0.000823)	(0.00109)
med_manual	0.100***	0.0950***	0.0827***
	(0.000590)	(0.000694)	(0.000990)
high_manual	0.186***	0.157***	0.141***
	(0.000523)	(0.000601)	(0.00105)
low_noman	0.0764***	0.0601***	0.143***
	(0.000605)	(0.000860)	(0.000899)
med_noman	0.331***	0.334***	0.350***
	(0.000588)	(0.000734)	(0.000929)
high_noman	0.563***	0.520***	0.615***
	(0.000686)	(0.000878)	(0.00107)
10-19 workers	0.0749***	0.0653***	0.0774***
	(0.000510)	(0.000598)	(0.000894)



Table 32A: continued

20-49 workers				0.120*** (0.000467)	0.115*** (0.000553)	0.115*** (0.000804)
50-249 workers				0.188*** (0.000439)	0.192*** (0.000534)	0.173*** (0.000723)
250-499 workers				0.247*** (0.000588)	0.254*** (0.000733)	0.233*** (0.000923)
>500 workers				0.286*** (0.000496)	0.290*** (0.000634)	0.274*** (0.000759)
Constant	7.515*** (0.000280)	7.552*** (0.000335)	7.444*** (0.000505)	7.080*** (0.00123)	7.123*** (0.00152)	6.978*** (0.00202)
Observations	4,391,751	2,739,343	1,652,408	4,230,136	2,627,941	1,602,195

Notes: this table displays the detrended age-period-cohort effects using as dependent variable the logarithm of monthly earnings. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

ANNEX 4: Trended age-period-cohort effects on monthly earnings

Table 33A: Trended age-period-cohort effects on monthly earnings

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Uncontrolled			Controlled		
	All workers	Males	Females	All workers	Males	Females
coh_1951	7.408*** (0.00430)	7.462*** (0.00472)	7.262*** (0.00887)	7.097*** (0.00365)	7.159*** (0.00390)	6.964*** (0.00809)
coh_1952	7.400*** (0.00343)	7.449*** (0.00374)	7.252*** (0.00657)	7.092*** (0.00296)	7.148*** (0.00353)	6.972*** (0.00586)
coh_1953	7.406*** (0.00279)	7.452*** (0.00312)	7.252*** (0.00560)	7.099*** (0.00251)	7.166*** (0.00280)	6.974*** (0.00486)
coh_1954	7.406*** (0.00251)	7.463*** (0.00284)	7.268*** (0.00489)	7.106*** (0.00233)	7.176*** (0.00266)	6.985*** (0.00426)
coh_1955	7.412*** (0.00220)	7.460*** (0.00253)	7.294*** (0.00411)	7.111*** (0.00213)	7.169*** (0.00250)	6.999*** (0.00365)
coh_1956	7.424*** (0.00196)	7.470*** (0.00224)	7.301*** (0.00373)	7.121*** (0.00193)	7.183*** (0.00227)	7.007*** (0.00334)
coh_1957	7.424*** (0.00177)	7.475*** (0.00203)	7.306*** (0.00326)	7.119*** (0.00186)	7.186*** (0.00219)	6.999*** (0.00322)
coh_1958	7.420*** (0.00166)	7.474*** (0.00195)	7.298*** (0.00289)	7.127*** (0.00177)	7.195*** (0.00214)	7.000*** (0.00300)
coh_1959	7.435*** (0.00157)	7.482*** (0.00182)	7.322*** (0.00284)	7.135*** (0.00172)	7.201*** (0.00204)	7.011*** (0.00300)
coh_1960	7.425*** (0.00145)	7.479*** (0.00170)	7.311*** (0.00264)	7.139*** (0.00166)	7.202*** (0.00200)	7.012*** (0.00290)
coh_1961	7.436*** (0.00138)	7.486*** (0.00162)	7.322*** (0.00243)	7.144*** (0.00161)	7.209*** (0.00194)	7.020*** (0.00268)
coh_1962	7.424*** (0.00132)	7.479*** (0.00156)	7.317*** (0.00230)	7.137*** (0.00158)	7.200*** (0.00192)	7.010*** (0.00263)
coh_1963	7.440*** (0.00124)	7.488*** (0.00148)	7.342*** (0.00215)	7.145*** (0.00153)	7.211*** (0.00186)	7.021*** (0.00255)
coh_1964	7.444*** (0.00114)	7.496*** (0.00137)	7.350*** (0.00198)	7.152*** (0.00149)	7.215*** (0.00179)	7.025*** (0.00250)
coh_1965	7.461*** (0.00114)	7.513*** (0.00136)	7.363*** (0.00199)	7.158*** (0.00147)	7.223*** (0.00178)	7.025*** (0.00248)
coh_1966	7.471*** (0.00113)	7.512*** (0.00135)	7.392*** (0.00196)	7.169*** (0.00146)	7.225*** (0.00176)	7.051*** (0.00245)
coh_1967	7.473*** (0.00111)	7.523*** (0.00134)	7.387*** (0.00188)	7.174*** (0.00145)	7.238*** (0.00176)	7.049*** (0.00240)
coh_1968	7.483*** (0.00111)	7.525*** (0.00133)	7.402*** (0.00190)	7.183*** (0.00144)	7.245*** (0.00174)	7.057*** (0.00240)
coh_1969	7.498*** (0.00109)	7.542*** (0.00131)	7.419*** (0.00187)	7.193*** (0.00142)	7.250*** (0.00172)	7.074*** (0.00238)
coh_1970	7.511*** (0.00106)	7.553*** (0.00128)	7.441*** (0.00185)	7.203*** (0.00140)	7.260*** (0.00170)	7.083*** (0.00237)
coh_1971	7.521*** (0.00104)	7.555*** (0.00126)	7.461*** (0.00180)	7.210*** (0.00139)	7.263*** (0.00168)	7.095*** (0.00233)
coh_1972	7.527*** (0.00103)	7.566*** (0.00126)	7.468*** (0.00176)	7.214*** (0.00138)	7.266*** (0.00168)	7.099*** (0.00230)
coh_1973	7.543*** (0.00101)	7.580*** (0.00122)	7.483*** (0.00171)	7.226*** (0.00136)	7.278*** (0.00166)	7.109*** (0.00227)
coh_1974	7.561***	7.594***	7.508***	7.236***	7.288***	7.122***

Table 33A: continued

	(0.000975)	(0.00120)	(0.00164)	(0.00134)	(0.00164)	(0.00223)
coh_1975	7.563***	7.596***	7.514***	7.242***	7.294***	7.121***
	(0.000955)	(0.00117)	(0.00161)	(0.00133)	(0.00162)	(0.00222)
coh_1976	7.573***	7.613***	7.518***	7.249***	7.300***	7.129***
	(0.000944)	(0.00117)	(0.00155)	(0.00132)	(0.00161)	(0.00219)
coh_1977	7.577***	7.613***	7.528***	7.256***	7.311***	7.133***
	(0.000922)	(0.00114)	(0.00153)	(0.00131)	(0.00160)	(0.00219)
coh_1978	7.577***	7.611***	7.527***	7.260***	7.308***	7.137***
	(0.000917)	(0.00115)	(0.00151)	(0.00131)	(0.00160)	(0.00217)
coh_1979	7.581***	7.614***	7.538***	7.268***	7.317***	7.152***
	(0.000937)	(0.00119)	(0.00152)	(0.00132)	(0.00163)	(0.00217)
coh_1980	7.585***	7.615***	7.545***	7.274***	7.325***	7.155***
	(0.000920)	(0.00115)	(0.00152)	(0.00132)	(0.00161)	(0.00217)
coh_1981	7.590***	7.615***	7.553***	7.278***	7.323***	7.161***
	(0.00100)	(0.00127)	(0.00158)	(0.00134)	(0.00166)	(0.00220)
coh_1982	7.596***	7.624***	7.560***	7.280***	7.327***	7.165***
	(0.00107)	(0.00135)	(0.00171)	(0.00137)	(0.00169)	(0.00223)
coh_1983	7.586***	7.614***	7.553***	7.276***	7.318***	7.160***
	(0.00117)	(0.00149)	(0.00188)	(0.00142)	(0.00177)	(0.00231)
coh_1984	7.582***	7.609***	7.552***	7.269***	7.310***	7.157***
	(0.00129)	(0.00164)	(0.00203)	(0.00148)	(0.00184)	(0.00238)
coh_1985	7.577***	7.607***	7.545***	7.269***	7.313***	7.152***
	(0.00140)	(0.00180)	(0.00218)	(0.00154)	(0.00193)	(0.00245)
coh_1986	7.565***	7.599***	7.532***	7.264***	7.306***	7.139***
	(0.00155)	(0.00197)	(0.00248)	(0.00162)	(0.00201)	(0.00258)
coh_1987	7.565***	7.589***	7.538***	7.263***	7.297***	7.145***
	(0.00167)	(0.00212)	(0.00268)	(0.00169)	(0.00215)	(0.00268)
coh_1988	7.568***	7.591***	7.541***	7.260***	7.294***	7.143***
	(0.00181)	(0.00232)	(0.00289)	(0.00178)	(0.00227)	(0.00279)
coh_1989	7.573***	7.589***	7.553***	7.255***	7.286***	7.131***
	(0.00197)	(0.00254)	(0.00316)	(0.00188)	(0.00241)	(0.00289)
coh_1990	7.600***	7.610***	7.584***	7.266***	7.294***	7.149***
	(0.00215)	(0.00276)	(0.00337)	(0.00202)	(0.00260)	(0.00312)
coh_1991	7.617***	7.633***	7.587***	7.265***	7.304***	7.136***
	(0.00237)	(0.00313)	(0.00371)	(0.00221)	(0.00279)	(0.00345)
coh_1992	7.639***	7.649***	7.622***	7.271***	7.291***	7.148***
	(0.00269)	(0.00342)	(0.00418)	(0.00242)	(0.00319)	(0.00384)
coh_1993	7.662***	7.676***	7.645***	7.278***	7.292***	7.160***
	(0.00326)	(0.00415)	(0.00547)	(0.00300)	(0.00388)	(0.00451)
age_25	-0.346***	-0.334***	-0.362***	-0.277***	-0.266***	-0.281***
	(0.00110)	(0.00140)	(0.00174)	(0.000937)	(0.00119)	(0.00137)
age_26	-0.296***	-0.290***	-0.307***	-0.250***	-0.242***	-0.253***
	(0.00103)	(0.00131)	(0.00163)	(0.000846)	(0.00109)	(0.00128)
age_27	-0.253***	-0.251***	-0.258***	-0.224***	-0.217***	-0.226***
	(0.000988)	(0.00126)	(0.00157)	(0.000797)	(0.00104)	(0.00118)
age_28	-0.217***	-0.215***	-0.220***	-0.201***	-0.197***	-0.201***
	(0.000964)	(0.00123)	(0.00154)	(0.000760)	(0.000973)	(0.00114)
age_29	-0.186***	-0.184***	-0.192***	-0.181***	-0.178***	-0.181***
	(0.000956)	(0.00121)	(0.00152)	(0.000741)	(0.000953)	(0.00112)
age_30	-0.156***	-0.155***	-0.158***	-0.159***	-0.152***	-0.160***
	(0.000946)	(0.00120)	(0.00152)	(0.000728)	(0.000915)	(0.00110)
age_31	-0.129***	-0.131***	-0.128***	-0.137***	-0.137***	-0.141***
	(0.000943)	(0.00119)	(0.00152)	(0.000713)	(0.000903)	(0.00109)
age_32	-0.106***	-0.109***	-0.103***	-0.119***	-0.118***	-0.123***

Table 33A: continued

	(0.000944)	(0.00118)	(0.00154)	(0.000709)	(0.000879)	(0.00110)
age_33	-0.0838***	-0.0902***	-0.0843***	-0.102***	-0.101***	-0.105***
	(0.000947)	(0.00118)	(0.00155)	(0.000700)	(0.000877)	(0.00111)
age_34	-0.0674***	-0.0717***	-0.0658***	-0.0854***	-0.0838***	-0.0910***
	(0.000957)	(0.00119)	(0.00160)	(0.000704)	(0.000865)	(0.00112)
age_35	-0.0510***	-0.0548***	-0.0499***	-0.0692***	-0.0685***	-0.0750***
	(0.000970)	(0.00119)	(0.00163)	(0.000711)	(0.000864)	(0.00115)
age_36	-0.0334***	-0.0392***	-0.0317***	-0.0533***	-0.0536***	-0.0636***
	(0.000978)	(0.00119)	(0.00167)	(0.000716)	(0.000865)	(0.00117)
age_37	-0.0185***	-0.0229***	-0.0146***	-0.0380***	-0.0398***	-0.0451***
	(0.000995)	(0.00120)	(0.00169)	(0.000725)	(0.000866)	(0.00119)
age_38	-0.00527***	-0.00902***	-0.00545***	-0.0232***	-0.0251***	-0.0255***
	(0.00101)	(0.00122)	(0.00174)	(0.000731)	(0.000881)	(0.00120)
age_39	0.0119***	0.00570***	0.0133***	-0.00699***	-0.00960***	-0.0107***
	(0.00102)	(0.00123)	(0.00175)	(0.000736)	(0.000883)	(0.00122)
age_40	0.0259***	0.0223***	0.0258***	0.00894***	0.00806***	0.00508***
	(0.00103)	(0.00123)	(0.00178)	(0.000745)	(0.000883)	(0.00124)
age_41	0.0397***	0.0369***	0.0427***	0.0248***	0.0223***	0.0224***
	(0.00104)	(0.00125)	(0.00179)	(0.000746)	(0.000886)	(0.00126)
age_42	0.0535***	0.0516***	0.0517***	0.0391***	0.0376***	0.0375***
	(0.00105)	(0.00126)	(0.00183)	(0.000761)	(0.000901)	(0.00129)
age_43	0.0644***	0.0631***	0.0580***	0.0527***	0.0545***	0.0493***
	(0.00107)	(0.00128)	(0.00185)	(0.000771)	(0.000909)	(0.00130)
age_44	0.0783***	0.0763***	0.0720***	0.0678***	0.0665***	0.0644***
	(0.00109)	(0.00130)	(0.00189)	(0.000782)	(0.000928)	(0.00133)
age_45	0.0890***	0.0889***	0.0888***	0.0810***	0.0792***	0.0799***
	(0.00110)	(0.00132)	(0.00190)	(0.000800)	(0.000954)	(0.00135)
age_46	0.100***	0.0992***	0.0993***	0.0971***	0.0942***	0.0975***
	(0.00111)	(0.00134)	(0.00192)	(0.000799)	(0.000951)	(0.00137)
age_47	0.114***	0.115***	0.112***	0.111***	0.110***	0.111***
	(0.00112)	(0.00135)	(0.00196)	(0.000814)	(0.000964)	(0.00139)
age_48	0.128***	0.129***	0.129***	0.127***	0.126***	0.131***
	(0.00114)	(0.00136)	(0.00198)	(0.000826)	(0.000963)	(0.00142)
age_49	0.141***	0.141***	0.140***	0.140***	0.140***	0.145***
	(0.00116)	(0.00139)	(0.00201)	(0.000839)	(0.000991)	(0.00143)
age_50	0.152***	0.156***	0.156***	0.157***	0.154***	0.165***
	(0.00118)	(0.00141)	(0.00203)	(0.000863)	(0.00102)	(0.00144)
age_51	0.166***	0.172***	0.172***	0.173***	0.168***	0.183***
	(0.00121)	(0.00143)	(0.00211)	(0.000871)	(0.00103)	(0.00148)
age_52	0.179***	0.181***	0.185***	0.189***	0.186***	0.199***
	(0.00122)	(0.00146)	(0.00215)	(0.000888)	(0.00104)	(0.00152)
age_53	0.189***	0.192***	0.194***	0.203***	0.198***	0.213***
	(0.00126)	(0.00148)	(0.00222)	(0.000919)	(0.00108)	(0.00160)
age_54	0.201***	0.206***	0.210***	0.219***	0.214***	0.232***
	(0.00131)	(0.00154)	(0.00228)	(0.000957)	(0.00112)	(0.00166)
age_55	0.215***	0.222***	0.231***	0.236***	0.230***	0.247***
	(0.00141)	(0.00167)	(0.00245)	(0.00103)	(0.00122)	(0.00177)
per_2005	-0.0242***	-0.0260***	-0.0238***	-0.0192***	-0.0170***	-0.0240***
	(0.000642)	(0.000762)	(0.00114)	(0.000504)	(0.000587)	(0.000871)
per_2006	-0.0169***	-0.0171***	-0.0144***	-0.00610***	-0.00568***	-0.00661***
	(0.000635)	(0.000760)	(0.00112)	(0.000488)	(0.000573)	(0.000830)
per_2007	-0.000216	0.000413	-0.00291***	0.00799***	0.00893***	0.00867***
	(0.000636)	(0.000758)	(0.00110)	(0.000515)	(0.000613)	(0.000861)
per_2008	0.0131***	0.0135***	0.00999***	0.0196***	0.0210***	0.0182***

Table 33A: continued

	(0.000645)	(0.000774)	(0.00110)	(0.000480)	(0.000571)	(0.000798)
per_2009	0.0382***	0.0381***	0.0382***	0.0296***	0.0299***	0.0338***
	(0.000678)	(0.000826)	(0.00114)	(0.000499)	(0.000596)	(0.000810)
per_2010	0.0231***	0.0219***	0.0267***	0.0181***	0.0144***	0.0218***
	(0.000693)	(0.000850)	(0.00116)	(0.000506)	(0.000619)	(0.000821)
per_2011	0.00985***	0.00870***	0.0121***	-0.000202	-0.00292***	0.00448***
	(0.000709)	(0.000871)	(0.00118)	(0.000513)	(0.000625)	(0.000822)
per_2012	-0.0150***	-0.0115***	-0.0146***	-0.0250***	-0.0256***	-0.0249***
	(0.000737)	(0.000913)	(0.00120)	(0.000532)	(0.000657)	(0.000848)
per_2013	-0.0193***	-0.0183***	-0.0234***	-0.0318***	-0.0326***	-0.0338***
	(0.000785)	(0.000974)	(0.00128)	(0.000564)	(0.000702)	(0.000885)
per_2014	-0.00104	0.00221**	-0.00311**	-0.00836***	-0.00740***	-0.0114***
	(0.000776)	(0.000964)	(0.00128)	(0.000558)	(0.000684)	(0.000894)
per_2015	-0.000966	-0.000717	-0.000353	-0.00220***	-0.00314***	-0.00375***
	(0.000757)	(0.000942)	(0.00125)	(0.000540)	(0.000667)	(0.000860)
per_2016	0.00136*	0.000306	0.00530***	0.00270***	0.00100	0.00390***
	(0.000734)	(0.000914)	(0.00121)	(0.000526)	(0.000648)	(0.000841)
per_2017	-0.00782***	-0.0118***	-0.00761***	-0.00387***	-0.00404***	-0.00443***
	(0.000710)	(0.000874)	(0.00118)	(0.000512)	(0.000625)	(0.000824)
per_2018	-0.0113***	-0.0120***	-0.0136***	-0.00435***	-0.00223***	-0.00597***
	(0.000682)	(0.000840)	(0.00114)	(0.000498)	(0.000607)	(0.000806)
per_2019	0.0111***	0.0121***	0.0116***	0.0231***	0.0253***	0.0240***
	(0.000656)	(0.000813)	(0.00109)	(0.000475)	(0.000586)	(0.000759)
spanish_n				0.0196***	0.0417***	0.00220
				(0.000890)	(0.00113)	(0.00142)
abroad				-0.0741***	-0.0827***	-0.0683***
				(0.000735)	(0.000946)	(0.00113)
v.t.				0.0812***	0.0775***	0.0887***
				(0.000382)	(0.000460)	(0.000631)
p.comp_educ				0.0580***	0.0494***	0.0769***
				(0.000538)	(0.000684)	(0.000831)
university_ed				0.111***	0.100***	0.143***
				(0.000533)	(0.000710)	(0.000789)
Aragón				0.0420***	0.0664***	0.0241***
				(0.000902)	(0.00107)	(0.00146)
Asturias				0.0169***	0.0582***	-0.0353***
				(0.00105)	(0.00125)	(0.00168)
I_Baleares				0.0740***	0.0738***	0.100***
				(0.000922)	(0.00117)	(0.00140)
I_Canarias				-0.0625***	-0.0734***	-0.0301***
				(0.000781)	(0.000986)	(0.00122)
Cantabria				0.0263***	0.0413***	0.00392*
				(0.00135)	(0.00166)	(0.00209)
C.-LaMancha				-0.000504	0.00282***	0.00350**
				(0.000799)	(0.000933)	(0.00141)
CastillayLeón				0.00157**	0.0111***	-0.00205*
				(0.000714)	(0.000856)	(0.00119)
Cataluña				0.0968***	0.118***	0.0933***
				(0.000529)	(0.000631)	(0.000886)
Extremadura				-0.0801***	-0.0911***	-0.0601***
				(0.00116)	(0.00137)	(0.00203)
Galicia				-0.0600***	-0.0391***	-0.0614***
				(0.000695)	(0.000839)	(0.00113)
C. Madrid				0.0417***	0.0478***	0.0457***

Table 33A: continued

	(0.000540)	(0.000662)	(0.000885)
Murcia	-0.0170***	-0.0132***	-0.0144***
	(0.000954)	(0.00111)	(0.00169)
Navarra	0.151***	0.173***	0.130***
	(0.00112)	(0.00134)	(0.00185)
P. Vasco	0.175***	0.182***	0.172***
	(0.000719)	(0.000861)	(0.00120)
La Rioja	0.0505***	0.0633***	0.0559***
	(0.00160)	(0.00194)	(0.00259)
C. Valenciana	-0.00102*	0.00337***	0.00530***
	(0.000602)	(0.000727)	(0.000999)
CeutaMelilla	0.0886***	0.0695***	0.123***
	(0.00333)	(0.00402)	(0.00560)
temporary	-0.0859***	-0.104***	-0.0643***
	(0.000373)	(0.000467)	(0.000599)
exp	-0.00227***	-0.00333***	-0.00280***
	(2.67e-05)	(3.35e-05)	(4.19e-05)
agriculture	-0.146***	-0.162***	-0.132***
	(0.00182)	(0.00194)	(0.00481)
construction	-0.00109**	-0.0169***	-0.0225***
	(0.000516)	(0.000552)	(0.00156)
trade	-0.159***	-0.129***	-0.152***
	(0.000480)	(0.000566)	(0.000837)
tourism	-0.181***	-0.185***	-0.0741***
	(0.000601)	(0.000808)	(0.000978)
transport	-0.0619***	-0.0782***	-0.0301***
	(0.000658)	(0.000713)	(0.00151)
health	-0.212***	-0.179***	-0.149***
	(0.000637)	(0.00113)	(0.000885)
education	-0.282***	-0.266***	-0.219***
	(0.000980)	(0.00166)	(0.00128)
financial	0.135***	0.104***	0.212***
	(0.000702)	(0.000863)	(0.00117)
s_company	-0.161***	-0.159***	-0.115***
	(0.000531)	(0.000670)	(0.000886)
o_services	-0.148***	-0.118***	-0.134***
	(0.000680)	(0.000831)	(0.00109)
med_manual	0.104***	0.0960***	0.0879***
	(0.000604)	(0.000710)	(0.00101)
high_manual	0.191***	0.159***	0.147***
	(0.000534)	(0.000614)	(0.00107)
low_noman	0.0801***	0.0603***	0.151***
	(0.000617)	(0.000877)	(0.000914)
med_noman	0.335***	0.336***	0.358***
	(0.000598)	(0.000747)	(0.000943)
high_noman	0.562***	0.513***	0.619***
	(0.000695)	(0.000891)	(0.00109)
10-19 workers	0.0760***	0.0671***	0.0777***
	(0.000515)	(0.000605)	(0.000903)
20-49 workers	0.121***	0.117***	0.117***
	(0.000473)	(0.000560)	(0.000812)
50-249 w.	0.189***	0.194***	0.173***

Table 33A: continued

				(0.000443)	(0.000541)	(0.000731)
250-499				0.246***	0.254***	0.233***
workers						
				(0.000596)	(0.000742)	(0.000933)
>500 workers				0.286***	0.292***	0.272***
				(0.000501)	(0.000642)	(0.000772)
Observations	4,391,680	2,738,896	1,652,314	4,230,395	2,628,345	1,602,038

Notes: this table displays the trended age-period-cohort effects using as dependent variable the logarithm of monthly earnings. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

ANNEX 5: Detrended age-period-cohort effects on annual earnings

Table 34A: Detrended age-period-cohort effects on annual earnings

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Uncontrolled			Controlled		
	All workers	Males	Females	All workers	Males	Females
coh_1951	0.0292*** (0.00513)	0.0274*** (0.00578)	0.00138 (0.0105)	0.00766** (0.00389)	0.00282 (0.00424)	-0.0129 (0.00839)
coh_1952	0.0148*** (0.00403)	0.0108** (0.00466)	-0.000714 (0.00768)	-0.00715** (0.00314)	-0.0172*** (0.00358)	-0.00465 (0.00612)
coh_1953	0.00781** (0.00337)	0.00828** (0.00389)	-0.0160** (0.00644)	-0.00586** (0.00256)	-0.0120*** (0.00289)	-0.00921* (0.00505)
coh_1954	-0.000184 (0.00306)	0.00213 (0.00353)	-0.0174*** (0.00584)	-0.0161*** (0.00230)	-0.0198*** (0.00260)	-0.0177*** (0.00445)
coh_1955	-0.00477* (0.00269)	-0.0126*** (0.00318)	0.00348 (0.00492)	-0.0212*** (0.00202)	-0.0300*** (0.00236)	-0.00759** (0.00369)
coh_1956	0.00119 (0.00245)	0.000380 (0.00288)	-0.00117 (0.00447)	-0.0171*** (0.00181)	-0.0220*** (0.00211)	-0.00733** (0.00330)
coh_1957	-0.00616*** (0.00223)	-0.00539** (0.00266)	-0.00527 (0.00396)	-0.0232*** (0.00167)	-0.0255*** (0.00195)	-0.0131*** (0.00301)
coh_1958	-0.0204*** (0.00212)	-0.0157*** (0.00255)	-0.0267*** (0.00371)	-0.0213*** (0.00160)	-0.0190*** (0.00188)	-0.0236*** (0.00282)
coh_1959	-0.0104*** (0.00199)	-0.00946*** (0.00238)	-0.00726** (0.00353)	-0.0112*** (0.00149)	-0.0117*** (0.00173)	-0.00796*** (0.00270)
coh_1960	-0.0279*** (0.00189)	-0.0247*** (0.00227)	-0.0320*** (0.00332)	-0.0134*** (0.00142)	-0.0133*** (0.00166)	-0.0152*** (0.00254)
coh_1961	-0.0235*** (0.00181)	-0.0197*** (0.00218)	-0.0272*** (0.00316)	-0.00384*** (0.00135)	-0.00540*** (0.00161)	-0.00219 (0.00235)
coh_1962	-0.0354*** (0.00173)	-0.0292*** (0.00210)	-0.0430*** (0.00297)	-0.00900*** (0.00129)	-0.00723*** (0.00154)	-0.0144*** (0.00223)
coh_1963	-0.0223*** (0.00164)	-0.0204*** (0.00201)	-0.0181*** (0.00281)	0.00260** (0.00122)	0.00317** (0.00146)	0.00197 (0.00210)
coh_1964	-0.0217*** (0.00154)	-0.0190*** (0.00188)	-0.0176*** (0.00262)	0.00458*** (0.00114)	0.00491*** (0.00136)	0.00322 (0.00197)
coh_1965	-0.0103*** (0.00153)	-0.00658*** (0.00188)	-0.00815*** (0.00262)	0.00581*** (0.00114)	0.0119*** (0.00136)	-0.00472** (0.00196)
coh_1966	-0.00777*** (0.00152)	-0.0125*** (0.00187)	0.00945*** (0.00259)	0.00876*** (0.00113)	0.00705*** (0.00135)	0.0133*** (0.00193)
coh_1967	-0.0118*** (0.00151)	-0.00683*** (0.00186)	-0.00801*** (0.00252)	0.00715*** (0.00113)	0.0121*** (0.00137)	0.00563*** (0.00187)
coh_1968	-0.0108*** (0.00150)	-0.0126*** (0.00186)	0.00391 (0.00253)	0.00801*** (0.00112)	0.0155*** (0.00137)	0.00193 (0.00187)
coh_1969	-0.000880 (0.00148)	-0.000428 (0.00184)	0.00820*** (0.00250)	0.0128*** (0.00111)	0.0132*** (0.00135)	0.0160*** (0.00187)
coh_1970	0.00573*** (0.00146)	0.00407** (0.00181)	0.0196*** (0.00247)	0.0103*** (0.00110)	0.0151*** (0.00133)	0.00936*** (0.00185)
coh_1971	0.00867*** (0.00144)	0.00303* (0.00178)	0.0285*** (0.00242)	0.00928*** (0.00108)	0.0110*** (0.00132)	0.0136*** (0.00182)
coh_1972	0.0106*** (0.00143)	0.00606*** (0.00180)	0.0301*** (0.00237)	0.00736*** (0.00108)	0.00925*** (0.00133)	0.0154*** (0.00177)
coh_1973	0.0211*** (0.00141)	0.0196*** (0.00175)	0.0336*** (0.00234)	0.0123*** (0.00106)	0.0167*** (0.00131)	0.0126*** (0.00176)
coh_1974	0.0325***	0.0296***	0.0491***	0.0189***	0.0215***	0.0255***



Table 34A: continued

	(0.00138)	(0.00175)	(0.00224)	(0.00104)	(0.00131)	(0.00167)
coh_1975	0.0292***	0.0255***	0.0442***	0.0202***	0.0260***	0.0175***
	(0.00137)	(0.00172)	(0.00224)	(0.00104)	(0.00130)	(0.00169)
coh_1976	0.0350***	0.0358***	0.0431***	0.0231***	0.0306***	0.0206***
	(0.00135)	(0.00173)	(0.00216)	(0.00104)	(0.00131)	(0.00164)
coh_1977	0.0336***	0.0316***	0.0448***	0.0240***	0.0308***	0.0205***
	(0.00135)	(0.00173)	(0.00214)	(0.00105)	(0.00134)	(0.00164)
coh_1978	0.0291***	0.0291***	0.0352***	0.0221***	0.0291***	0.0191***
	(0.00135)	(0.00174)	(0.00214)	(0.00106)	(0.00135)	(0.00165)
coh_1979	0.0255***	0.0263***	0.0304***	0.0218***	0.0286***	0.0220***
	(0.00139)	(0.00181)	(0.00218)	(0.00110)	(0.00142)	(0.00169)
coh_1980	0.0250***	0.0219***	0.0331***	0.0237***	0.0298***	0.0227***
	(0.00139)	(0.00180)	(0.00217)	(0.00111)	(0.00144)	(0.00172)
coh_1981	0.0230***	0.0220***	0.0283***	0.0231***	0.0285***	0.0238***
	(0.00149)	(0.00195)	(0.00230)	(0.00120)	(0.00156)	(0.00182)
coh_1982	0.0317***	0.0309***	0.0348***	0.0258***	0.0313***	0.0266***
	(0.00157)	(0.00206)	(0.00243)	(0.00126)	(0.00165)	(0.00191)
coh_1983	0.0223***	0.0203***	0.0249***	0.0207***	0.0214***	0.0242***
	(0.00171)	(0.00223)	(0.00264)	(0.00137)	(0.00179)	(0.00208)
coh_1984	0.0119***	0.0138***	0.00961***	0.0135***	0.0162***	0.0186***
	(0.00184)	(0.00244)	(0.00281)	(0.00147)	(0.00195)	(0.00221)
coh_1985	-0.00144	0.000377	-0.00642**	0.00905***	0.0131***	0.00857***
	(0.00202)	(0.00268)	(0.00306)	(0.00162)	(0.00215)	(0.00242)
coh_1986	-0.0185***	-0.0134***	-0.0310***	-0.00145	0.000914	-0.00680**
	(0.00222)	(0.00291)	(0.00344)	(0.00178)	(0.00234)	(0.00271)
coh_1987	-0.0356***	-0.0349***	-0.0431***	-0.0128***	-0.0163***	-0.0111***
	(0.00240)	(0.00314)	(0.00372)	(0.00194)	(0.00257)	(0.00294)
coh_1988	-0.0409***	-0.0349***	-0.0570***	-0.0186***	-0.0202***	-0.0208***
	(0.00259)	(0.00340)	(0.00401)	(0.00210)	(0.00276)	(0.00318)
coh_1989	-0.0423***	-0.0456***	-0.0479***	-0.0292***	-0.0356***	-0.0303***
	(0.00282)	(0.00370)	(0.00435)	(0.00230)	(0.00306)	(0.00346)
coh_1990	-0.0319***	-0.0316***	-0.0434***	-0.0282***	-0.0366***	-0.0271***
	(0.00309)	(0.00409)	(0.00472)	(0.00256)	(0.00343)	(0.00382)
coh_1991	-0.0158***	-0.00723	-0.0403***	-0.0273***	-0.0279***	-0.0392***
	(0.00344)	(0.00453)	(0.00526)	(0.00288)	(0.00381)	(0.00434)
coh_1992	-0.00678*	-0.0114**	-0.0156***	-0.0368***	-0.0509***	-0.0349***
	(0.00389)	(0.00511)	(0.00598)	(0.00331)	(0.00440)	(0.00497)
coh_1993	0.00964**	0.00520	-0.00247	-0.0388***	-0.0600***	-0.0318***
	(0.00485)	(0.00635)	(0.00749)	(0.00421)	(0.00560)	(0.00634)
age_25	-0.159***	-0.140***	-0.180***	-0.0659***	-0.0485***	-0.0774***
	(0.00173)	(0.00229)	(0.00265)	(0.00152)	(0.00201)	(0.00227)
age_26	-0.100***	-0.0925***	-0.105***	-0.0412***	-0.0332***	-0.0407***
	(0.00160)	(0.00212)	(0.00244)	(0.00137)	(0.00182)	(0.00203)
age_27	-0.0614***	-0.0611***	-0.0571***	-0.0267***	-0.0251***	-0.0192***
	(0.00151)	(0.00199)	(0.00229)	(0.00126)	(0.00167)	(0.00187)
age_28	-0.0288***	-0.0307***	-0.0219***	-0.0145***	-0.0149***	-0.00618***
	(0.00145)	(0.00192)	(0.00220)	(0.00119)	(0.00158)	(0.00176)
age_29	-0.00821***	-0.00937***	-0.00299	-0.00732***	-0.00833***	0.000209
	(0.00140)	(0.00186)	(0.00212)	(0.00113)	(0.00150)	(0.00168)
age_30	0.0140***	0.0122***	0.0191***	0.00247**	0.00183	0.00715***
	(0.00136)	(0.00179)	(0.00209)	(0.00109)	(0.00143)	(0.00164)
age_31	0.0301***	0.0244***	0.0395***	0.00973***	0.00700***	0.0147***
	(0.00134)	(0.00176)	(0.00207)	(0.00106)	(0.00138)	(0.00162)
age_32	0.0400***	0.0344***	0.0486***	0.0148***	0.0112***	0.0183***

Table 34A: continued

	(0.00133)	(0.00173)	(0.00209)	(0.00105)	(0.00134)	(0.00162)
age_33	0.0452***	0.0402***	0.0518***	0.0187***	0.0147***	0.0204***
	(0.00133)	(0.00171)	(0.00212)	(0.00103)	(0.00131)	(0.00162)
age_34	0.0513***	0.0482***	0.0541***	0.0227***	0.0205***	0.0199***
	(0.00133)	(0.00169)	(0.00214)	(0.00102)	(0.00128)	(0.00163)
age_35	0.0526***	0.0470***	0.0580***	0.0238***	0.0190***	0.0228***
	(0.00133)	(0.00169)	(0.00216)	(0.00102)	(0.00127)	(0.00163)
age_36	0.0513***	0.0473***	0.0534***	0.0241***	0.0194***	0.0212***
	(0.00135)	(0.00169)	(0.00221)	(0.00102)	(0.00127)	(0.00165)
age_37	0.0499***	0.0466***	0.0499***	0.0231***	0.0189***	0.0187***
	(0.00135)	(0.00169)	(0.00225)	(0.00102)	(0.00126)	(0.00168)
age_38	0.0505***	0.0496***	0.0459***	0.0244***	0.0210***	0.0187***
	(0.00136)	(0.00168)	(0.00227)	(0.00102)	(0.00125)	(0.00169)
age_39	0.0471***	0.0451***	0.0445***	0.0230***	0.0190***	0.0189***
	(0.00136)	(0.00169)	(0.00228)	(0.00102)	(0.00125)	(0.00169)
age_40	0.0436***	0.0416***	0.0406***	0.0220***	0.0175***	0.0189***
	(0.00138)	(0.00171)	(0.00231)	(0.00103)	(0.00125)	(0.00171)
age_41	0.0387***	0.0366***	0.0363***	0.0192***	0.0149***	0.0172***
	(0.00139)	(0.00172)	(0.00233)	(0.00103)	(0.00126)	(0.00171)
age_42	0.0338***	0.0349***	0.0260***	0.0169***	0.0159***	0.0108***
	(0.00139)	(0.00171)	(0.00235)	(0.00103)	(0.00125)	(0.00173)
age_43	0.0260***	0.0259***	0.0212***	0.0116***	0.00917***	0.00948***
	(0.00141)	(0.00174)	(0.00238)	(0.00105)	(0.00127)	(0.00175)
age_44	0.0189***	0.0213***	0.0108***	0.00830***	0.00894***	0.00291
	(0.00142)	(0.00175)	(0.00239)	(0.00106)	(0.00128)	(0.00177)
age_45	0.0130***	0.0136***	0.00916***	0.00563***	0.00571***	0.00317*
	(0.00143)	(0.00177)	(0.00241)	(0.00106)	(0.00129)	(0.00178)
age_46	0.00599***	0.00720***	0.00228	0.00276***	0.00334***	0.000943
	(0.00145)	(0.00178)	(0.00243)	(0.00107)	(0.00129)	(0.00179)
age_47	0.000384	0.00317*	-0.00512**	-0.00135	0.00138	-0.00530***
	(0.00146)	(0.00179)	(0.00246)	(0.00108)	(0.00130)	(0.00183)
age_48	-0.00642***	-0.00476***	-0.00878***	-0.00380***	-0.00202	-0.00483***
	(0.00147)	(0.00181)	(0.00247)	(0.00109)	(0.00131)	(0.00183)
age_49	-0.0119***	-0.00884***	-0.0154***	-0.00676***	-0.00387***	-0.00758***
	(0.00148)	(0.00182)	(0.00249)	(0.00109)	(0.00131)	(0.00184)
age_50	-0.0188***	-0.0173***	-0.0187***	-0.00982***	-0.00793***	-0.00783***
	(0.00151)	(0.00185)	(0.00253)	(0.00111)	(0.00134)	(0.00186)
age_51	-0.0269***	-0.0264***	-0.0239***	-0.0133***	-0.0125***	-0.00824***
	(0.00153)	(0.00188)	(0.00258)	(0.00113)	(0.00136)	(0.00188)
age_52	-0.0327***	-0.0309***	-0.0316***	-0.0142***	-0.0116***	-0.0119***
	(0.00156)	(0.00190)	(0.00263)	(0.00115)	(0.00138)	(0.00194)
age_53	-0.0433***	-0.0417***	-0.0411***	-0.0194***	-0.0164***	-0.0167***
	(0.00159)	(0.00194)	(0.00272)	(0.00117)	(0.00140)	(0.00201)
age_54	-0.0532***	-0.0525***	-0.0482***	-0.0232***	-0.0202***	-0.0195***
	(0.00165)	(0.00201)	(0.00281)	(0.00122)	(0.00145)	(0.00210)
age_55	-0.0616***	-0.0628***	-0.0511***	-0.0257***	-0.0245***	-0.0188***
	(0.00178)	(0.00218)	(0.00300)	(0.00131)	(0.00158)	(0.00220)
per_2005	-0.0479***	-0.0524***	-0.0432***	-0.0325***	-0.0318***	-0.0357***
	(0.000907)	(0.00112)	(0.00154)	(0.000714)	(0.000861)	(0.00121)
per_2006	-0.0444***	-0.0453***	-0.0457***	-0.0295***	-0.0262***	-0.0354***
	(0.000897)	(0.00110)	(0.00153)	(0.000699)	(0.000842)	(0.00119)
per_2007	-0.0343***	-0.0330***	-0.0383***	-0.0129***	-0.00833***	-0.0187***
	(0.000900)	(0.00111)	(0.00152)	(0.000748)	(0.000905)	(0.00126)
per_2008	0.0203***	0.0231***	0.0165***	0.0285***	0.0303***	0.0267***

Table 34A: continued

	(0.000888)	(0.00110)	(0.00148)	(0.000686)	(0.000834)	(0.00114)
per_2009	0.0658***	0.0647***	0.0697***	0.0505***	0.0463***	0.0585***
	(0.000910)	(0.00114)	(0.00148)	(0.000691)	(0.000853)	(0.00112)
per_2010	0.0494***	0.0484***	0.0530***	0.0355***	0.0308***	0.0437***
	(0.000923)	(0.00116)	(0.00149)	(0.000706)	(0.000877)	(0.00114)
per_2011	0.0317***	0.0339***	0.0300***	0.0144***	0.0132***	0.0168***
	(0.000926)	(0.00117)	(0.00149)	(0.000721)	(0.000893)	(0.00117)
per_2012	0.0241***	0.0265***	0.0228***	0.000106	-0.00270***	0.00480***
	(0.000963)	(0.00122)	(0.00155)	(0.000733)	(0.000917)	(0.00117)
per_2013	-0.00209**	0.000183	-0.00308*	-0.0256***	-0.0275***	-0.0228***
	(0.00102)	(0.00131)	(0.00163)	(0.000768)	(0.000969)	(0.00121)
per_2014	0.00444***	0.00632***	0.00267	-0.00902***	-0.00936***	-0.00979***
	(0.00104)	(0.00132)	(0.00165)	(0.000773)	(0.000971)	(0.00123)
per_2015	-0.00468***	-0.00510***	-0.00403**	-0.00597***	-0.00698***	-0.00604***
	(0.00102)	(0.00129)	(0.00164)	(0.000756)	(0.000951)	(0.00120)
per_2016	-0.000112	-0.00198	0.00203	0.00328***	0.00220**	0.00332***
	(0.000978)	(0.00124)	(0.00157)	(0.000726)	(0.000911)	(0.00116)
per_2017	-0.0217***	-0.0224***	-0.0220***	-0.0116***	-0.0100***	-0.0145***
	(0.000955)	(0.00121)	(0.00155)	(0.000716)	(0.000895)	(0.00115)
per_2018	-0.0358***	-0.0366***	-0.0363***	-0.0235***	-0.0212***	-0.0267***
	(0.000926)	(0.00117)	(0.00151)	(0.000705)	(0.000882)	(0.00113)
per_2019	-0.00471***	-0.00640***	-0.00400***	0.0184***	0.0213***	0.0158***
	(0.000891)	(0.00113)	(0.00144)	(0.000666)	(0.000835)	(0.00106)
rescacoh	0.0623***	0.0319***	0.155***	-0.103***	-0.123***	-0.0794***
	(0.00195)	(0.00242)	(0.00333)	(0.00156)	(0.00192)	(0.00267)
rescaage	0.256***	0.256***	0.257***	0.0137***	0.00788***	0.0589***
	(0.00101)	(0.00126)	(0.00167)	(0.00111)	(0.00144)	(0.00173)
spanish_n				0.0331***	0.0552***	0.0280***
				(0.00133)	(0.00171)	(0.00212)
abroad				-0.0383***	-0.0412***	-0.0430***
				(0.00108)	(0.00140)	(0.00164)
v.t.				0.104***	0.101***	0.109***
				(0.000530)	(0.000645)	(0.000890)
p.comp_educ				0.0867***	0.0807***	0.103***
				(0.000747)	(0.000952)	(0.00117)
university_ed				0.155***	0.146***	0.180***
				(0.000754)	(0.00101)	(0.00113)
Aragón				0.0414***	0.0632***	0.0283***
				(0.00127)	(0.00155)	(0.00212)
Asturias				0.0379***	0.0773***	-0.0182***
				(0.00146)	(0.00178)	(0.00238)
I_Baleares				0.00330**	0.0167***	0.0138***
				(0.00136)	(0.00177)	(0.00208)
I_Canarias				-0.0601***	-0.0754***	-0.0208***
				(0.00113)	(0.00145)	(0.00176)
Cantabria				0.0407***	0.0590***	0.0177***
				(0.00183)	(0.00224)	(0.00299)
C.-LaMancha				-0.00615***	-0.00325**	0.00103
				(0.00118)	(0.00140)	(0.00209)
CastillayLeón				0.00539***	0.0163***	-0.000370
				(0.00103)	(0.00125)	(0.00173)
Cataluña				0.0736***	0.0968***	0.0678***
				(0.000744)	(0.000910)	(0.00124)
Extremadura				-0.0711***	-0.0838***	-0.0449***

Table 34A: continued

	(0.00174)	(0.00211)	(0.00299)
Galicia	-0.0458***	-0.0248***	-0.0481***
	(0.000996)	(0.00123)	(0.00163)
C. Madrid	0.0240***	0.0321***	0.0278***
	(0.000766)	(0.000954)	(0.00126)
Murcia	-0.0190***	-0.0182***	-0.0131***
	(0.00136)	(0.00161)	(0.00238)
Navarra	0.152***	0.172***	0.133***
	(0.00160)	(0.00191)	(0.00271)
P. Vasco	0.191***	0.200***	0.185***
	(0.00101)	(0.00121)	(0.00172)
La Rioja	0.0505***	0.0605***	0.0636***
	(0.00227)	(0.00275)	(0.00379)
C. Valenciana	-0.0148***	-0.0116***	-0.00246*
	(0.000863)	(0.00106)	(0.00143)
CeutaMelilla	0.102***	0.0882***	0.129***
	(0.00506)	(0.00611)	(0.00877)
temporary	-0.398***	-0.424***	-0.360***
	(0.000659)	(0.000835)	(0.00106)
exp	0.00635***	0.00555***	0.00432***
	(5.29e-05)	(7.16e-05)	(7.81e-05)
agriculture	-0.154***	-0.177***	-0.111***
	(0.00279)	(0.00309)	(0.00638)
construction	-0.0168***	-0.0354***	-0.0231***
	(0.000824)	(0.000889)	(0.00234)
trade	-0.166***	-0.134***	-0.157***
	(0.000632)	(0.000750)	(0.00114)
tourism	-0.257***	-0.267***	-0.134***
	(0.000917)	(0.00123)	(0.00148)
transport	-0.0819***	-0.101***	-0.0363***
	(0.000901)	(0.00100)	(0.00197)
health	-0.124***	-0.0877***	-0.0644***
	(0.000897)	(0.00157)	(0.00126)
education	-0.279***	-0.247***	-0.225***
	(0.00130)	(0.00215)	(0.00174)
financial	0.0962***	0.0667***	0.179***
	(0.000986)	(0.00127)	(0.00159)
s_company	-0.181***	-0.182***	-0.126***
	(0.000745)	(0.000953)	(0.00124)
o_services	-0.155***	-0.126***	-0.135***
	(0.000907)	(0.00113)	(0.00149)
med_manual	0.115***	0.108***	0.0988***
	(0.000936)	(0.00113)	(0.00159)
high_manual	0.207***	0.175***	0.155***
	(0.000834)	(0.000990)	(0.00164)
low_noman	0.101***	0.0787***	0.180***
	(0.000925)	(0.00129)	(0.00141)
med_noman	0.359***	0.353***	0.394***
	(0.000871)	(0.00110)	(0.00140)
high_noman	0.602***	0.545***	0.676***
	(0.00100)	(0.00129)	(0.00160)
10-19 workers	0.0986***	0.0924***	0.0932***
	(0.000737)	(0.000890)	(0.00127)

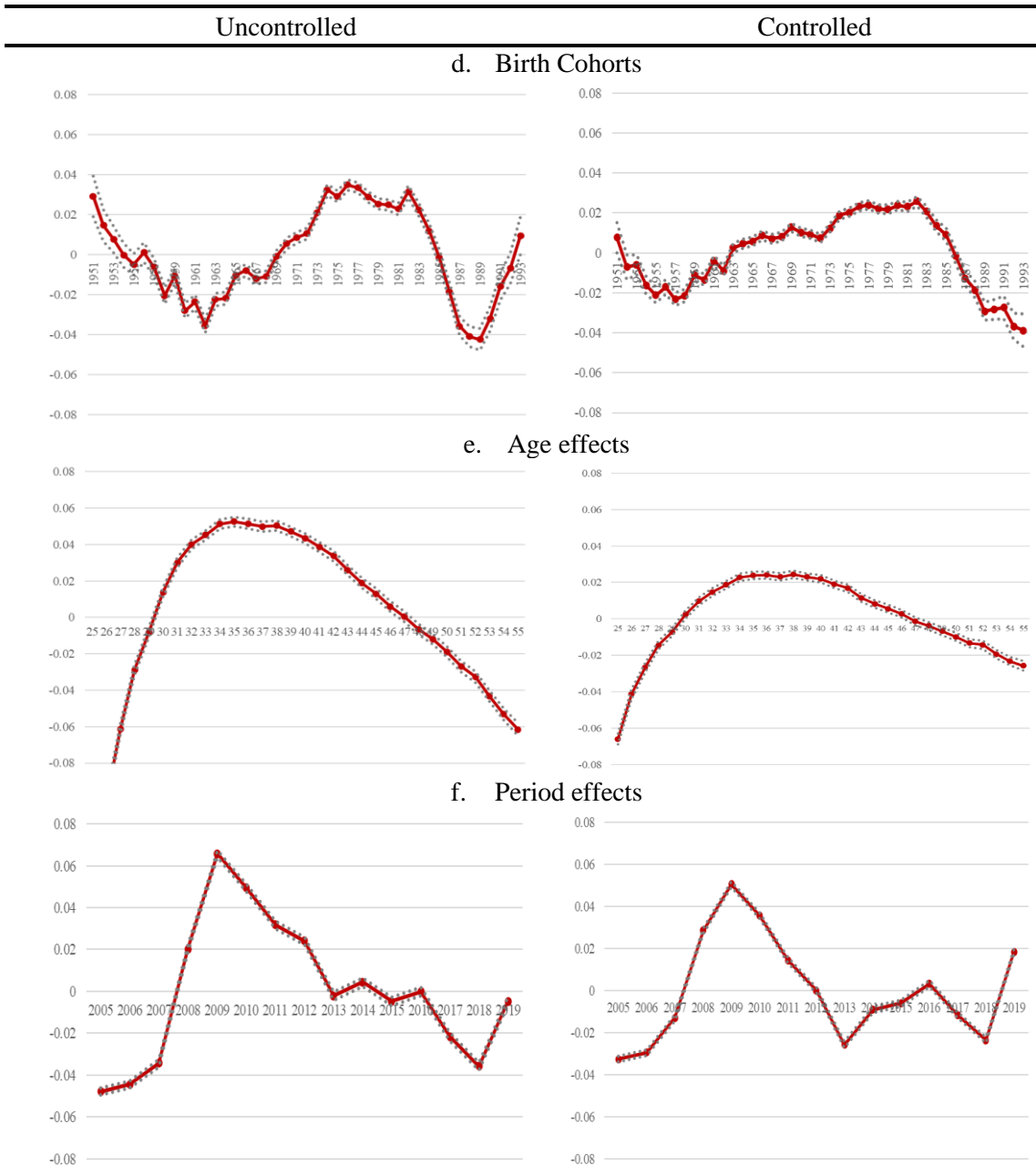
Table 34A: continued

20-49 workers				0.149*** (0.000666)	0.148*** (0.000811)	0.135*** (0.00113)
50-249 workers				0.224*** (0.000619)	0.232*** (0.000769)	0.201*** (0.00101)
250-499 workers				0.291*** (0.000825)	0.299*** (0.00104)	0.276*** (0.00131)
>500 workers				0.351*** (0.000693)	0.347*** (0.000889)	0.344*** (0.00108)
Constant	9.860*** (0.000383)	9.895*** (0.000475)	9.795*** (0.000660)	9.389*** (0.00185)	9.439*** (0.00234)	9.275*** (0.00303)
Observations	4,397,372	2,742,806	1,654,566	4,235,283	2,631,079	1,604,204

Notes: this table displays the detrended age-period-cohort effects using as dependent variable the logarithm of annual earnings. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

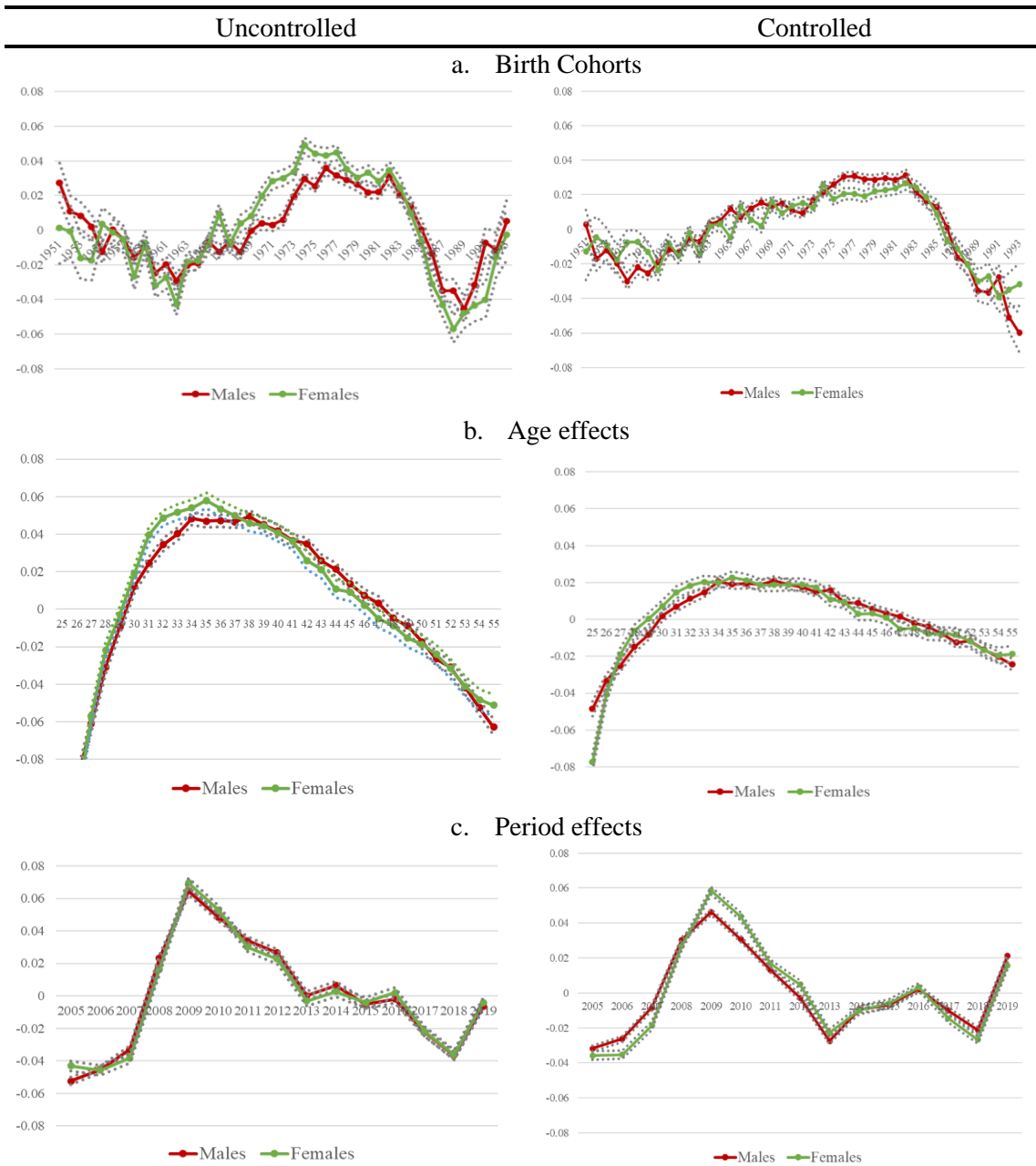
ANNEX 6: Detrended age-period-cohort effects on annual earnings (graphics)

Figure 19A: ‘Detrended’ Age-Period-Cohort effects on annual earnings without and with controls



Note: Results of APCD Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCD coefficient and horizontal axis shows each APCD component. Dotted lines represent 95 percent confidence intervals.

Figure 20A: ‘Detrended’ Age-Period-Cohort effects on annual earnings by gender without and with controls



Note: Results of APCD Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCD coefficient and horizontal axis shows each APCD component. Dotted lines represent 95 percent confidence intervals.

## ANNEX 7: Trended age-period-cohort effects on annual earnings

Table 35A: Trended age-period-cohort effects on annual earnings

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Uncontrolled			Controlled		
	All workers	Males	Females	All workers	Males	Females
coh_1951	9.734*** (0.00559)	9.807*** (0.00630)	9.567*** (0.0120)	9.264*** (0.00547)	9.335*** (0.00601)	9.122*** (0.0120)
coh_1952	9.741*** (0.00433)	9.797*** (0.00494)	9.596*** (0.00819)	9.263*** (0.00475)	9.329*** (0.00547)	9.145*** (0.00954)
coh_1953	9.734*** (0.00354)	9.796*** (0.00413)	9.597*** (0.00688)	9.269*** (0.00435)	9.337*** (0.00495)	9.131*** (0.00892)
coh_1954	9.731*** (0.00326)	9.794*** (0.00372)	9.592*** (0.00613)	9.271*** (0.00416)	9.339*** (0.00477)	9.142*** (0.00845)
coh_1955	9.739*** (0.00276)	9.788*** (0.00328)	9.621*** (0.00526)	9.273*** (0.00398)	9.338*** (0.00462)	9.162*** (0.00797)
coh_1956	9.743*** (0.00253)	9.801*** (0.00293)	9.627*** (0.00458)	9.286*** (0.00385)	9.353*** (0.00445)	9.172*** (0.00773)
coh_1957	9.746*** (0.00225)	9.804*** (0.00269)	9.634*** (0.00400)	9.288*** (0.00375)	9.351*** (0.00435)	9.177*** (0.00755)
coh_1958	9.743*** (0.00214)	9.802*** (0.00256)	9.622*** (0.00366)	9.292*** (0.00371)	9.363*** (0.00431)	9.167*** (0.00748)
coh_1959	9.759*** (0.00197)	9.810*** (0.00239)	9.645*** (0.00354)	9.305*** (0.00365)	9.374*** (0.00421)	9.183*** (0.00744)
coh_1960	9.740*** (0.00188)	9.799*** (0.00225)	9.636*** (0.00326)	9.303*** (0.00361)	9.370*** (0.00418)	9.179*** (0.00735)
coh_1961	9.757*** (0.00178)	9.812*** (0.00215)	9.652*** (0.00306)	9.310*** (0.00357)	9.376*** (0.00414)	9.188*** (0.00727)
coh_1962	9.749*** (0.00169)	9.802*** (0.00208)	9.641*** (0.00290)	9.304*** (0.00354)	9.368*** (0.00410)	9.183*** (0.00721)
coh_1963	9.769*** (0.00161)	9.819*** (0.00197)	9.675*** (0.00271)	9.318*** (0.00350)	9.377*** (0.00407)	9.202*** (0.00716)
coh_1964	9.773*** (0.00149)	9.821*** (0.00184)	9.685*** (0.00252)	9.321*** (0.00347)	9.382*** (0.00403)	9.205*** (0.00713)
coh_1965	9.791*** (0.00149)	9.842*** (0.00184)	9.705*** (0.00251)	9.330*** (0.00347)	9.393*** (0.00400)	9.210*** (0.00711)
coh_1966	9.805*** (0.00147)	9.841*** (0.00182)	9.733*** (0.00249)	9.342*** (0.00345)	9.397*** (0.00400)	9.239*** (0.00711)
coh_1967	9.809*** (0.00147)	9.857*** (0.00182)	9.725*** (0.00243)	9.353*** (0.00345)	9.411*** (0.00400)	9.243*** (0.00708)
coh_1968	9.821*** (0.00146)	9.856*** (0.00182)	9.756*** (0.00243)	9.365*** (0.00344)	9.424*** (0.00398)	9.248*** (0.00706)
coh_1969	9.838*** (0.00144)	9.879*** (0.00178)	9.771*** (0.00240)	9.380*** (0.00343)	9.428*** (0.00397)	9.274*** (0.00706)
coh_1970	9.855*** (0.00141)	9.888*** (0.00176)	9.797*** (0.00237)	9.389*** (0.00342)	9.444*** (0.00395)	9.283*** (0.00706)
coh_1971	9.866*** (0.00139)	9.898*** (0.00173)	9.818*** (0.00233)	9.398*** (0.00341)	9.448*** (0.00394)	9.297*** (0.00703)
coh_1972	9.875*** (0.00139)	9.902*** (0.00175)	9.830*** (0.00228)	9.405*** (0.00340)	9.455*** (0.00393)	9.308*** (0.00702)
coh_1973	9.897*** (0.00136)	9.924*** (0.00170)	9.846*** (0.00226)	9.420*** (0.00339)	9.466*** (0.00391)	9.315*** (0.00701)
coh_1974	9.916***	9.944***	9.872***	9.432***	9.475***	9.337***



Table 35A: continued

	(0.00133)	(0.00169)	(0.00215)	(0.00337)	(0.00390)	(0.00697)
coh_1975	9.921***	9.945***	9.879***	9.439***	9.488***	9.336***
	(0.00131)	(0.00166)	(0.00216)	(0.00337)	(0.00389)	(0.00698)
coh_1976	9.934***	9.964***	9.889***	9.452***	9.499***	9.347***
	(0.00129)	(0.00166)	(0.00207)	(0.00336)	(0.00389)	(0.00697)
coh_1977	9.942***	9.963***	9.904***	9.459***	9.504***	9.356***
	(0.00129)	(0.00166)	(0.00206)	(0.00336)	(0.00390)	(0.00696)
coh_1978	9.944***	9.968***	9.905***	9.467***	9.511***	9.364***
	(0.00129)	(0.00166)	(0.00204)	(0.00336)	(0.00389)	(0.00696)
coh_1979	9.946***	9.971***	9.912***	9.478***	9.519***	9.376***
	(0.00135)	(0.00174)	(0.00210)	(0.00337)	(0.00392)	(0.00696)
coh_1980	9.956***	9.976***	9.924***	9.487***	9.529***	9.386***
	(0.00133)	(0.00173)	(0.00207)	(0.00337)	(0.00391)	(0.00697)
coh_1981	9.960***	9.981***	9.926***	9.493***	9.529***	9.391***
	(0.00144)	(0.00189)	(0.00223)	(0.00340)	(0.00396)	(0.00701)
coh_1982	9.972***	9.991***	9.939***	9.500***	9.538***	9.404***
	(0.00154)	(0.00199)	(0.00237)	(0.00343)	(0.00400)	(0.00703)
coh_1983	9.966***	9.982***	9.936***	9.496***	9.531***	9.399***
	(0.00168)	(0.00221)	(0.00260)	(0.00348)	(0.00406)	(0.00708)
coh_1984	9.958***	9.979***	9.928***	9.492***	9.525***	9.393***
	(0.00183)	(0.00242)	(0.00278)	(0.00351)	(0.00415)	(0.00711)
coh_1985	9.948***	9.969***	9.920***	9.489***	9.523***	9.389***
	(0.00202)	(0.00268)	(0.00305)	(0.00359)	(0.00424)	(0.00719)
coh_1986	9.939***	9.960***	9.893***	9.483***	9.513***	9.379***
	(0.00224)	(0.00296)	(0.00351)	(0.00367)	(0.00435)	(0.00732)
coh_1987	9.924***	9.939***	9.893***	9.474***	9.494***	9.380***
	(0.00245)	(0.00318)	(0.00375)	(0.00376)	(0.00451)	(0.00741)
coh_1988	9.929***	9.947***	9.894***	9.471***	9.494***	9.358***
	(0.00265)	(0.00345)	(0.00409)	(0.00385)	(0.00461)	(0.00753)
coh_1989	9.928***	9.935***	9.903***	9.464***	9.478***	9.359***
	(0.00292)	(0.00384)	(0.00446)	(0.00399)	(0.00486)	(0.00768)
coh_1990	9.948***	9.960***	9.924***	9.463***	9.479***	9.366***
	(0.00324)	(0.00422)	(0.00495)	(0.00418)	(0.00516)	(0.00787)
coh_1991	9.973***	9.996***	9.938***	9.466***	9.491***	9.352***
	(0.00365)	(0.00474)	(0.00555)	(0.00444)	(0.00547)	(0.00824)
coh_1992	9.980***	9.990***	9.978***	9.459***	9.476***	9.359***
	(0.00417)	(0.00550)	(0.00652)	(0.00481)	(0.00603)	(0.00860)
coh_1993	10.00***	10.03***	9.993***	9.461***	9.469***	9.376***
	(0.00522)	(0.00663)	(0.00793)	(0.00563)	(0.00720)	(0.00976)
age_25	-0.512***	-0.495***	-0.525***	-0.408***	-0.395***	-0.425***
	(0.00174)	(0.00229)	(0.00264)	(0.00154)	(0.00204)	(0.00229)
age_26	-0.428***	-0.417***	-0.427***	-0.356***	-0.350***	-0.359***
	(0.00161)	(0.00211)	(0.00244)	(0.00138)	(0.00184)	(0.00204)
age_27	-0.362***	-0.360***	-0.361***	-0.316***	-0.315***	-0.312***
	(0.00151)	(0.00199)	(0.00230)	(0.00127)	(0.00168)	(0.00187)
age_28	-0.307***	-0.307***	-0.298***	-0.280***	-0.280***	-0.281***
	(0.00145)	(0.00192)	(0.00219)	(0.00119)	(0.00159)	(0.00178)
age_29	-0.264***	-0.263***	-0.257***	-0.248***	-0.248***	-0.249***
	(0.00140)	(0.00186)	(0.00214)	(0.00114)	(0.00151)	(0.00168)
age_30	-0.221***	-0.218***	-0.214***	-0.221***	-0.216***	-0.224***
	(0.00136)	(0.00179)	(0.00208)	(0.00110)	(0.00143)	(0.00164)
age_31	-0.180***	-0.183***	-0.176***	-0.191***	-0.189***	-0.193***
	(0.00134)	(0.00176)	(0.00209)	(0.00107)	(0.00139)	(0.00163)
age_32	-0.148***	-0.152***	-0.143***	-0.163***	-0.164***	-0.170***

Table 35A: continued

	(0.00134)	(0.00173)	(0.00210)	(0.00105)	(0.00135)	(0.00164)
age_33	-0.123***	-0.122***	-0.116***	-0.139***	-0.143***	-0.145***
	(0.00134)	(0.00173)	(0.00214)	(0.00104)	(0.00133)	(0.00162)
age_34	-0.0890***	-0.0934***	-0.0914***	-0.114***	-0.117***	-0.124***
	(0.00133)	(0.00169)	(0.00213)	(0.00103)	(0.00130)	(0.00165)
age_35	-0.0679***	-0.0715***	-0.0628***	-0.0917***	-0.0949***	-0.101***
	(0.00133)	(0.00169)	(0.00216)	(0.00103)	(0.00129)	(0.00164)
age_36	-0.0464***	-0.0477***	-0.0459***	-0.0705***	-0.0721***	-0.0816***
	(0.00135)	(0.00169)	(0.00221)	(0.00103)	(0.00128)	(0.00167)
age_37	-0.0267***	-0.0247***	-0.0294***	-0.0522***	-0.0528***	-0.0636***
	(0.00136)	(0.00169)	(0.00225)	(0.00104)	(0.00128)	(0.00169)
age_38	0.000344	0.00311*	-0.00910***	-0.0257***	-0.0286***	-0.0398***
	(0.00135)	(0.00167)	(0.00227)	(0.00103)	(0.00127)	(0.00172)
age_39	0.0183***	0.0190***	0.0135***	-0.00701***	-0.00757***	-0.0151***
	(0.00136)	(0.00169)	(0.00229)	(0.00104)	(0.00126)	(0.00170)
age_40	0.0399***	0.0413***	0.0362***	0.0154***	0.0129***	0.00814***
	(0.00138)	(0.00171)	(0.00231)	(0.00105)	(0.00126)	(0.00172)
age_41	0.0573***	0.0570***	0.0553***	0.0367***	0.0332***	0.0304***
	(0.00139)	(0.00172)	(0.00232)	(0.00104)	(0.00128)	(0.00174)
age_42	0.0754***	0.0794***	0.0663***	0.0562***	0.0585***	0.0525***
	(0.00139)	(0.00173)	(0.00236)	(0.00105)	(0.00126)	(0.00175)
age_43	0.0930***	0.0925***	0.0886***	0.0757***	0.0735***	0.0728***
	(0.00141)	(0.00175)	(0.00238)	(0.00105)	(0.00129)	(0.00176)
age_44	0.110***	0.114***	0.101***	0.0958***	0.0976***	0.0917***
	(0.00142)	(0.00176)	(0.00241)	(0.00108)	(0.00129)	(0.00181)
age_45	0.128***	0.129***	0.124***	0.116***	0.115***	0.116***
	(0.00144)	(0.00178)	(0.00244)	(0.00108)	(0.00132)	(0.00183)
age_46	0.148***	0.146***	0.137***	0.137***	0.138***	0.137***
	(0.00145)	(0.00179)	(0.00244)	(0.00109)	(0.00131)	(0.00183)
age_47	0.163***	0.167***	0.160***	0.155***	0.159***	0.159***
	(0.00147)	(0.00180)	(0.00247)	(0.00110)	(0.00131)	(0.00185)
age_48	0.182***	0.183***	0.181***	0.177***	0.177***	0.183***
	(0.00147)	(0.00182)	(0.00247)	(0.00110)	(0.00133)	(0.00188)
age_49	0.202***	0.198***	0.202***	0.199***	0.198***	0.206***
	(0.00149)	(0.00182)	(0.00247)	(0.00111)	(0.00133)	(0.00188)
age_50	0.220***	0.214***	0.219***	0.219***	0.217***	0.226***
	(0.00151)	(0.00186)	(0.00255)	(0.00113)	(0.00136)	(0.00191)
age_51	0.233***	0.231***	0.240***	0.239***	0.237***	0.253***
	(0.00154)	(0.00188)	(0.00260)	(0.00115)	(0.00138)	(0.00192)
age_52	0.254***	0.250***	0.253***	0.262***	0.259***	0.276***
	(0.00155)	(0.00191)	(0.00266)	(0.00117)	(0.00141)	(0.00198)
age_53	0.265***	0.261***	0.273***	0.279***	0.279***	0.298***
	(0.00160)	(0.00194)	(0.00271)	(0.00120)	(0.00142)	(0.00205)
age_54	0.284***	0.278***	0.288***	0.299***	0.298***	0.325***
	(0.00165)	(0.00201)	(0.00286)	(0.00125)	(0.00149)	(0.00215)
age_55	0.300***	0.289***	0.318***	0.321***	0.319***	0.348***
	(0.00178)	(0.00218)	(0.00303)	(0.00135)	(0.00162)	(0.00225)
per_2005	-0.0476***	-0.0488***	-0.0437***	-0.0322***	-0.0301***	-0.0399***
	(0.000910)	(0.00112)	(0.00156)	(0.000726)	(0.000870)	(0.00123)
per_2006	-0.0409***	-0.0465***	-0.0453***	-0.0272***	-0.0229***	-0.0352***
	(0.000897)	(0.00111)	(0.00154)	(0.000710)	(0.000852)	(0.00120)
per_2007	-0.0332***	-0.0311***	-0.0372***	-0.0188***	-0.0137***	-0.0223***
	(0.000901)	(0.00111)	(0.00153)	(0.000758)	(0.000916)	(0.00128)
per_2008	0.0201***	0.0236***	0.0156***	0.0298***	0.0317***	0.0285***

Table 35A: continued

	(0.000890)	(0.00110)	(0.00149)	(0.000692)	(0.000844)	(0.00115)
per_2009	0.0632***	0.0614***	0.0686***	0.0497***	0.0443***	0.0600***
	(0.000911)	(0.00115)	(0.00148)	(0.000696)	(0.000863)	(0.00113)
per_2010	0.0474***	0.0453***	0.0512***	0.0344***	0.0303***	0.0441***
	(0.000924)	(0.00117)	(0.00150)	(0.000713)	(0.000886)	(0.00115)
per_2011	0.0286***	0.0331***	0.0298***	0.0136***	0.0102***	0.0191***
	(0.000930)	(0.00117)	(0.00149)	(0.000725)	(0.000902)	(0.00117)
per_2012	0.0230***	0.0251***	0.0224***	0.000682	-0.00340***	0.00467***
	(0.000966)	(0.00122)	(0.00155)	(0.000739)	(0.000922)	(0.00117)
per_2013	-0.00140	0.00171	-0.00127	-0.0240***	-0.0271***	-0.0213***
	(0.00102)	(0.00131)	(0.00163)	(0.000775)	(0.000976)	(0.00122)
per_2014	0.00537***	0.00722***	0.00283*	-0.00561***	-0.00675***	-0.00632***
	(0.00103)	(0.00133)	(0.00165)	(0.000777)	(0.000980)	(0.00124)
per_2015	-0.00352***	-0.00411***	-0.00190	-0.00321***	-0.00420***	-0.00259**
	(0.00102)	(0.00130)	(0.00163)	(0.000763)	(0.000961)	(0.00121)
per_2016	-0.000128	-0.00239*	0.00624***	0.00520***	0.00473***	0.00606***
	(0.000981)	(0.00125)	(0.00157)	(0.000734)	(0.000923)	(0.00117)
per_2017	-0.0207***	-0.0222***	-0.0244***	-0.0119***	-0.00909***	-0.0156***
	(0.000957)	(0.00121)	(0.00155)	(0.000726)	(0.000905)	(0.00117)
per_2018	-0.0358***	-0.0381***	-0.0353***	-0.0250***	-0.0224***	-0.0279***
	(0.000931)	(0.00117)	(0.00151)	(0.000717)	(0.000897)	(0.00114)
per_2019	-0.00448***	-0.00415***	-0.00750***	0.0145***	0.0184***	0.00885***
	(0.000892)	(0.00113)	(0.00145)	(0.000677)	(0.000850)	(0.00109)
spanish_n				0.0745***	0.106***	0.0505***
				(0.00137)	(0.00175)	(0.00217)
abroad				-0.111***	-0.120***	-0.102***
				(0.00108)	(0.00141)	(0.00164)
v.t.				0.0876***	0.0813***	0.0986***
				(0.000534)	(0.000647)	(0.000898)
p.comp_educ				0.0567***	0.0449***	0.0797***
				(0.000750)	(0.000951)	(0.00118)
university_ed				0.104***	0.0882***	0.136***
				(0.000737)	(0.000986)	(0.00111)
Aragón				0.0518***	0.0718***	0.0409***
				(0.00129)	(0.00158)	(0.00213)
Asturias				0.0338***	0.0776***	-0.0206***
				(0.00149)	(0.00178)	(0.00240)
I_Baleares				0.0119***	0.0246***	0.0270***
				(0.00138)	(0.00179)	(0.00213)
I_Canarias				-0.0585***	-0.0741***	-0.0182***
				(0.00115)	(0.00147)	(0.00178)
Cantabria				0.0369***	0.0594***	0.0207***
				(0.00185)	(0.00229)	(0.00298)
C.-LaMancha				0.00174	0.00745***	0.00529**
				(0.00119)	(0.00141)	(0.00211)
CastillayLeón				0.00866***	0.0180***	0.00454***
				(0.00104)	(0.00127)	(0.00175)
Cataluña				0.0897***	0.112***	0.0853***
				(0.000751)	(0.000917)	(0.00125)
Extremadura				-0.0664***	-0.0783***	-0.0410***
				(0.00174)	(0.00214)	(0.00303)
Galicia				-0.0509***	-0.0275***	-0.0523***
				(0.00101)	(0.00124)	(0.00164)
C. Madrid				0.0375***	0.0458***	0.0427***

Table 35A: continued

	(0.000774)	(0.000964)	(0.00127)
Murcia	-0.00848***	-0.00687***	-0.00393
	(0.00137)	(0.00162)	(0.00242)
Navarra	0.164***	0.183***	0.156***
	(0.00162)	(0.00193)	(0.00269)
P. Vasco	0.192***	0.200***	0.189***
	(0.00102)	(0.00123)	(0.00173)
La Rioja	0.0589***	0.0624***	0.0728***
	(0.00228)	(0.00279)	(0.00377)
C. Valenciana	-0.00444***	-0.00126	0.00757***
	(0.000872)	(0.00107)	(0.00145)
CeutaMelilla	0.0999***	0.0748***	0.126***
	(0.00510)	(0.00605)	(0.00883)
temporary	-0.390***	-0.419***	-0.355***
	(0.000665)	(0.000841)	(0.00107)
exp	-0.00425***	-0.00602***	-0.00426***
	(3.86e-05)	(4.96e-05)	(6.01e-05)
agriculture	0.171***	0.191***	0.128***
	(0.00284)	(0.00316)	(0.00632)
construction	0.160***	0.160***	0.109***
	(0.00290)	(0.00322)	(0.00664)
trade	0.00228	0.0561***	-0.0282***
	(0.00285)	(0.00319)	(0.00631)
tourism	-0.0949***	-0.0752***	-0.0116*
	(0.00292)	(0.00333)	(0.00638)
transport	0.0843***	0.0847***	0.0911***
	(0.00293)	(0.00326)	(0.00653)
health	0.0309***	0.0943***	0.0527***
	(0.00293)	(0.00349)	(0.00633)
education	-0.116***	-0.0620***	-0.106***
	(0.00307)	(0.00377)	(0.00645)
financial	0.265***	0.256***	0.307***
	(0.00296)	(0.00337)	(0.00642)
s_company	-0.0184***	0.00345	-0.00226
	(0.00288)	(0.00325)	(0.00633)
o_services	0.00698**	0.0572***	-0.0102
	(0.00293)	(0.00331)	(0.00639)
med_manual	0.121***	0.111***	0.108***
	(0.000955)	(0.00115)	(0.00163)
high_manual	0.216***	0.179***	0.163***
	(0.000848)	(0.00101)	(0.00166)
low_noman	0.107***	0.0777***	0.193***
	(0.000941)	(0.00131)	(0.00143)
med_noman	0.367***	0.357***	0.408***
	(0.000886)	(0.00111)	(0.00143)
high_noman	0.601***	0.536***	0.687***
	(0.00102)	(0.00130)	(0.00162)
10-19	0.100***	0.0938***	0.0928***
workers			
	(0.000747)	(0.000900)	(0.00128)
20-49	0.151***	0.150***	0.138***
workers			
	(0.000673)	(0.000820)	(0.00114)
50-249 w.	0.224***	0.233***	0.201***

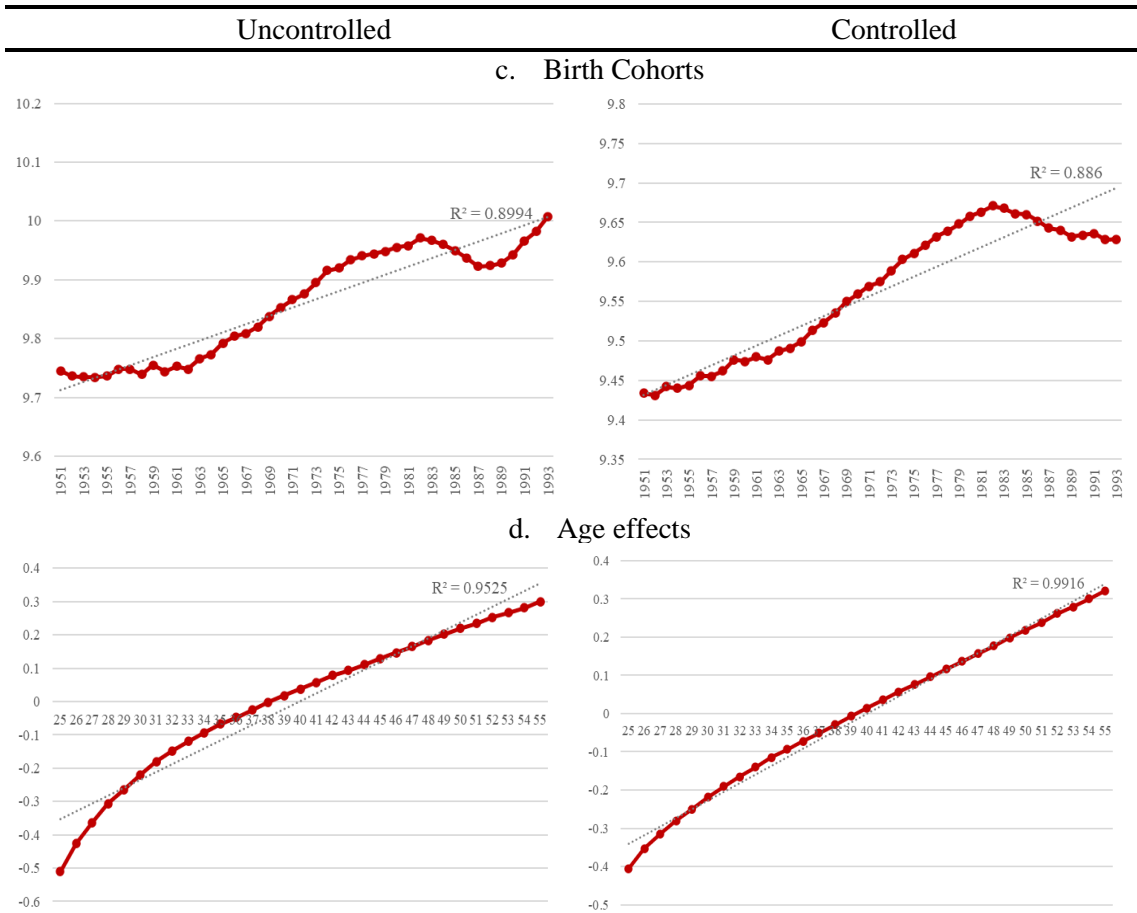
Table 35A: continued

				(0.000626)	(0.000780)	(0.00102)
250-499				0.290***	0.298***	0.276***
workers						
				(0.000836)	(0.00105)	(0.00133)
>500 workers				0.349***	0.347***	0.340***
				(0.000701)	(0.000898)	(0.00109)
Observations	4,397,415	2,744,283	1,654,727	4,234,972	2,629,794	1,604,670

Notes: this table displays the trended age-period-cohort effects using as dependent variable the logarithm of annual earnings. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

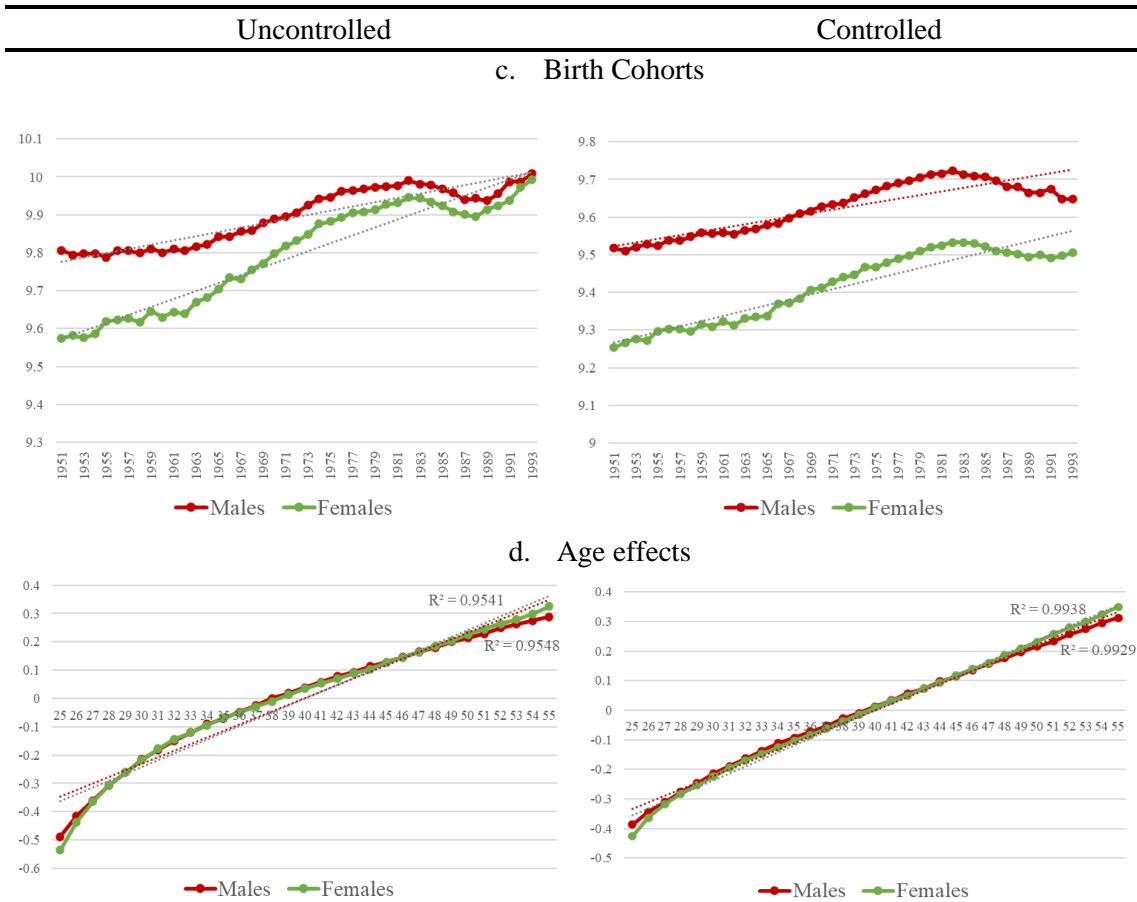
ANNEX 8: Trended age-period-cohort effects on annual earnings (graphics)

Figure 21A: Results of APCT-Lag model on annual earnings without and with controls



Note: Results of APCT-Lag Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCT-Lag coefficient and horizontal axis shows each APC component. As the period coefficients of the APCT-Lag model are the same as those obtained in the APCD model, we do not show them in the figure.

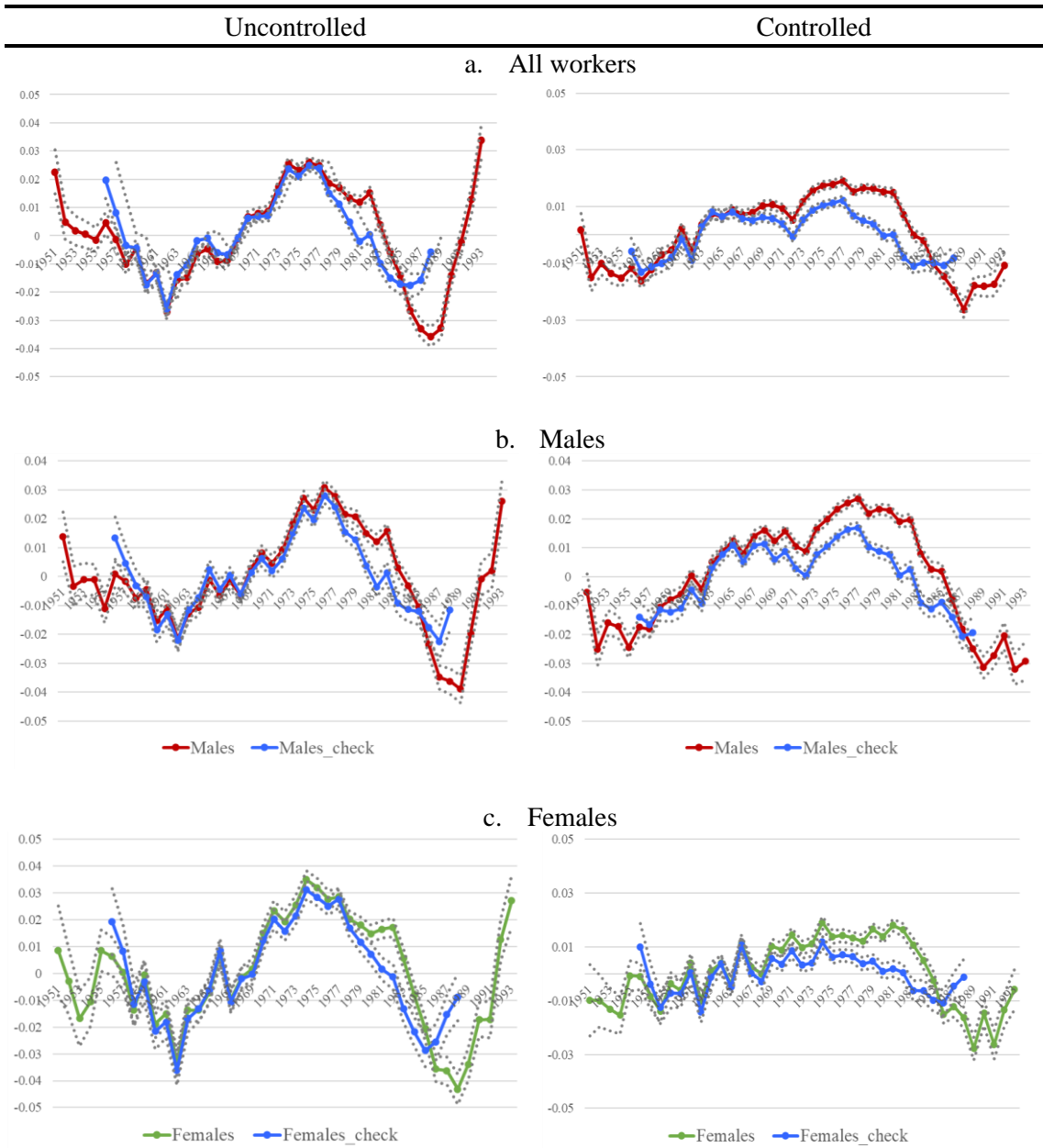
Figure 22A: Results of APCT-Lag model on annual earnings without and with controls by gender



Note: Results of APCT-Lag Model (solid lines). Controlled model is adjusted by education, nationality, country of birth, region of residence, economic activity, temporary contract, experience, contribution group and firm size. Vertical axis shows APCT-Lag coefficient and horizontal axis shows each APCD component. As the period coefficients of the APCT-Lag model are the same as those obtained in the APCD model, we do not show them in the figure.

ANNEX 9: Detrended age-period-cohort effects – age span

Figure 23A: Results of APCD model on monthly earnings with narrower age span

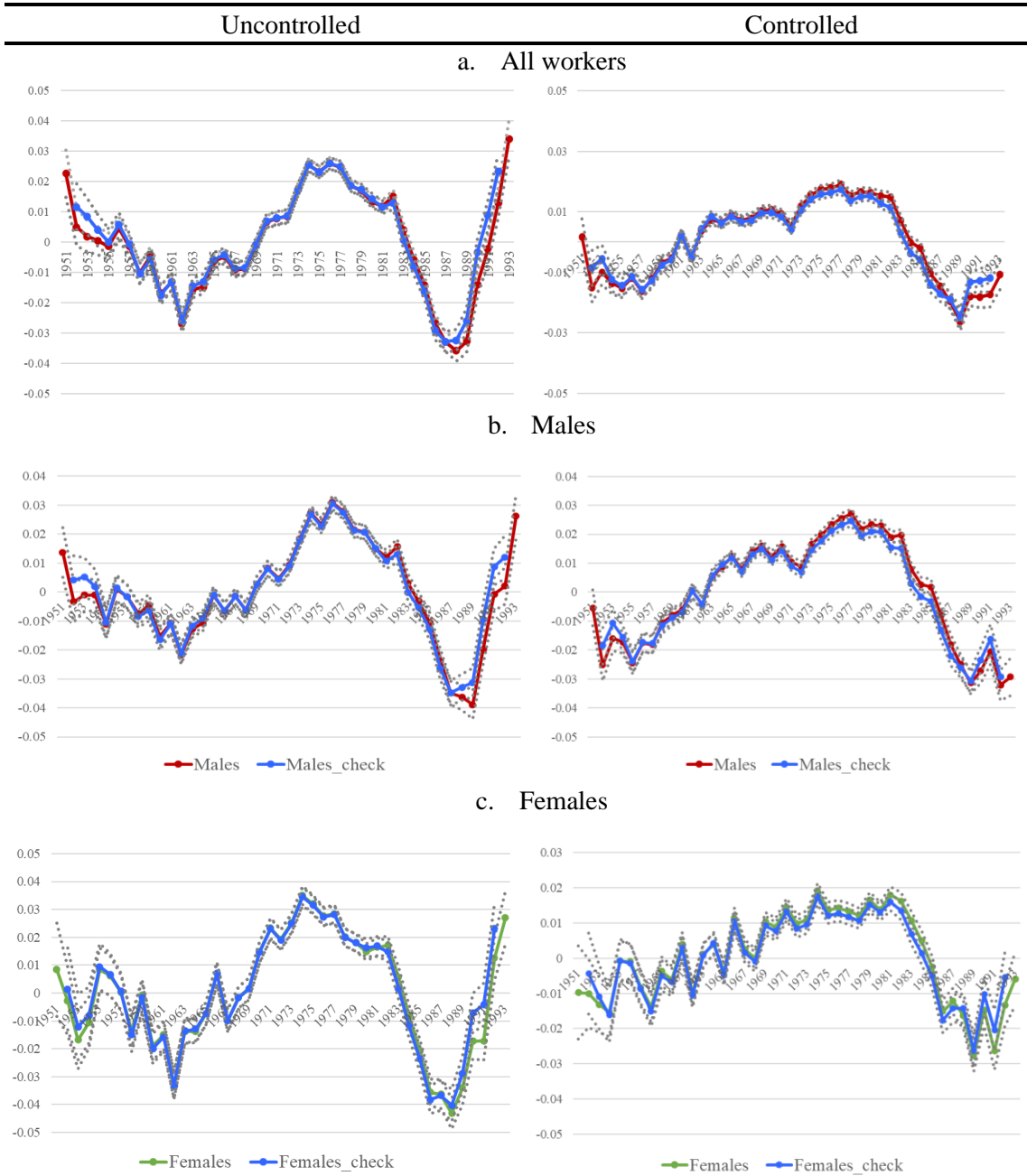


Note: Results of APCD Model (solid lines). Blue lines show the results of APCD model on monthly earnings with narrower age span.



ANNEX 10: Detrended age-period-cohort effects – cohort span

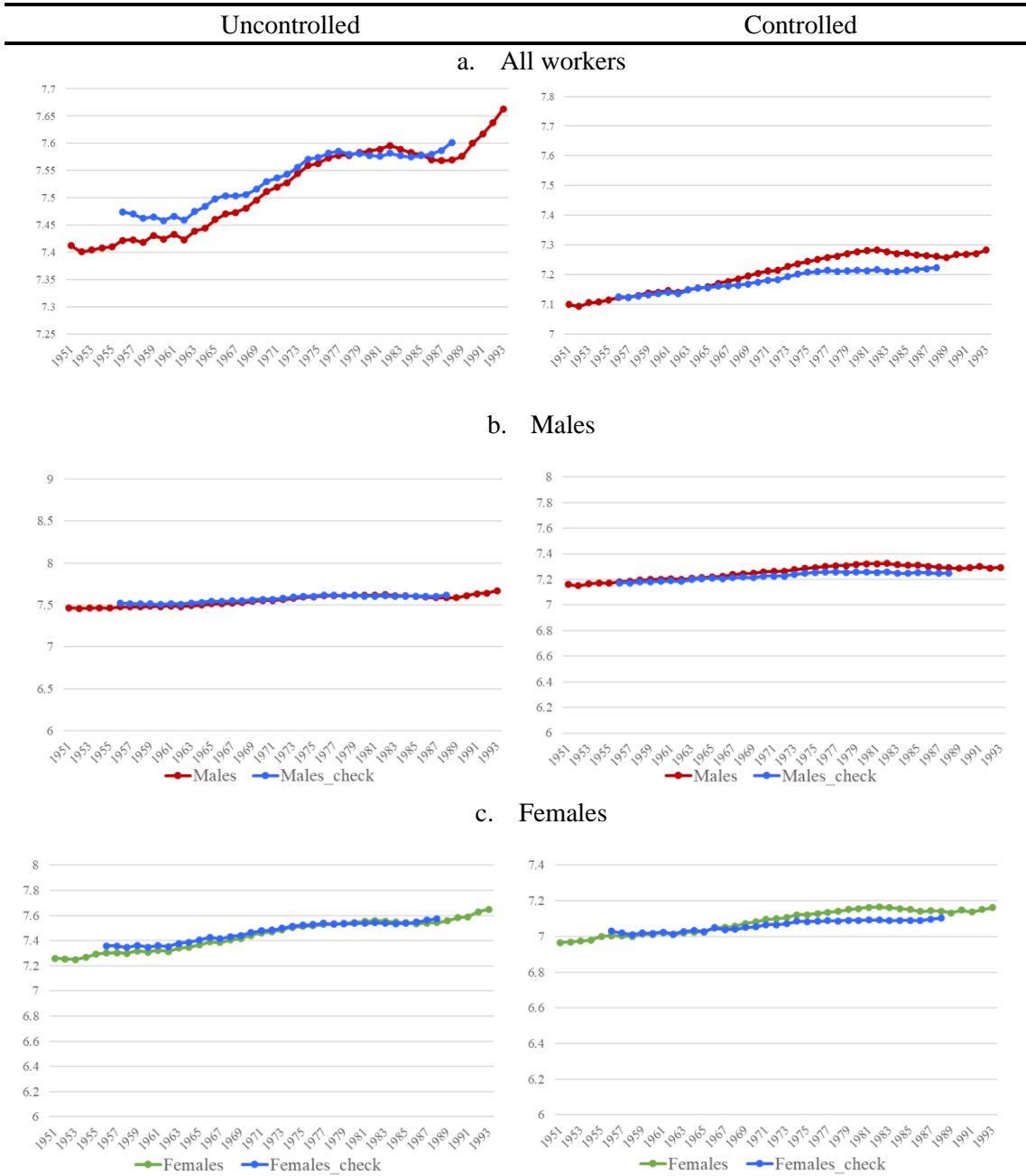
Figure 24A: Results of APCD model on monthly earnings with narrower cohort span



Note: Results of APCD Model (solid lines). Blue lines show the results of APCD model on monthly earnings with narrower cohort span.

ANNEX 11: Trended age-period-cohort effects – age span

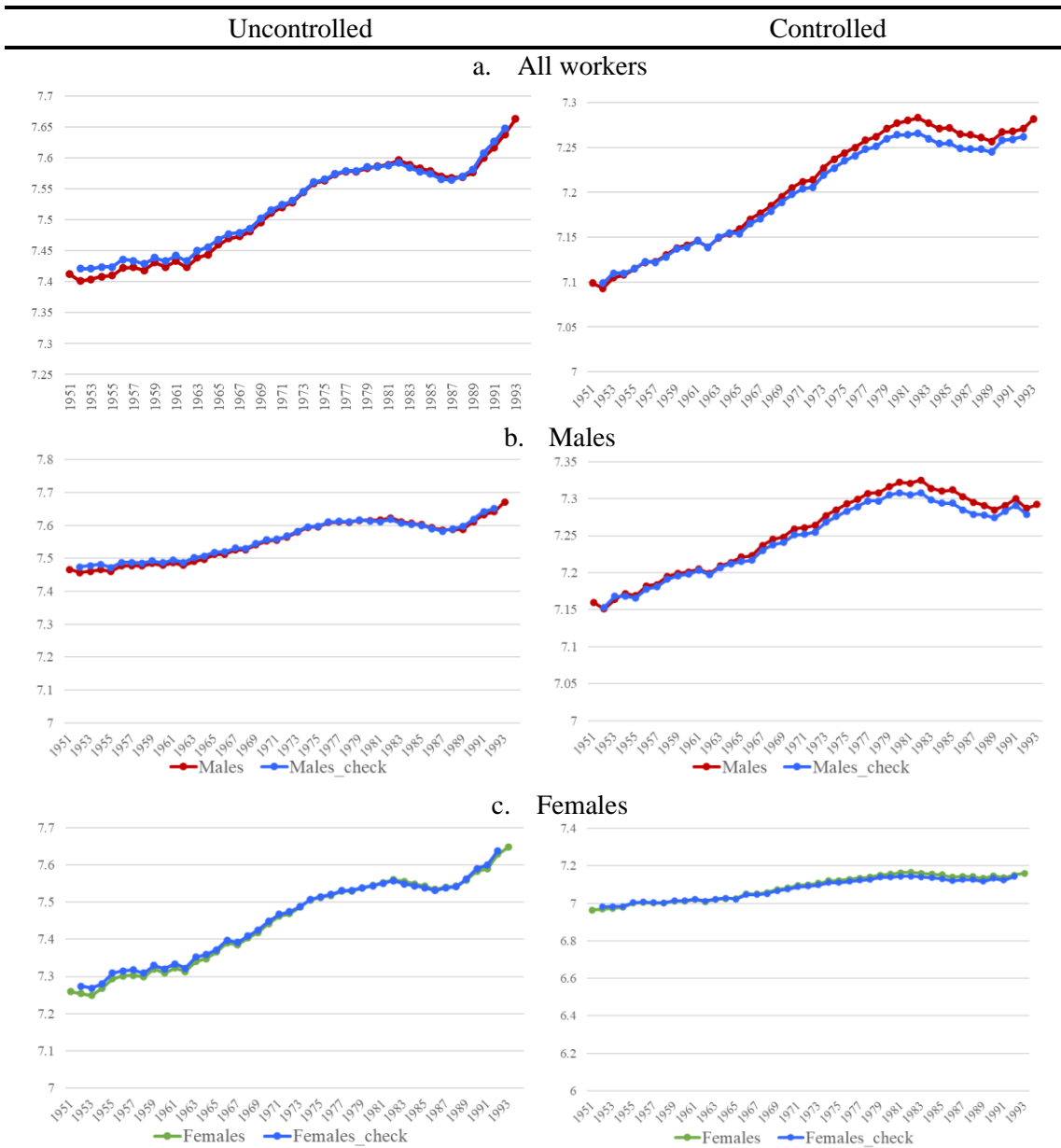
Figure 25A: Results of APCT-Lag model on monthly earnings with narrower age span



Note: Results of APCT-Lag Model (solid lines). Blue lines show the results of APCT-lag model on monthly earnings with narrower age span.

ANNEX 12: Trended age-period-cohort effects – cohort span

Figure 26A: Results of APCT-Lag model on monthly earnings with narrower cohort span



Note: Results of APCT-Lag Model (solid lines). Blue lines show the results of APCT-lag model on monthly earnings with narrower age span.

ANNEX 13: Minimum and maximum limit of the contribution bases

Table 36A: Minimum and maximum limit of the contribution bases

YEAR	Contribution base	
	Min.	Max.
2005	598.50	2,813.40
2006	631.20	2,897.70
2007	665.70	2,996.10
2008	699.90	3,074.10
2009	728.10	3,166.20
2010	738.90	3,198.00
2011	784.20	3,230.10
2012	748.20	3,262.50
2013	753.00	3,425.70
2014	753.00	3,597.00
2015	756.60	3,606.00
2016	764.40	3,642.00
2017	825.60	3,751.20
2018	858.60	3,751.20
2019	1,050.00	4,070.10

Notes: although the minimum and maximum limits of the contribution base depend on the General Regime and the contribution group, this table presents, as a guide, the minimum and maximum contribution bases in each year, between 2005-2019, for the General Regime.